VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

An Autonomous Institution

Aziznagar Gate, C.B. Post, Hyderabad – 500075, Telangana, India.

B.Tech Syllabus (R-18)

Department of

Electrical & Electronics Engineering

COURSE STRUCTURE FOR B.TECH I YEAR

B. Tech. I Year I Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1.	A21001	Mathematics-I	3	1	0	4.0
2.	A21002	Chemistry	3	1	0	4.0
3.	A21004	Chemistry Lab	0	0	3	1.5
4.	A21501	English	2	0	0	2.0
5.	A21081	English Language Skills Lab (ELSL)	0	0	2	1.0
6.	A21083	Programming for Problem Solving-I	2	0	0	2.0
7.	A21381	Programming for Problem Solving Lab-I	0	0	2	1.0
8.	A21581	Engineering Workshop	0	1	3	2.5
Total			**10**	**3**	**10**	**18**

B. Tech. I Year II Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1.	A22006	Mathematics-II	3	1	0	4.0
2.	A22007	Engineering Physics	3	1	0	4.0
3.	A22302	Engineering Physics Lab	0	0	3	1.5
4.	A22202	Basic Electrical Engineering	3	0	0	3.0
5.	A22502	Basic Electrical Engineering Lab	0	0	2	1.0
6.	A22084	Engineering Graphics & Modeling	1	0	3	2.5
7.	A22282	English Communication Skills Lab (ECSL)	0	0	2	1.0
8.	A22085	Programming for Problem Solving-II	2	0	0	2.0
9	A22582	Programming for Problem Solving Lab-II	0	0	2	1.0
Total			**12**	**2**	**12**	**20**

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Course Category	Course Title	L	T	P	Credits
1	A23011	Complex Analysis & Fourier Transforms	3	0	0	3
2	A23010	Professional Communication	2	0	0	2
3	A23203	Power Systems –I	3	0	0	3
4	A23204	Network Analysis	3	0	0	3
5	A23205	Electro Magnetic Fields	3	0	0	3
6	A23206	Electrical Machines-I	3	0	0	3
7	A23283	Basic Simulation Tools Lab	0	0	0	1
8	A23284	Electric Circuits Lab	0	0	0	1
9	A23MC1	Environmental Science	2	0	0	0
		Total	**19**	**0**	**4**	**19**

B. Tech. EEE II Year II Semester

S. No.	Course Category	Course Title	L	T	P	Credits
1	A24014	Numerical Methods and Partial Differential Equations	3	0	0	3
2	A24109	Fluid Mechanics and Hydraulic Machinery	3	0	0	3
3	A24406	Electronic Devices and Circuits	3	0	0	3
4.	A24208	Electrical Machines-II	4	0	0	4
5	A24209	Power Systems - II	3	0	0	3
6	A24210	Control Systems	3	0	0	3
7	A24285	Electrical Machines-I Lab	0	0	2	1
8	A24484	Electronic Devices and Circuits Lab	0	0	2	1
9	A24MC1	Gender Sensitization	2	0	0	0
		Total	**21**	**0**	**4**	0

COURSE STRUCTURE FOR B.TECH III YEAR

B. Tech. EEE III Year I Semester

S.No	Course Category	Course Title	L	T	P	Credits
1	A25016	Managerial Economics and Financial Analysis	3	0	0	3
2	A25412	Switching Theory and Logic Design	3	0	0	3
3	A25212	Electrical Machines-III	3	0	0	3
4	A25213	Power Electronics	3	0	0	3
5	A25214/ A25215	Electrical Energy Conservation and Auditing/ Electrical Estimation and Costing	3	0	0	3
6	A25216/ A25217	Non-Conventional Energy Sources / Fundamentals of Electrical Power Generation and Protection	3	0	0	3
7	A25287	Electrical Machines-II Lab	0	0	2	1
8	A25087	Advanced Communication Skills Lab	0	0	2	1
9	A25TP1	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech. EEE III Year II Semester

S.No	Course Category	Course Title	L	T	P	Credits
1	A26219	Electrical Measurements & Instrumentation	3	0	0	3
2	A26220	Computer Methods in Power Systems	3	0	0	3
3	A26221	Power Semiconductor Drives	3	0	0	3
4	A26222	Switch Gear and Protection	3	0	0	3
5	A26223/ A26224	Integrated Circuit and Applications/ Artificial Intelligence Techniques in Electrical Engineering	3	0	0	3
6	A26225/ A26226	Energy Auditing and Conservation/ Principles of Electric Power Utilization	3	0	0	3
7	A26288	Control Systems and Simulation Lab	0	0	2	1
8	A26289	Power Electronics and Simulation Lab	0	0	2	1
9	A26TP1	Personality Development &Behavioral Skills	2	0	0	1
		Total	**20**	**0**	**4**	**21**

COURSE STRUCTURE FOR B.TECH IV YEAR

B. Tech. EEE IV Year I Semester

S.No	Course Category	Course Title	L	T	P	Credits
1	A27428	Microprocessors and Interfacing Devices	3	0	0	3
2	A27227	Power Systems Operation and Control	3	0	0	3
3	A27228/ A27229	Electric Vehicles / Smart Grids	3	0	0	3
4	A27230/ A27231	Electrical Distribution Systems/ Industrial Electrical Systems	3	0	0	3
5	A27232/ A27233	Electric Vehicles and Hybrid Vehicles/ Energy Storage Systems	3	0	0	3
6	A27490	Microprocessors and Interfacing Lab	0	0	2	1
7	A27290	Electrical Measurements Lab	0	0	2	1
8	A272P1	Mini Project	0	0	0	3
Total			**15**	**0**	**4**	**20**

B. Tech. EEE IV Year II Semester

S.No	Course Category	Course Title	L	T	P	Credits
1	A28234	Utilization of Electrical Energy	3	0	0	3
2	A28235	Renewable Energy and Energy Storage Technologies	3	0	0	3
3	A282TS	Technical Seminar	2	0	0	2
4	A282CV	Comprehensive Viva-Voce	0	0	0	2
5	A282P2	Major Project	0	0	0	10
Total			**8**	**0**	**0**	**20**

COURSE STRUCTURE (for FAST TRACK)

B. Tech. III Year I Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1	H&S – 6	Managerial Economics and Financial Analysis	3	0	0	3
2	ES – 9	Switching Theory and Logic Design	3	0	0	3
3	PC – 8	Electrical Machines-III	3	0	0	3
4	PC – 9	Power Electronics	3	0	0	3
5	PE – 1	Electrical Energy Conservation and Auditing/ Electrical Estimation and Costing	3	0	0	3
6	OE – 1	Non-Conventional Energy Sources / Fundamentals of Electrical Power Generation and Protection	3	0	0	3
7	PC Lab – 5	Electrical Machines -II Lab	0	0	2	1
8	PC Lab – 6	Advanced Communication Skills Lab	0	0	2	1
9	MC – 3	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech. III Year IISemester

S.No.	Course Category	Course Title	L	T	P	Credits
1	PC – 10	Electrical Measurements & Instrumentation	3	0	0	3
2	PC – 11	Computer Methods in Power Systems	3	0	0	3
3	PC – 12	Power Semiconductor Drives	3	0	0	3
4	PC – 13	Switch Gear and Protection	3	0	0	3
5	PE – 2	Integrated Circuit and Applications / Artificial Intelligence Techniques in Electrical Engineering	3	0	0	3
6	OE – 2	Energy Auditing and Conservation/ Principles of Electric Power Utilization	3	0	0	3
7	PC Lab – 7	Control Systems and Simulation Lab	0	0	2	1
8	PC Lab – 8	Power Electronics and Simulation Lab	0	0	2	1
9	MC – 4	Personality Development &Behavioural Skills	2	0	0	1
10	PC -16	Utilization of Electrical Energy	3	0	0	3
		Total	**23**	**0**	**4**	**24**

COURSE STRUCTURE (for FAST TRACK)

B. Tech. IVYear ISemester

S. No.	Course Category	Course Title	L	T	P	Credits
1	PC -14	Microprocessors and Interfacing Devices	3	0	0	3
2	PC -15	Power Systems Operation and Control	3	0	0	3
3	PE - 3	Electric Vehicles/ Smart Grids	3	0	0	3
4	PE – 4	Electrical Distribution Systems/ Industrial Electrical Systems	3	0	0	3
5	OE-3	Electric Vehicles and Hybrid Vehicles/ Energy Storage Systems	3	0	0	3
6	PC Lab – 9	Microprocessors and Interfacing Lab	0	0	2	1
7	PC Lab – 10	Electrical Measurements Lab	0	0	2	1
8	PW-1	Mini Project		0	0	3
9	PC - 17	Renewable Energy and Energy Storage Technologies	3	0	0	3
Total			**18**	**0**	**4**	**23**

B. Tech. IV Year II Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1	TS	Technical Seminar	2	0	0	2
2	CVV	Comprehensive Viva-Voce	0	0	0	2
3	PW-2	Major Project	0	0	0	10
Total			**2**	**0**	**0**	**14**

MATHEMATICS I
(Matrices and Calculus)

I Year I Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
3. Analyze the convergence of sequence and series.
4. Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
5. Examine the extreme of functions of two variables with/ without constraints.

UNIT-I:
Matrices and Linear System of Equations:
Matrices and Linear system of equations: Real matrices – Symmetric, skew - symmetric, Orthogonal. Complex matrices: Hermitian, Skew – Hermitian and Unitary. Rank-Echelon form, Normal form. Solution of Linear Systems – Gauss Elimination, Gauss Jordan & LU Decomposition methods.

UNIT-II:
Eigen Values and Eigen Vectors:
Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonolization of matrix- Quadratic forms: Reduction to Canonical form, Nature, Index, Signature.

UNIT-III:
Sequences & Series:
Basic definitions of Sequences and series, Convergence and divergence, Ratio test, Comparison test, Cauchy's root test, Raabe's test, Integral test, Absolute and conditional convergence.

UNIT-IV:
Beta & Gamma Functions and Mean Value Theorems:
Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.
Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized Mean Value theorem (all theorems without proof) – Geometrical interpretation of Mean value theorems.

UNIT-V:
Functions of Several Variables:
Partial Differentiation and total differentiation, Functional dependence, Jacobian Determinant-Maxima and Minima of functions of two variables with constraints and without constraints, Method of Lagrange Multipliers.

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain &Iyengar, Narosa Publications.

Reference Books:

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9^{th} Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2^{nd} Edition), Michael D. Greenberg.

CHEMISTRY

I Year I Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Acquire knowledge of atomic, molecular and electronic changes related to conductivity.
2. Apply the various processes of treatment of water for both domestic and industrial purpose.
3. Apply the knowledge of electrode potentials for the protection of metals from corrosion.
4. Analyze the major chemical reactions that are used in the synthesis of compounds.
5. Apply the knowledge of polymers in every day's life.

UNIT- I:

Atomic and Molecular Structure:

Introduction, Concept of atomic and molecular orbitals, LCAO, Molecular orbitals of di-atomic molecules, Molecular orbital energy level diagrams of diatomic molecules (N_2, O2 & F_2). Pi-molecular orbitals of butadiene and benzene.

Crystal field theory (CFT): Crystal field theory, Crystal field splitting patterns of transition metal ion d-orbital- tetrahedral, octahedral and square planar geometries.

UNIT- II:

Water Technology:

Hardness of water, expression of hardness ($CaCO_3$ equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler feed water and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (ion –exchange process).

UNIT- III:

Electrochemistry and Corrosion:

Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Calomel electrode and Quinhydrone electrode),Determination of P^H using quinhydrone electrode. Nernst equation, Numerical problems.

Batteries: Introduction to cell and battery, Primary (lithium cell) and secondary cells, (lead-Acid cell, and Lithium ion cells). Fuel cells – Hydrogen – Oxygen fuel cell, advantages and engineering applications of fuel cells.

Corrosion: Introduction, types of corrosion: chemical and electrochemical corrosion, factors affecting the rate of corrosion: nature of the metal, position of metal in galvanic series, purity of metal, nature of corrosion product, nature of environment: effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protectivecoatings: metallic coatings (anodic and cathodic), methods of application on metals, electroplating (of copper), electroless plating (of Ni), organic coatings- paints.

UNIT-IV:

Stereochemistry:

Structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity. Conformations of cyclic (cyclohexane) and acyclic systems (Ethane).

Organic Reactions and Synthesis of a Drug Molecule:

Introduction to reactions involving substitution (SN1 & SN2), addition (addition of HBr to propene, Markownikoff and Anti Markownikoff addition), elimination, oxidation (oxidation of alcoholsusing $KMnO_4$& CrO_3), reduction (reduction of carbonyl compounds by $LiAlH_4$& $NaBH_4$). Synthesis of a commonly used drug molecule- paracetamol and Asprin.

UNIT-V:

Polymer Chemistry:

Introduction, classification of polymers, types of polymerization (addition and condensation, mechanisms not included). Plastics- types of plastics -thermoplastics and thermosetting plastics.Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, Butyl rubber &Thikol rubber. Conducting polymers: classification and applications.

Biodegradable polymers:Types, examples: Polyhydroxy butyrate (PHB) ,Poly-Hydroxybutyrate-co-b-Hydroxyvalerate (PHBV) ,Polyglycolic acid (PGA) , Polylactic acid (PLA) ,Poly (Î-caprolactone) (PCL). Applications of biodegradable polymers.

Textbooks:

1. Engineering Chemistry, P.C Jain & Monica Jain, DhanpatRai Publications, 2017.
2. Engineering Chemistry, BharathiKumari. Y, VGS Publications, 2018.

Reference Books:

1. March's Advanced Organic Chemistry, Smith, Wiley publications, 2017.
2. Engineering Chemistry, Shiva Sankar, TMH Publications, 2010.

CHEMISTRY LAB

I Year I Semester

L	T	P	C
0	0	3	1.5

Course Outcomes:

1. Determination of parameters like hardness, alkalinity and chloride content in water.
2. Estimation of rate constant of a reaction from concentration-time relationships.
3. Determination of physical properties like adsorption, surface tension and viscosity.
4. Synthesize a small drug molecule and analyze a salt sample.
5. Calculation of strength of compound using instrumentation techniques.

Choice of 10-12 experiments from the following:

1. Estimation of total hardness of water by EDTA method.
2. Determination of alkalinity of water.
3. Determination of chloride content of water.
4. Estimation of HCl by conductometric titration.
5. Estimation of mixture of acids by conductometric titration.
6. Estimation of HCl by potentiometric titration.
7. Estimation of Fe^{2+} by potentiometry using $KMnO_4$.
8. Determination of the rate constant of a reaction.
9. Determination of surface tension.
10. Determination of viscosity of a lubricant.
11. Chemical analysis of a salt.
12. Synthesis of a polymer/drug.
13. Adsorption of acetic acid by charcoal.
14. Determination of Saponification /acid value of an oil.

Reference Books:

1. Practical Engineering Chemistry, Mukkanti, B.S. Publications, 2010.
2. Volga's Qualitative Inorganic Chemistry, PEAR Publications 2010.

ENGLISH

I Year I Semester

L	T	P	C
2	0	0	2

Course Outcomes:

1. Infer the importance of scientific discoveries in promoting social responsibilities.
2. Comprehend the given texts and respond appropriately for technical and professional purposes.
3. Communicate confidently and transfer information into various forms of writing.
4. Understand the importance of health and nutrition for a better society.
5. Present various forms of business writing skills for successful careers.

UNIT-I:

'The Raman Effect' from the prescribed textbook **'English for Engineers'**

Grammar : Articles & Prepositions

Reading : Reading and Its Importance- Techniques for Effective Reading.

Writing : Organizing principles of paragraphs in documents.

Vocabulary: The concept of word Formation, synonyms, antonyms, and standard abbreviations.

UNIT-II:

'Ancient Architecture in India' from the prescribed textbook **'English for Engineers'**

Reading : Improving Comprehension Skills – Techniques for good comprehension

Writing :Sentence Structures, Use of phrases and clauses in sentences

Writing Formal Letters-Eg. Letter of Complaint, Letter of Requisition,

Job Application with Resume.

Vocabulary: Root words and acquaintance with prefixes and suffixes from foreign languages in English, to form derivatives

UNIT-III:

'Blue Jeans' from the prescribed textbook **'English for Engineers'**

Grammar: Tenses: Types and uses.

Reading : Sub-skills of Reading- Skimming and Scanning

Writing : Identifying Common Errors in Writing

Subject-Verb agreement in number, gender and person

Information Transfer-Process writing

UNIT-IV:

'What Should You Be Eating' from the prescribed textbook **'English for Engineers'**

Reading : Intensive Reading and Extensive Reading

Writing : Nature and Style of Sensible Writing

Describing & Defining

Identifying common errors in writing

UNIT-V:

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook **'English for Engineers'**

Vocabulary : Technical Vocabulary and their usage

Reading : Reading Comprehension-Exercises for Practice

Writing : Cohesive Devices

Précis Writing

Technical Reports-Introduction, Characteristics of a Report –

Categories of Reports, Formats- Structure of Reports (Manuscript Format) –Types of Reports - Writing a Report.

Textbooks:

1. English for Engineers,Sudarshana, N.P. and Savitha, C. Cambridge University Press, 2018.

Reference Books:

1. Effective Technical communication, Muhammed Rizvi, TMH, 2008.
2. Advanced English Grammar, Hewings, Cambridge University Press, 2010.

ENGLISH LANGUAGE SKILLS LAB

I Year I Semester

L	T	P	C
0	0	2	1

Course Outcomes:

1. Reproduce speech sounds and improve fluency in language.
2. Understand syllables and consonant clusters for appropriate pronunciation.
3. Exhibit effective professional skills with rhetoric eloquence.
4. Deliver enthusiastic and well-practiced presentation.
5. Learn Task-Based Language Learning (TBLL) through various language learning activities effectively.

Exercise-I:
CALL Lab:
Introduction to Pronunciation- Speech Sounds, Vowels and Consonants- Practice for Listening
ICS Lab:
Ice-Breaking activity and JAM session

Exercise-II:
CALL Lab:
Silent Letters, Consonant Clusters, Homographs
ICS Lab:
Common Everyday Situations: Conversations and Dialogues

Exercise-III:
CALL Lab:
Syllables
ICS Lab:
Communication at Workplace, Social and Professional Etiquette

Exercise-IV:
CALL Lab:
Word Accent and Stress Shifts
ICS Lab:
Formal Presentations, Visual Aids in Presentations

Exercise-V:
CALL Lab:
Intonation, Situational dialogues for practice
ICS Lab:
Interviews, Types of Interviews

Reference Books:

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian, Macmillan Publishers, 2010.
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010.

PROGRAMMING FOR PROBLEM SOLVING-I

I Year I Semester

L	T	P	C
2	0	0	2

Course Outcomes:

1. Design Algorithms and Flowcharts for real world applications using ‘C’.
2. Know the usage of various operators in Program development.
3. Design programs involving decision and iteration structures.
4. Apply the concepts code reusability using Functions.
5. Analyze various searching and sorting techniques using Arrays.

UNIT-I:

Problem Solving Using Computers: Introduction, Algorithms, Flowcharts and Pseudo code, Applications of C language.

Overview of C Language: Introduction, Salient Features of C Language, Structure of a “C” Program.

C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input / Output Statements with suitable illustrative “C” Programs.

UNIT-II:

Operators: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative “C” Programs.

UNIT-III:

Statements in C:

Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative “C” Programs.

Loop Control Statements: while, do-while and for with suitable illustrative “C” Programs.

UNIT-IV:

Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, return vs exit (), Parameter Passing mechanism: Call-by-Value, Recursion, Storage Classes.

UNIT-V:

Arrays: Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions.

Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Insertion Sort.

Textbooks:

1. COMPUTER SCIENCE: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

Reference Books:

1. Problem Solving Using C, M.T. Somashekara, PHI, 2nd Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

PROGRAMMING FOR PROBLEM SOLVING LAB – I

I Year I Semester

L	T	P	C
0	0	2	1

Course Outcomes:

1. Apply the specification of syntax rules for numerical constants and variables, data types.
2. Know the Usage of various operators and other C constructs.
3. Design programs on decision and control constructs.
4. Develop programs on code reusability using functions.
5. Implement various searching and sorting techniques using arrays.

Week 1:
Ubuntu and Linux Commands.

Week 2:
Designing of flowcharts and algorithms using raptor tool
1. Areas of Polygons.
2. Calculation of Simple and Compound Interest.
3. Swapping of Two numbers with and without temporary variable.
4. Checking whether a number is even or odd.
5. Sum of first 'n' natural numbers.
6. Checking a number whether it is divisible by any given number.
7. Evaluation of mathematical expressions.
8. Programs using scanf( ) and printf( ) statements.

Week 3:
Programs on operators (Minimum 4 Programs)

Week 4, 5 & 6:
Programs on Conditional Statements. (Minimum 12 Programs)

Week 7,8& 9:
Programs on Control Statements. (Minimum 12 Programs)

Week 10 &11:
Programs on Functions. (Minimum 6 Programs)

Week 12:
Programs on One Dimensional Arrays. (Minimum 3 Programs)

Week 13:
Programs on Two Dimensional Arrays. (Minimum 2 Programs)

Week 14:
Implementation of Linear Search and Binary Search.

Week 15:
Implementation of Bubble Sort and Insertion Sort.

Week 16:
Review

ENGINEERING WORKSHOP

I Year I Semester

L	T	P	C
0	1	3	2.5

Course Outcomes:

1. Understanding the tools and methods of using to fabricate engineering components
2. Applying the measuring techniques to verify the dimensional accuracy
3. Evaluating various methods and trades of workshop in the component building

(i) Lectures & videos:
Detailed contents

1. Manufacturing Methods- Metal Forming, Machining, Advanced manufacturing methods (2 lectures)
2. CNC machining, Additive manufacturing (2 lectures)
3. Fitting operations & power tools (1 lecture)
4. House wiring (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding(1 lecture)
7. Metal casting (1 lecture)
8. Welding (1 Lecture)

(ii) Workshop Practice:
Detailed contents:

1. Machine shop (Lathe machine)
2. Fitting shop
3. Carpentry
4. House Wiring
5. Welding shop (Arc welding)
6. Tin Smithy

Reference Books:

1. Elements of Workshop Technology, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Manufacturing Engineering and Technology, Kalpakjian S. and Steven S. Schmid, 4th edition, Pearson Education India Edition, 2002.

MATHEMATICS - II
(Ordinary Differential Equations and Vector Calculus)

I Year II Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
2. Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
3. Find the Laplace Transform of various functions and apply to find the solutions of differential equations.
4. Evaluate the multiple integrals and identify the vector differential operators physicallyin engineering problems.
5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

UNIT-I:
First order Ordinary Differential Equations and their Applications:
Formation of Differential equations, Differential equations of first order and first degree: exact, linear and Bernoulli, Applications of ODE: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-II:
Higher Order Linear Differential Equations:
Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) $= e^{ax}, \sin ax, \cos ax \; and \; x^k, e^{ax}V(x), x^kV(x)$. Method of variation of parameters.

UNIT-III:
Laplace Transforms:
Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

UNIT-IV:
Multiple Integrals & Vector Differentiation:
Multiple integrals - double and triple integrals – change of order of integration (Only Cartesian form)- change of variables (Cartesian to Polar for double integral, Cartesian to Spherical for triple integral). Gradient- Divergence- Curl and their related properties - Potential function - Laplacian and second order operators.

UNIT-V:
Vector Integration:
Line integral, work done, Surface and Volume integrals. Vector integrals theorems: Green's, Stoke's and Gauss Divergence Theorems (Only Statements & their Verifications).

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain &Iyengar, Narosa Publications.

Reference Books:

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2nd Edition), Michael D. Greenberg.

ENGINEERING PHYSICS

I Year II Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Interpret the forced damped harmonic oscillations and Transverse waves.
2. Identify various optical phenomena of light.
3. Explain the working principle of optical fibers and lasers.
4. Describe the crystalline structures of solids.
5. Classify magnetic and dielectric behavior of materials.

UNIT-I:
Oscillations and Waves:
Simple harmonic motion, equation of simple harmonic motion, Simple Pendulum, Torsional pendulum, damped harmonic motion-heavy, critical and light damping, energy decay in a damped harmonic oscillator, power dissipation, quality factor. Forced vibration, steady state motion of forced damped harmonic oscillator, Amplitude of forced vibration, Resonance, Electrical analogy of simple harmonic oscillator. Transverse waves in a stretched string, differential equation, reflection and transmission of transverse waves at a boundary, standing waves.

UNIT-II:
Wave Optics:
Huygen's principle, superposition of waves, coherence and methods to produce coherent sources, young's double slit experiment, interference by parallel thin film by reflection, Newton's rings. Diffraction: Introduction, Fraunhofer diffraction at single slit, plane diffraction Gratings and its resolving power. Polarization: Introduction, methods of polarization, double refraction- Nicol Prism.

UNIT-III:
Fiber Optics and Lasers:
Introduction, total internal reflection, acceptance angle and numerical aperture, losses associated with optical fibers, step and graded index fibers, applications of optical fibers. Introduction to interaction of radiation with matter: stimulated absorption, spontaneous emission and stimulated emission, Einstein's coefficients and their relation, characteristics of a laser, components of a laser: active medium, pumping source, optical resonator. Population inversion, Construction and working of Ruby laser, He-Ne laser and Semiconductor laser. Applications of lasers.

UNIT-IV:
Crystal Structures, Crystal Planes and XRD:
Space lattice – Unit cell – Lattice parameter – Crystal systems – Bravais lattices, Atomic radius – Co-ordination number - Structures and Packing fractions of Simple Cubic – Body Centered Cubic – Face Centered Cubic crystals. Miller Indices for Crystal planes and directions – Inter planar spacing of orthogonal crystal systems –Diffraction of X-rays by crystal planes and Bragg's law–Powder method – Applications of X-ray diffraction.

UNIT-V:
Dielectric and Magnetic properties of Materials:
Dielectric polarization, permittivity and dielectric constant, polar and non-polar dielectrics, Electronic, Ionic and Orientation Polarization – Calculation of electronic and Ionic Polarizability – Internal fields – Claussius – Mossotti equation – Basic concepts of Piezo, Pyro and Ferro electricity, applications of dielectrics.Introduction to magnetism – Basic definitions - Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – properties of Anti ferro and Ferri magnetic materials, applications.

Textbooks:

1. Engineering Physics, P K Palanisamy, Scietech publication.
2. Engineering Physics, Hitendra K Malik, A K Singh, McGraw Hill Edition (I) Private Limited.

Reference Books:

1. A Text book of Engineering Physics, M N Avadhanulu, P G Kshirsagar; S Chand.
2. Physics Volume I & II, Resnick and Halliday, John Wiley and sons, Inc.

ENGINEERING PHYSICS LAB

I Year II Semester

L	T	P	C
0	0	3	1.5

Course Outcomes:

1. Characterize the mechanical properties of given material.
2. Demonstrate various types of oscillation and rotational motion to determine mechanical parameters.
3. Evaluate the magnetic Induction along the axis of current carrying coil.
4. Apply optical phenomena to characterize optical sources and components.
5. Characterize LCR and RC circuits.

List of Experiments

1. Torsional pendulum: Determination of Rigidity modulus of a material.
2. Fly-wheel: Determination of moment of Inertia.
3. Melde's Experiment: Determination of frequency of electrically maintained tuning fork.
4. Sonometer: Determination of velocity of transverse wave in a string.
5. Newton's rings: Determination of the radius of curvature of the given lens by forming Newton's rings.
6. Diffraction grating: Determination of wavelength of given light using diffraction grating.
7. Dispersive power: Determination of dispersive power of the prism material using spectrometer.
8. Single Slit Diffraction using Lasers- Determination of Wavelength of a Monochromatic Source.
9. Stewart & Gee's experiment: Determination of magnetic field along the axis of current carrying coil.
10. LCR Circuit: Determination of Resonance frequency of forced electrical oscillator.
11. RC- Circuit: Determination of time constant of RC-circuit.
12. Optical Fiber: Determination of Numerical Aperture of Optical Fiber.

Note: Any 10 experiments are to be performed

BASIC ELECTRICAL ENGINEERING

L	T	P	C
3	0	0	3

I Year II Semester

Course Outcomes:

1. Understand the fundamentals of basic circuit components and their characteristics.
2. Analyze basic electrical circuits with A.C excitation.
3. Understand the concepts of magnetic circuits and transformers.
4. Acquire the basic concepts of electrical motors.
5. Understand the concept of A.C generator and low voltage electrical installations.

UNIT I:

Introduction to Electrical Engineering and DC Circuits:

Basic definitions, types of elements, types of sources, Kirchhoff's Laws, resistive networks, inductive networks, series, parallel circuits, Star- Delta and Delta- Star transformation, Network theorems- Superposition, Thevenin's - simple problems.

UNIT II:

AC Circuits:

Representation of sinusoidal waveforms, peak, RMS and average values **-** Elementary treatment of single-phase AC circuits consisting of R, R-L, R-C, R-L-C combinations (series and parallel) **-** Phase representation, real power, reactive power, apparent power, resonance concept. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III:

Magnetic Circuits &Transformers:

Magnetic circuits: Magnetic materials, Faraday's laws of Electromagnetic Induction, BH characteristics, Magnetic Circuits - concept of Self & Mutual Inductance.

Transformers: Ideal and practical single phase transformer, OC-SC tests, equivalent circuit, losses in transformer, regulation and efficiency - simple problems.

UNTI IV:

DC Machines and Induction Motors:

DC Machines: Construction, Principle and Operation of DC Motor, Voltage- torque equations - simple problems.

Three Phase Induction Motor: Construction, Principle and working of three phase Induction Motor, torque slip characteristics, - simple problems.

Single Phase Induction Motor: Single phase Induction Motor construction and working principle, capacitor start - applications

UNIT V:

AC Generator & Electrical Installation:

AC Generator: Construction, Principle of operation of Synchronous Generator, Pitch Factor- Distribution Factor (or winding factor) - EMF equation – simple problems.

Electrical Installation: Fuse, Circuit breakers, difference between fuse and circuit breaker, Types of Batteries, battery backup.

Textbooks:

1. Basic Electrical Engineering, D.P Kothari & I.J Nagrath, Tata McGraw Hill Publishing Company Limited, 2nd Edition.
2. Basic Electrical Engineering, T.K. Nagsarkar and M.S. Sukhija, Oxford University Press, 3rd Edition.

Reference Books:

1. Circuits and Networks, A.Sudhakar&ShyamMohan.S, Tata McGraw Hill Publishing Company limited, 5th Edition.
2. Basic Electrical Engineering, K.Uma Rao and A.Jayalakshmi, Pearson Publications.
3. Basic Electrical Engineering, D C Kulshreshtha, McGraw Hill Education Private limited, 1st Edition.

BASIC ELECTRICAL ENGINEERING LAB

L	T	P	C
0	0	2	1

I Year II Semester

Course Outcomes:

1. Get an exposure to basic electrical laws.
2. Understand the response of different types of electrical circuits to different excitations.
3. Understand the measurement, calculation and relation between the basic electrical parameters.
4. Understand the performance characteristics of D.C electrical machines.
5. Understand the performance characteristics of A.C electrical machines.

List of experiments/ demonstrations:
Any 5 experiments from Part-A and Part-B should be conducted (Total 10 Experiments)

Part A

1. Verification of Ohms law.
2. Verification of KVL and KCL.
3. Verification of Thevenin's Theorem
4. Verification of Superposition Theorem.
5. Transient Response of Series R- L and R - C circuits using DC excitation.
6. Determination and Verification of Impedance and Current of RL and RC series circuits.

Part B

1. Transient Response of R-L-C Series circuit using DC excitation.
2. Load Test on Single Phase Transformer. (Calculate Efficiency and Regulation)
3. OC & SC Test on Single phase transformer
4. Brake test on DC shunt motor
5. Brake test on Three Phase Squirrel cage induction motor.
6. OCC of Three phase alternator.

Reference Books:

1. Circuits and Networks, A. Sudhakar&ShyamMohan.S, Tata McGraw Hill Publishing Company Limited, 5th Edition.
2. Basic Electrical Engineering, by T.K. Nagsarkar and M.S. Sukhija, Oxford University Press, 3rd Edition
3. Basic Electrical Engineering, D.P Kothari & I.J Nagrath, Tata McGraw Hill Publishing Company Limited, 2nd Edition

ENGINEERING GRAPHICS & MODELING

I Year II semester

L	T	P	C
1	0	3	2.5

Course Outcomes:

1. Understand the concepts of engineering drawing of planes, solids and the CAD drawing software.
2. Applying the principles of engineering graphics while drawing the engineering components.
3. Analyze the sectional views for their configurations.
4. Evaluate the surfaces of solids developed for further processing in the engineering applications.

UNIT– I:
Introduction to Engineering Drawing: Principles of engineering graphics and their significance, usage of drawing instruments, conic sections, including the rectangular hyperbola- General method only. Cycloid, Epicycloid, Hypocycloid. Scales – Plain & Diagonal only.
Introduction to CAD: Introduction to CAD software and its importance, standard toolbar/menus and navigation tools used in the software, using basic commands limits ,units, grid, test , move, offset ,mirror, rotate, trim, extend, fillet etc. drawing lines using line command. Drawing spline, ellipse, circle, rectangle etc.. Concept of layers and dimensioning.

UNIT-II:
Principles of Orthographic Projections: Conventions, projections of points, projections of lines (first angle projection) inclined to both planes (traces and midpoint problem to be excluded).
Implementation of CAD: Drawing orthographic projections of points and lines using a CAD package.

UNIT – III:
Projections of the Planes: Projections of regular planes inclined to both the planes.
Projections of Solids: Projections of regular solids inclined to both the planes (prisms, pyramids, cones and cylinders, change of potion method only).
Implementation in CAD: Drawing orthographic projection of planes and regular solids using a CAD package.

UNIT – IV:
Sections and Sectional Views of Right Angular Solids: Prism, Cylinder, Pyramid, Cone. Development of surfaces of right regular solids - Prism, Pyramid, Cylinder and Cone.
Implementation in CAD: Concept of hatching, drawing sectional views of solids and the development of right regular solids using a CAD package.

UNIT-V:
Principles of Isometric projection: Isometric scale, isometric views, conventions, isometric views of lines, planes, simple solids, conversion of isometric views to orthographic views and vice-versa, conventions.
Implementation in CAD: Drawing isometric views of simple solids. Drawing isometric views from giving orthographic views and vice-versa using a CAD package.
Note: Implementation in CAD (For Internal Evaluation Weightage Only)

Textbooks:

1. Engineering Drawing, Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Charotar Publishing House.

Reference Books:

1. Engineering Graphics, Agrawal B. & Agrawal C. M. (2012), TMH Publication, Text book on Engineering Drawing, Narayana, K.L. & P Kannaiah (2008), Scitech Publishers.
2. Engineering Drawing and Computer Graphics, Shah, M.B. &Rana B.C. (2008), Pearson Education.
3. http://docs.autodesk.com/ACDMAC/2013/ENU/PDFs/acdmac_2013_users_guide.pdf

ENGLISH COMMUNICATION SKILLS LAB

I Year II Semester

L	T	P	C
0	0	2	1

Course Outcomes:

1. Understand the variants in pronunciation.
2. Identify the diverse purposes of listening and speaking.
3. Discuss ideas in diverse communicative settings.
4. Exhibit increased confidence in public speaking.
5. Display critical thinking, problem solving and decision making skills through GD's.

Exercise-I:
CALL Lab:
Common Indian Variants in Pronunciation – Differences between British and American Pronunciation.
ICS Lab:
Spoken vs. Written language-Formal and Informal English- Introducing Oneself and Others.

Exercise-II:
CALL Lab:
Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.
ICS Lab:
Features of Good Conversation – Strategies for Effective Communication Role-Play- Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise-III:
CALL Lab:
Information Transfer
ICS Lab:
Descriptions-Narrations-Giving Directions and Guidelines-Giving Instructions-Seeking Clarifications-Asking for and Giving Directions-Thanking and Responding-Agreeing and Disagreeing-Seeking and Giving Advice-Making Suggestions.

Exercise-IV:
CALL Lab:
Past Tense Marker and Plural Marker
ICS Lab:
Public Speaking- Exposure to Structured Talks - Non-verbal Communication- Making a Short Speech - Extempore

Exercise-V:
CALL Lab:
Intonation- Sentence Stress -Weak Forms and Strong Forms.
ICS Lab:
Group Discussion, Mock Group Discussion sessions

Reference Books:

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian Macmillan Publishers, 2010.
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010.

PROGRAMMING FOR PROBLEM SOLVING-II

L	T	P	C
2	0	0	2

I Year II Semester

Course Outcomes:

1. Identify various string handling functions in 'C'.
2. Develop programs with user defined data types.
3. Use Dynamic memory allocation functions with pointers.
4. Distinguish between Stacks and Queues.
5. Analyze various Dynamic Data Structures.

UNIT – I:

Overview of Arrays and Functions.

Strings: Introduction to Strings, String I/O, String Operations with and without built-in functions (strlen( ), strcmp( ), strcat( ),strcpy( ) and strrev( )).

UNIT -II:

Structures: Definition and Initialization of Structures, Accessing structure members, Nested Structures, Array of Structures, Structures and Functions, Unions, typedef, Enumerated Data types.

UNIT-III:

Pointers: Introduction to Pointers, Pointer Arithmetic, Pointers and Arrays, Pointer to Structure, Pointers and Strings, Parameter passing mechanism: Call by Reference, Pointer to Pointer, Dynamic Memory Allocation.

UNIT-IV:

Introduction to Data Structures: Lists and Operations, Linear and Nonlinear Data structures.

Stacks- Introduction to Stacks, Operations, Implementation of Stack using Arrays.

Queues- Introduction to Queues, Operations, Implementation of Queue using Arrays.

UNIT-V:

Linked Lists: Introduction to Linked List, Operations on Single Linked List (search, Insertion & Deletion).

Files: Introduction to Files, File Operations (Open, Close, read & Write).

Textbooks:

1. COMPUTER SCIENCE: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

Reference Books:

1. Problem Solving Using C, M.T. Somashekara, PHI, 2nd Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

PROGRAMMING FOR PROBLEM SOLVING LAB – II

L	T	P	C
0	0	2	1

I Year II Semester

Course Outcomes:

1. Build programs on various string handling functions.
2. Develop applications on user defined data types.
3. Apply dynamic memory allocation through pointers.
4. Implement linear data structures through stacks and queues.
5. Create linked list dynamically through stacks and queues.

Week 1:
Programs on Arrays and Functions. (Minimum 3 Programs)

Week 2 & 3:
Programs on Strings with and without string built-in Functions. (Minimum 6 Programs)

Week 4:
Programs on Accessing Structures and Nested Structures. (Minimum 3 Programs)

Week 5 & 6:
Programs on Array of Structures, Structures and Functions. (Minimum 5 Programs)

Week 7:
Programs on Unions, typedef and enum. (Minimum 4 Programs)

Week 8:
Programs on Pointers, pointer arithmetic, pointer expression, One Dimensional and Two dimensional arrays. (Minimum 4 Programs)

Week 9:
Programs on Pointer to structure, Call by Reference, Pointer to Pointer. (Minimum 3 Programs)

Week 10:
Programs on Dynamic Memory Allocation Functions. (Minimum 3 Programs)

Week 11:
Programs on Stacks and Queues using Arrays.

Week 12 & 13:
Programs on Single Linked List.

Week 14 & 15:
Programs on File Operations. (Minimum 6 Programs)

Week 16:
Review

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. EEE II Year I Semester

S. No.	Course Category	Course Title	L	T	P	Credits
1	BS – 7	Complex Analysis & Fourier Transforms	3	0	0	3
2	H&S – 5	Professional Communication	2	0	0	2
3	PC – 1	Power Systems –I	3	0	0	3
4	PC – 2	Network Analysis	3	0	0	3
5	PC – 3	Electro Magnetic Fields	3	0	0	3
6	PC – 4	Electrical Machines-I	3	0	0	3
7	PC Lab – 1	Basic Simulation Tools Lab	0	0	2	1
8	PC Lab – 2	Electric Circuits Lab	0	0	2	1
9	MC – 1	Environmental Science	2	0	0	0
Total			**19**	**0**	**4**	**19**

B. Tech. EEE II Year II Semester

S. No.	Course Category	Course Title	L	T	P	Credits
1	BS – 8	Numerical Methods	3	0	0	3
2	ES – 8	Fluid Mechanics and Hydraulic Machinery	3	0	0	3
3	ES – 9	Electronic Devices and Circuits	3	0	0	3
4.	PC – 5	Electrical Machines-II	4	0	0	4
5	PC – 6	Power Systems - II	3	0	0	3
6	PC – 7	Control Systems	3	0	0	3
7	PC Lab-3	Electrical Machines-I Lab	0	0	2	1
8	PC Lab-4	Electronic Devices and Circuits Lab	0	0	2	1
9	MC – 2	Gender Sensitization	2	0	0	0
Total			**21**	**0**	**4**	**21**

COMPLEX ANALYSIS AND FOURIER TRANSFORMS
(Common to EEE & ECE)

II Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Work with the functions of complex variables and evaluation of complexdifferentiation.
2. Acquire the knowledge of complex power series andintegration.
3. Apply the knowledge of contour integration to evaluate real integrals in engineering problems and acquire the knowledge of evaluating of conformal mapping and bilineartransformations.
4. Study Fourier series and define it for various types offunctions.
5. Apply Fourier sine and cosine integral theorems for a given function f(x), evaluate Fourier transforms, sine and cosinetransforms.

UNIT I
FUNCTIONS OF COMPLEX VARIABLES:
Introduction, Complex functions - limits and Continuity-Differentiability, Analytic functions and Properties, Cauchy-Riemann Equations (Cartesian and Polar), Harmonic functions, Construction of analytic functions.

UNIT II
COMPLEX INTEGRATION:
Introduction, Complex integration-Line integral, Cauchy's integral theorem, Cauchy's integral formula, Generalized Cauchy's integral formula, Power series: Taylor's series, Laurent series, Singular points, Types of Singularities, Residue, Cauchy's Residuetheorem.

UNIT III
EVALUATION OF INTEGRALS & CONFORMAL MAPPING:
Introduction, Evaluation of improper real integrals of the type (a) $\int_{\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta,\sin\theta)d\theta$- Conformal Mapping,-Critical Points-Bilinear transformation – fixed point – cross ratio - properties - invariance of circles.

UNIT IV
FOURIER SERIES:
Introduction- Periodic functions- Fourier series of periodic function- Dirichlet's conditions- Even and odd functions- Change of interval- Half-range sine and cosine series.

UNIT V
FOURIER TRANSFORMS:
Introduction- Fourier integral theorem (without proof)- Fourier integrals in complex form- Standard results- Fourier sine and cosine integrals- Fourier Transforms- Infinite and finite Fourier Transforms-Properties- Fourier sine and cosine transforms- inverse transforms, Finite Fourier transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publisher-44thedition.
2. A Text book of Engineering Mathematics, N.P.Bali, ManeshGoyal- 9thedition.

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, Kreyszig, John Wiley & Sons-10thedition.
2. Fundamentals of Complex Analysis, Saff, E. B. and A. D. Snider, Pearson-3rdedition.
3. Functions of Complex Variables, J.N.Sharma, Publisher Krishna prakashan-49thedition.

PROFESSIONAL COMMUNICATION

(Common to all branches)

II Year I Semester

L	T	P	C
2	0	0	2

Course Outcomes: At the end of the course, the student should be able to

1. Acquire enhancedpersonality
2. Exhibit appropriate professionaletiquette
3. Practice team building with strong communicationskills
4. Develop problem solving skills anddecision-making
5. Demonstrate effective presentation skills

UNIT I

SELF APPRAISAL:

Self-Introspection/ Self
Retrospection introducing self &
others
Goal setting
SWOT
Analysis,

UNIT II

PROFESSIONAL ETIQUETTE:

Etiquette-Telephone Etiquette-
Netiquette Email, Social Network
Behavioral
Traits Case
study

UNIT III

TEAM BUILDING:

Leadership skills-Case
Studies Team Essentials
Negotiation Skills
Group Discussion-Functional Aspects

UNIT IV

LOGICAL THINKING AND ANALYTICAL REASONING:

Decision Making
Problem Solving
Conflict
management
Case Study

UNIT V

PRESENTATION SKILLS:

Poster Presentation
Oral Presentation-Individual Presentation, Team Presentation, Thematic Presentation

TEXT BOOK:

1. Effective technical communication, Ashrif Rizvi, Tata McGraw Hill-2011

REFERENCE BOOKS:

1. Speaking and writing for effective business, Soundaraja, MACMILLAN,2010.
2. English for professional success, Hector Sanchez, Thomson,2010.

POWER SYSTEMS – I

II Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand the principle of generation of electric power in thermal, hydro, nuclear and gas powerstations.
2. Apply concepts in distribution systems to solveproblems.
3. Interpret the arrangement and operation of AIS and GISsubstations.
4. Analyze methods to improve the power factor and voltage control.
5. Evaluate various power tariffmethods.

UNIT I
POWER STATIONS:
Thermal Power Stations: Line diagram of Thermal PowerStation (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components-Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.
Hydel Power Stations: Schematic Arrangement, Brief description of Hydraulic Structures, Water turbines.
Nuclear Power Stations: Nuclear Fission and Chain reaction, Nuclear fuels, Principle of operation ofNuclear reactor, Reactor Components- Moderators, Control rods, Reflectors and Coolants, Radiationhazards- Shielding and Safety precautions, Types of Nuclear reactors and brief description of PWR,BWR and FBR.
Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only).

UNIT II
D.C & A.C DISTRIBUTION SYSTEMS:
D.C Distribution Systems: Classification of Distribution Systems - Comparison of DC vs. AC and Under-Ground vs. Over -Head Distribution Systems- Requirements and Design features of Distribution Systems- Voltage,Drop Calculations (Numerical Problems inD.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal voltages) and Ring Main Distributor.
Distribution Systems: Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to related load voltages.

UNIT III
AIR INSULATED & GAS INSULATED (GIS) SUBSTATIONS:
Classification of substations: - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single busbar, sectionalized single busbar, main and transfer busbar system with relevant diagrams.
Gas Insulated Substations (GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, busbar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT IV
POWER FACTOR & VOLTAGE CONTROL:
Causes of low power factor – Methods of Improving power factor – Phase advancing and generation of reactive KVAR using static Capacitors – Most economical power factor for constant KW load and constant KVA type loads, Numerical Problems. Dependency of Voltage on Reactive Power flow- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and BoosterTransformers.

UNIT V

ECONOMIC ASPECTS OF POWER GENERATION & TARIFF:

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

Tariff methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method-Tariff Methods: Flat Rate, Block- Rate, two-part, three-part, and power factor tariff methods and Numerical Problems.

TEXT BOOKS:

1. A text book on power system engineering, A.Chakrabarthi, M.L.Soni, P.V.Gupta and M.L Soni, DhanpathRai and Sons-2016 Edition
2. Principles of power systems, V.K.Mehtha and RohitMehtha, S.Chand Company Pvt. Ltd, 2005, RevisedEdition

REFERENCE BOOKS:

1. Generation, distribution and utilization of electrical energy, C.L.Wadhwa, New Age International-3rd Edition.
2. A course in power systems, J.B.Gupta, S.K. Kataria&Sons-11thEdition.
3. A text book of power system engineering, R.K. Rajput, Laxmi Publications (P) Limited-1st Edition.

NETWORK ANALYSIS

II Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Apply network theorems for the analysis of electricalnetworks.
2. Obtain the transient and steady-state response of electricalcircuits.
3. Apply graph theory to formulate networkequations.
4. Analyze two portnetworks.
5. Evaluate circuits in the sinusoidal steady-state(Three-phase).

UNIT I
NETWORK THEOREMS (DC & AC), MESH AND NODAL ANALYSIS:
Analysis of Circuits using Mesh and Nodal methods, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and Compensation theorem

UNIT II
D.C AND A.C TRANSIENTANALYSIS:
Transient response of R-L, R-C, R-L-C circuits (series and parallel) for D.C excitation- Initial conditions- Solution method using differential equation and Laplace transforms .
Transient response of R-L, R-C, R-L-C circuits (series and parallel) for sinusoidal excitation- Initial conditions- Solution method using differential equation and Laplace transforms.

UNIT III
NETWORK TOPOLOGY:
Network Topology - Definitions, Graph, Tree, Incidence Matrix, Basic Cut Set and Basic Tie Set Matrices for Planar Networks, Loop and Nodal methods for analysis of Networks with Voltage and Current Sources, Duality & Dual Networks.

UNIT IV
TWO PORT NETWORKS:
Two port network parameters - Z, Y, ABCD and Hybrid parameters and their inter relations. Series, parallel and cascaded connection of two port networks, Concept of transformed network- Two port network parameters using transformed variables.

UNIT V
ANALYSIS OF THREE PHASE CIRCUITS:
Three phase Circuits – Generation of Three Phase Voltage - Review of Voltage and Current relations in Star and Delta systems. Analysis of balanced and unbalanced three phase circuits - Measurement of active and reactive power.

TEXT BOOKS

1. Circuit theory-analysis & synthesis, A.Chakrabarthy, DhanpatRai& Sons-7th revisedEdition.
2. Circuits & networks-analysis and synthesis, A.Sudhakar and ShyammohanS.Palli, Tata McGraw Hill-5thEdition.

REFERENCE BOOKS

1. Network analysis, Van Valkenburg, Prentice Hall-3rdEdition.
2. Network analysis, MahmoodNahvi, Joseph Edminister, Schaum's Outline series, McGraw Hill Companies -4thEdition.
3. Electric circuit analysis,C.L.Wadhwa, New Age International-2ndEdition.

ELECTRO MAGNETIC FIELDS

II Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand the basic laws ofelectromagnetism.
2. Obtain the electric and magnetic fields' concepts for simple configurations under staticconditions.
3. Analyze time varying electric and magneticfields.
4. Examine Maxwell's equations in different forms and differentmedia.
5. Apply electromagnetic concepts to electricalmachines.

UNIT I

ELECTROSTATICS:

Vector Algebra – Divergence theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential– Properties of potential function – Potential gradient – Gauss's law – Application of Gauss's Law – Maxwell's first law. Laplace's and Poison'sequations.

UNIT II

DIPOLE& CAPACITANCE:

Electric Dipole – Dipole moment – Polarization – Potential due to an Electric Dipole and Torque. Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT III

MAGNETO STATICS, AMPERE'S CIRCUITAL LAW:

Biot-Savart's law – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density– Maxwell's second Equation.

Ampere's circuital Law & Applications:

Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law-Curl-Stroke's Theorem – Maxwell's third equation.

UNIT IV

FORCE IN MAGNETIC FIELDS, MAGNETIC POTENTIAL:

Magnetic force - Lorentz force equation – force on a current element in a magnetic field - Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment –Torque in a magnetic field.

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties.

UNIT V

INDUCTANCE, TIME VARYING FIELDS:

Self and Mutual inductance – Determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire– Energy stored and Density in a Magnetic field. Time varying fields – Faraday's laws of electromagnetic induction –Maxwell's fourth equation –Simple problems - Modification of Maxwell's equations for time varying fields – Displacement current.

TEXT BOOKS

1. Engineering electromagnetics by William H. Hayt& John. A. Buck, McGraw Hill Companies-7th Edition,2012.
2. Electromagnetic fields, Sadiku, Oxford Publications-7thEdition.

REFERENCE BOOKS

1. Engineering electromagnetics, J P Tewari, Khanna Publishers-2nd Edition, 2005.
2. Elements of electromagnetic fields, S. P. Seth, DhanpatRai& Co. (Pvt.) Ltd-2ndEdition.
3. Electromagnetic field theory, K. A. Gangadhar, P. M. Ramanathan, Khanna Publishers-16th Edition.

ELECTRICAL MACHINES-I

II Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand different types of DCMachines.
2. Identify different parts of a DC machine & understand itsoperation.
3. Carry out different testing methods to predetermine the efficiency of DCmachines.
4. Analyze speed control of DCmachines.
5. Carry out different testing methods to pre-determine the efficiency DCmachines.

UNIT I

D.C. GENERATORS – CONSTRUCTION & OPERATION:

Electromechanical Energy conversion – force and torque in magnetic field systems – energybalance-D.C. Generators – Principle of operation – Action of commutator – classification of DC generators – separately excited and self-excited generators – armature windings – lap and wave windings – use of laminated armature – E.M.F Equation – Armature reaction and commutation – cross magnetizing and demagnetizing AT/pole – compensating winding.

UNIT II

D.C. GENERATORS – OPERATING CHARACTERISTICS:

Commutation – reactance voltage – methods of improving commutation - Buildup of EMF – magnetization curve/OCC characteristics – critical field resistance and critical speed – causes for failure of self-excitation – remedial measures – internal and external characteristics of DC shunt, series and compound generators, Parallel operation of DC generators – use of equalizer bar and cross connection of field windings – load sharing- Different applications of DCGenerators.

UNIT III

D.C. MOTORS:

Principle of operation – Back EMF - Torque equation, Types of DC Motors (shunt, series and compound) – characteristics of DC Motors- applications.

UNIT IV

SPEED CONTROL OF DC MOTORS:

Principle of operation of 3 point and 4 point starters with protective devices – Speed control of DC Motors: armature voltage and field flux control methods – Ward-Leonard system - Different applications of DC Motors.

UNIT V

TESTING OF D.C. MACHINES:

Testing of D.C. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency. Methods of Testing: direct, indirect and regenerative testing – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a DC motor.

TEXT BOOKS:

1. Theory and performance of Electrical machines, J.B Gupta, S.K Kataria& Sons publishers-Reprint 2013Edition.
2. Electrical Machines, R.K.Rajput, Lakshmi Publication-4thEdition.

REFERENCE BOOKS:

1. Electrical machinery, P.S. Bimbra, Khanna Publishers-7thEdition
2. Electrical machines, S.K. BhattaCharya, McGraw Hill Companies-4thEdition.
3. Electric machines, I.J. Nagrath& Kothari, McGraw Hill Companies-3rdEdition.

BASIC SIMULATION TOOLS LAB

II Year I Semester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of laboratory course, the student should be able to

1. Correlate the data usingplots.
2. Verify networktheorems.
3. Observe transient response of seriescircuits.
4. Simulate rectifiercircuits.
5. Analyze networks using networktheorems.

Any Ten of the following experiments should be conducted

1. Basic operation onmatrices.
2. Basic 2D plots of simpleequations.
3. Find loop currents using meshanalysis.
4. Find node voltage using nodalanalysis.
5. Transient analysis of RL seriescircuit.
6. Transient analysis of RC seriescircuit.
7. Transient analysis of RLC seriescircuit.
8. Analysis of half wave rectifier with and withoutfilter.
9. Analysis of full wave rectifier with and without filter.
10. Verification of Thevenin'stheorem.
11. Verification of Maximum power transfertheorem.
12. Verification of super positiontheorem.

ELECTRIC CIRCUITS LAB

II Year I Semester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Evaluate response in a given network by using networktheorems.
2. Analyze complex DC and AC linearcircuits.
3. Apply concepts of electricalcircuits.
4. Evaluate active power and reactive power of electriccircuits.
5. Determine two port networkparameters.

Any Ten of the following experiments should be conducted

1. Measurement of voltage, current and equivalent resistance of variouscircuits.
2. Verification of Norton's theorem.
3. Verification of maximum power transfer theorem on DCexcitation.
4. Verification of compensationtheorem.
5. Verification of reciprocity theorem &Millman'stheorem.
6. Resonance in series and parallel R, L, Ccircuits.
7. Determination of self-inductance, mutual inductance and coefficient ofcoupling.
8. Locus diagrams of series RL and RCcircuits.
9. Calculation of RMS, average values, form factor and peak factor of complex waveform.
10. Determination of Z & Yparameters.
11. Determination of transmission & hybridparameters.
12. Measurement of active power for three phase balancedloads.
13. Measurement of reactive power for three phase balancedloads.

ENVIRONMENTAL SCIENCE

(Common to all Branches)

II Year ISemester

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, the student should be able to

1. Define and explain the structure and functions of ecosystem, values of biodiversity, threats to biodiversity and conservation ofbiodiversity.
2. Explain the limitations of the resources and impacts of over utilization of naturalresources.
3. Explain the sources and effects of environmental pollution and list and identify the available techniques to control the pollution.
4. Explain the global environmental issues like climate change, ozone depletion and can explain the scope of EIA, Environmental Management Plan and environmental audit and list the EIA methods.
5. Mention the salient features of environmental acts and rules and define the sustainable goals along with measures required for thesustainability.

UNIT I

ECOSYSTEM:

Definition, Scope and Importance of ecosystem, Structure and Functions of ecosystem: Food chains, Food Web and Ecological Pyramids, Flow of energy; Bio-magnification.

BIODIVERSITY AND BIOTIC RESOURCES:

Introduction, Definition, levels of Biodiversity, Value of biodiversity, Hot spots of biodiversity, Threats to biodiversity, conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT II

NATURAL RESOURCES:

Classification of Resources

WATER RESOURCES:

Use and over utilization of surface and ground water, Dams: benefits and problems, Rain water harvesting;

ENERGY RESOURCES:

Growing energy needs Renewable and Non Renewable Energy resources. **LAND RESOURCES**: land degradation – Landslide and Soil Erosion; **FOREST RESOURCES –** Uses and Exploitation.

UNIT III

ENVIRONMENTAL POLLUTION AND CONTROL:

Types of Pollution, Sources, Effects and Control measures of Air Pollution, WaterPollution, Soil Pollution and Noise Pollution.

UNIT- IV

GLOBAL ENVIRONMENTAL PROBLEMS AND GLOBAL EFFORTS:

Greenhouse effect, Global Warming, climate change and their impacts on human environment; Ozone depletion and Ozone depleting substances (ODS); AidRains.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

Scope of EIA and EIA methods, scope of Environmental audit and Environmental Management Plan.

UNIT- V

ENVIRONMENTAL POLICY, LEGISLATION, RULES AND REGULATIONS:

Salient features of Environmental Protection act, Air (Prevention and Control of pollution) Act- 1981, Water (Prevention and Control of pollution) Act-1974, Forest Conservation Act, Municipal solid waste, Hazardous waste, E-waste, Bio-medical waste, Radioactive waste Rules.

TOWARDS SUSTAINABLE FUTURE:
Concept of Sustainable Development, Sustainable goals defined by UN, Threats to Sustainability, Environmental Education, Role of IT in Environment, Smart Cities, Concept of Green Building, Low Carbon Lifestyle, Life cycle assessment and Ecological Foot Print.

TEXTBOOKS:

1. Text Book of Environmental Studies, AnubhaKaushik New age International Publishers-4th Edition.
2. Environmental studies, ErachBharucha, University Grants Commission, University Press, 2005.

REFERENCE BOOKS:

1. Text book of Environmental Science and Technology, M.Anji Reddy, 2007
2. Environmental Science: Towards a Sustainable Future, Richard T. Wright. PHL Learning Private Ltd. New Delhi, 2008.

NUMERICAL METHODS AND PARTIAL DIFFERENTIAL EQUATIONS

II Year IISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Develop skills in solving engineering problems involving algebraic and transcendental equations.
2. Acquires the knowledge of interpolation in predicting future out comes based on the present knowledge and also to fit different types of curves.
3. To know various types of numerical methods in solving engineeringproblems.
4. Classify the nature of second and higher order partial differential equations and find the solutions of linear and nonlinearPDE.
5. To apply partial differential equations in different engineeringproblems.

UNIT I

NUMERICAL TECHNIQUES: SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:

Introduction - The Bisection Method- The Method of False Position- The Iteration Method-Newton-Raphson Method. Solving system of linear Non- Homogeneous equations by Jacobi's and Gauss-Seidel Iteration methods.

UNIT II

CURVE FITTING AND NUMERICAL INTEGRATION:

Curve fitting: Fitting a straight line -second degree curve-exponential curve, power curve by method of least squares.

Numerical integration – General Quadrature (Newton's Cote's formula), Trapezoidal rule, Simpson's rule. $\left(\frac{1}{3}^{rd} \ \& \ \frac{3}{8}^{th}\right)$

UNIT III

NUMERICAL SOLUTIONS OF IVP'S:

Numerical solution of Ordinary Differential equations: Introduction- Solution by Taylor's series method- Picard's Method of successive approximations- Single step methods-Euler's Method - Runge- Kutta (second and classical fourth order) Methods- Predictor Corrector method- Adam's - Bashforth method.

UNIT IV

PARTIAL DIFFERENTIAL EQUATIONS:

Introduction- Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions- Solutions of first order Linear (Lagrange) Equation, Nonlinear Equations- Charpits Method.

UNIT V

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS:

Introduction- Classification of general second order partial differential equations- Method of separation of variables for second order equations- Applications of Partial Differential Equations- One dimensional wave equation – One dimensional heat equation- Steady State two dimensional Heat equation (or Laplace equation).

TEXT BOOKS:

1. Higher engineering mathematics, B.S. Grewal, Khanna Publishers-43rdEdition.
2. Numerical methods, S. S. Sastry – PHIPublications.

REFERENCE BOOKS:

1. Introductions of numerical methods, Jain &Iyengar
2. Numerical methods, E. Balaguruswamy, Tata McGraw HillPublication.
3. Ordinary and partial differential equations, theory and applications, Shah and, Nita H, PHI Publications.

FLUID MECHANICS AND HYDRAULIC MACHINERY

II Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be ableto

1. Explain fluid properties, types of fluid flows and formulate one and three dimensional compressible fluid flow problems and solve thesame.
2. Apply conservation of mass, energy and momentum laws to fluid flow problems in engineering applications and study the losses inpipes.
3. Compute drag and lift forces using theory of boundary layer and understand the basics of turbo machinery.
4. Analyze practical problems of various turbines used in Industry and hydro powerplants.
5. Solve various engineering problems related to centrifugal and reciprocating pumps used in agriculture, domestic and industrialapplications.

UNIT I

FLUID PROPERTIES AND FLUID STATICS:

Density, Specific weight, Specific gravity, viscosity, Vapour pressure, compressibility, Surface tension Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydro static law, Piezometer, Simple and differentialmanometers.

UNIT II

FLUID KINEMATICS:

Stream line, path line, streak line, stream tube, classification of flows, steady,unsteady, uniform, non- uniform, laminar, turbulent, rotational, irrigational flows, one, two and three dimensional flows.

Fluid Dynamics: Surface and Body forces, Euler's and Bernoulli's equation derivation, Application of Bernoulis Equation: Venturimeter, Orifice meter, Pitot tube, Navier stokes equation (explanation only), Momentum equation –applications.

UNIT III

CLOSE CONDUIT FLOW:

Reynolds Experiment, Darcy's equation, Minor losses - pipes in series, pipes in parallel, total energy line and hydraulic gradient line.

Impact Of Water Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and a tip-velocity triangles at inlet and outlet expressions for work done and efficiency, Series vanes, Radial flow turbines.

UNIT IV

HYDRAULIC TURBINES:

Overshot and undershot water wheels, classification of Water turbines, Pelton Wheel, work done and working proportions, Francis, Kaplan turbines, draft tubes, types & its efficiency.

Performance Of Turbines: Performance under unit head, unit quantities, performance under specific conditions, specific speed, performance characteristic curves, governing of turbines, surge tanks. Water hammer.

UNIT V

CENTRIFUGAL PUMPS:

Types Component parts and working, work done by the impeller, Manometric head losses and efficiencies, minimum starting speed, loss, Specific speed, Multistage Pumps, Pumps in parallel, performance of pump, NPSH, Cavitation, priming devices, pump troubles and remedies.

Reciprocating Pumps: Main components and working of a reciprocating pump, types of reciprocating pumps, power required driving the pump, coefficient of discharge and slipping indicator diagram.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and hyraulic machinery,Modi and Seth, Standard Book House- 14^{th} edition.
2. Fluid mechanics and hydraulic machines, Rajput, S. Chand- 6^{th}Edition.

REFERENCES:

1. Fluid mechanics and fluid power engineering, D.S Kumar, Kotaria& sons.
2. Fluid mechanics and machinery by D. Rama Durgaiah, New Age international, Reprint2004.
3. Hydraulic machines by Banga& Sharma, KhannaPublishers.

ELECTRONIC DEVICES AND CIRCUITS

II Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Demonstrate the concepts of semiconductor theory.
2. Interpret the characteristics of different semiconductor devices with itsapplications.
3. Apply different biasing techniques of transistors foramplification.
4. Analyze transistor amplifiers using small signalmodel.
5. Analyze FET amplifiers using small signalmodel.

UNIT I
DIODE:
PN junction Diode – Characteristics, Current equation, Temperature dependence, Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances.
Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive Filter, Clippers, Clampers.

UNIT II
BIPOLAR JUNCTION TRANSISTOR (BJT):
Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.

UNIT III
TRANSISTOR BIASING AND STABILIZATION:
Bias Stability, Fixed Bias, Collector to Base bias, Self-Bias, Bias compensation using Diodes and Transistors.
Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT IV
JUNCTION FIELD EFFECT TRANSISTOR:
Construction, Principle of Operation, Pinch-Off voltage, Volt-Ampere characteristic, comparison of BJT and FET, Biasing of FET, FET as voltage variable resistor, MOSFET construction and its characteristics in enhancement and depletion modes.

UNIT V
FET AMPLIFIERS:
Small Signal Model, Analysis of CS, CD, CG JFET Amplifiers. Basic Concepts of MOSFET Amplifiers.
Special Purpose Devices: Zener Diode - Characteristics, Voltage Regulator; Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.

TEXT BOOKS:

1. Electronic devices and circuits, Millman and Halkias, McGraw Hill Publication-2^{nd}Edition.
2. Electronic devices and circuits, R.L. Boylestad and Louis Nashelsky, PEI/PHI-9^{th}Edition.

REFERENCES:

1. Electronic devices and circuits, S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, TMH -2^{nd} Edition.
2. Integrated electronics, J. Millman and Christos C. Halkias, TMH-Edition2008.
3. Electronic devices and circuits, J.B Gupta, katson series-6^{th}Edition.

ELECTRICAL MACHINES – II

II Year IISemester

L	T	P	C
4	0	0	4

Course Outcomes: At the end of the course, the student should be able to

1. Understand the concepts of rotating magnetic fields and the working principle of single phase transformer.
2. Analyze the operation & connection of three phasetransformer.
3. Understand the construction & operation of three phase inductionmotor.
4. Analyze the performance of three phase inductionmotor.
5. Understand the construction & operation of single phase inductionmotor.

UNIT I
SINGLE PHASE TRANSFORMERS:
Principle of operation -Types - constructional details- Losses, Minimization of hysteresis and eddy current losses- E.M.F equation - operation on no load and on load - phasor diagrams- Problems.
Equivalent circuit – efficiency at different loads - Condition for maximum efficiency- All day efficiency -voltage regulation for different loads & different power factors - effect of variations of frequency & supply voltage on iron losses - Sumpner's test-separation of losses.

UNIT II
THREE PHASE TRANSFORMERS:
Three phase poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/ Δand open Δ, Third harmonics in phase voltages-three winding transformers-tertiary windings - Determination of Zp, Zs and Zt - off load and on load tap changing, Scott connection.
PARALLEL OPERATION AND AUTOTRANSFORMERS
Parallel operation of Single Phase Transformers with equal and unequal voltage ratios - Auto transformers - equivalent circuit - comparison with two winding transformers.

UNIT III
THREE PHASE INDUCTION MOTORS:
Construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf. at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed. Torque equation- expressions for maximum torque and starting torque - torque slip characteristics - double cage and deep barrotors.

UNIT IV
PERFORMANCE OF THREE PHASE INDUCTION MOTORS:
Equivalent circuit - phasor diagram - crawling and cogging. Circle diagram-no load and blocked rotor tests-predetermination of performance. Methods of starting. Calculations of torque, efficiency at different loads from circle diagram.
Speed control - voltage control – variable voltage and variable frequency method- change of poles and methods of consequent poles; cascade connection, injection of an emf into rotor circuit (qualitative treatment only) -induction generator-principle of operation.

UNIT V
SINGLE PHASE INDUCTION MOTORS:
Single phase Induction motor – Constructional features- Double revolving field theory Equivalent circuit- spilt –Phase motors- Capacitor start Capacitor run motors, applications.

TEXT BOOKS:

1. Electrical machinery, P.S. Bimbra, Khanna Publishers-7thedition.
2. Theory and performance of electrical machine, JB Gupta, SK Kataria&Sons-14thedition.

REFERENCE BOOKS:

1. Performance and design of AC machines, MG.Say, BPBPublishers-1968.
2. Electrical machines, R.K Rajput, LP publications-5thedition
3. Electric machines, I. J. Nagrath& D.P. Kothari, Tata McGraw Hill-7thEdition.

POWER SYSTEMS – II

II Year IISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand transmission lineparameters.
2. Observe the performance of transmissionlines.
3. Analyze transient behavior of transmissionlines.
4. Evaluate mechanical design of transmissionlines.
5. Understand the construction, grading and capacitance of undergroundcables.

UNIT I
TRANSMISSION LINE PARAMETERS:
Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT II
PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES:
Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types oflines
- Numerical Problems. **Long Transmission Line**: Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numericalproblems).

UNIT III
POWER SYSTEM TRANSIENTS:
Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Incident, Reflected and Refracted Waves- Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT IV
FACTORS GOVERNING THEPERFORMANCEOFTRANSMISSIONLINES, TRANSMISSION LINE INSULATORS, SAG AND TENSIONCALCULATIONS:
Skin and Proximity effects - Description and effect on Resistance of Solid Conductors - Ferranti effect- Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.Types of Insulators, String efficiency and Methods for improvement, Numerical Problems- voltage distribution, calculation of string efficiency, Capacitance grading and StaticShielding.Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and itsapplications.

UNIT V
UNDERGROUND CABLES:
Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation - Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheathgrading.

TEXT BOOKS:

1. Electrical power systems, C.L.Wadhwa, New Age International (P) Limited,Publishers.
2. Principles of Power Systems, V.K.Mehta and Rohit Mehta, S.Chand Company Pvt. Ltd,2005.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering, M.L.Soni, P.V. Gupta, U.S. Bhatnagar, A. Chakrabarthy, DhanpatRai& Co Pvt.Ltd.
2. Power System Engineering, I.J. Nagarath and D.P. Kothari,TMG.
3. Power System Analysis and Design, Dr. B. R. Gupta, S. Chand & CompanyLimited.

CONTROL SYSTEMS

II Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand the fundamentals of classical and modern controlsystems.
2. Model various electrical and mechanicalsystems.
3. Analyze time and frequency responses of first and second-ordersystems.
4. Analyze stability of controlsystems.
5. Represent linear discrete time system in State space

UNIT I
INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II
TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor - AC Servo motor- Synchro Transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction uses Mason's gain formula.

UNIT III
TIME RESPONSE AND STABILITY ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT IV
FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin Stability Analysis from Bode Plots, Nyquist Plots-Stability Analysis.

UNIT V
CLASSICAL CONTROL DESIGN TECHNIQUES AND STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Introduction to Compensation techniques, PID Controllers.

Concepts of state, state variables and state model, derivation of state models - Solving the Time invariant state Equations - State Transition Matrix and its Properties, Concepts of Controllability and Observability.

TEXT BOOKS:

1. Control Systems Engineering, I.J.Nagrath and M.Gopal, New Age International (P) Limited, Publishers-2nd Edition.
2. Automatic Control Systems, B. C. Kuo, John wiley and sons-8thEdition.

REFERENCE BOOKS:

1. Control Systems, Nagoorkani-2ndEdition.
2. Control Systems, N.C.Jagan, BS Publications-2ndEdition.
3. Modern Control Engineering, Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd.-3rdEdition.

ELECTRICAL MACHINES - I LAB

II Year IISemester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Start and control the Different types of DCmotors.
2. Assess the performance of different types of DC machines using different testingmethods.
3. Identify different conditions required to be satisfied for self - excitation of DCGenerators.
4. Separation losses of DC motor into differentcomponents.
5. Analyze the performance of coupledmachines.

Any 10 out of the following 12 experiments should be conducted:

1. Magnetization characteristics of a DC shuntgenerator.
2. Load test on DC shuntgenerator.
3. Load test on DC compoundgenerator.
4. Load test on DC series generator.
5. Brake test on DC compoundmotor.
6. Hopkinson's test on DC Shuntmachines.
7. Field's test on DC Seriesmachines.
8. Separation of losses in DC shunts motor.

In addition to the above eight experiments at least any two of the following experiments are required to be conducted from the following list.

1. Retardation test on DC shuntmotor.
2. Speed control of DC shuntmotor.
3. Swinburne's test on DC shuntmachine.
4. Brake Test on DC shunt Motor.

ELECTRONIC DEVICES AND CIRCUITS LAB

II Year IISemester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Understand basic concepts of electronic devices andcircuits.
2. Analyze the characteristics of electronic devices andcircuits.
3. Apply the concepts of electronics devices and circuits to find variousparameters.
4. Evaluate the behavior of basic electronicdevices.
5. Analyze the characteristics of FET and UJT.

PART-A: (Only for Viva-voce Examination)
Electronic Workshop Practice (In 3 Lab Sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards,PCB's.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR,UJT.
3. Study and operationof
   a. Multimeters (Analog andDigital).
   b. FunctionGenerator.
   c. Regulated PowerSupplies.
   d. CRO.

PART B: Minimum of 10 experiments of the following should be conducted

1. Forward & Reverse Bias Characteristics of PN JunctionDiode.
2. Zener diode characteristics and Zener as voltageRegulator.
3. Half Wave Rectifier with & withoutfilters.
4. Full Wave Rectifier with & withoutfilters.
5. Input & Output Characteristics of Transistor in CBConfiguration.
6. Input & Output Characteristics of Transistor in CEConfiguration.
7. FETcharacteristics.
8. Lissajous patterns usingCRO.
9. Frequency Response of CCAmplifier.
10. Frequency Response of CEAmplifier.
11. Frequency Response of Common Source FETamplifier.
12. SCRCharacteristics.
13. UJTCharacteristics.

GENDER SENSITIZATION

II Year IISemester

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, the student should be able to

1. To develop awareness about gender discrimination and take measurable steps to counterit.
2. To identify the basic dimensions of biological, sociological, psychological and legal aspects of gender.
3. To acquire knowledge about gendered division of labour in relation to politics andeconomics.
4. To prepare the students against genderviolence.
5. To prepare the students to work and live together asequals.

UNIT I
UNDERSTANDING GENDER:
Gender: Why Should We Study It? (Towards a World of Equals: Unit -1)
Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT II
GENDER AND BIOLOGY:
Missing Women: Sex Selection and Its Consequences (Towards a World of Equals: Unit -4) Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.

UNIT III
GENDER AND LABOUR:
Housework: the Invisible Labour (Towards a World of Equals: Unit -3)
"My Mother doesn't Work." "Share the Load".
Women's Work: Its Politics and Economics (Towards a World of Equals: Unit -7)
Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT IV
ISSUES OF VIOLENCE:
Sexual Harassment: Say No! (Towards a World of Equals: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".
Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8)
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.
Thinking about Sexual Violence (Towards a World of Equals: Unit -11)
Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

UNIT V
GENDER: CO – EXISTENCE:
Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -12)
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXT BOOKS:

1. Towards a World of Equals: A Bilingual Textbook on Gender,A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, VasudhaNagaraj, Asma Rasheed, GoguShyamala, DeepaSreenivas and Susie Tharu ,Telugu Akademi, Hyderabad,Telangana State in the year 2015.

REFERENCE BOOKS:

1. Seeing like a feminist, Menon, Nivedita, New Delhi, Zubaan-PenguinBooks-2012
2. I fought for my life and won, AbdulaliSohaila, Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal

COURSE STRUCTURE

B. Tech. EEE III Year I Semester

S. No	Course Category	Course Title	L	T	P	Credits
1	H&S – 6	Managerial Economics and Financial Analysis	3	0	0	3
2	ES – 10	Switching Theory and Logic Design	3	0	0	3
3	PC – 8	Electrical Machines III	3	0	0	3
4	PC – 9	Power Electronics	3	0	0	3
5	PE – 1	Electrical Energy Conservation and Auditing/ Electrical Estimation and Costing	3	0	0	3
6	OE – 1	Non-Conventional Energy Sources / Fundamentals of Electrical Power Generation and Protection	3	0	0	3
7	PC Lab – 5	Electrical Machines -II Lab	0	0	2	1
8	PC Lab – 6	Advanced Communication Skills Lab	0	0	2	1
9	MC – 3	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech. EEE III Year II Semester

S. No	Course Category	Course Title	L	T	P	Credits
1	PC – 10	Electrical Measurements & Instrumentation	3	0	0	3
2	PC – 11	Computer Methods in Power Systems	3	0	0	3
3	PC – 12	Power Semiconductor Drives	3	0	0	3
4	PC – 13	Switch Gear and Protection	3	0	0	3
5	PE – 2	Integrated Circuit and Applications / Artificial Intelligence Techniques in Electrical Engineering	3	0	0	3
6	OE – 2	Energy Auditing and Conservation/ Principles of Electric Power Utilization	3	0	0	3
7	PC Lab – 7	Control Systems and Simulation Lab	0	0	2	1
8	PC Lab – 8	Power Electronics and Simulation Lab	0	0	2	1
9	MC – 4	Personality Development &Behavioural Skills	2	0	0	1
		Total	**20**	**0**	**4**	**21**

COURSE STRUCTURE (for FAST TRACK)

B. Tech. III Year I Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1	H&S – 6	Managerial Economics and Financial Analysis	3	0	0	3
2	ES – 9	Switching Theory and Logic Design	3	0	0	3
3	PC – 8	Electrical Machines III	3	0	0	3
4	PC – 9	Power Electronics	3	0	0	3
5	PE – 1	Electrical Energy Conservation and Auditing/ Electrical Estimation and Costing	3	0	0	3
6	OE – 1	Non-Conventional Energy Sources / Fundamentals of Electrical Power Generation and Protection	3	0	0	3
7	PC Lab – 5	Electrical Machines -II Lab	0	0	2	1
8	PC Lab – 6	Advanced Communication Skills Lab	0	0	2	1
9	MC – 3	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech. III Year II Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1	PC – 10	Electrical Measurements & Instrumentation	3	0	0	3
2	PC – 11	Computer Methods in Power Systems	3	0	0	3
3	PC – 12	Power Semiconductor Drives	3	0	0	3
4	PC – 13	Switch Gear and Protection	3	0	0	3
5	PE – 2	Integrated Circuit and Applications/ Artificial Intelligence Techniques in ElectricalEngineering	3	0	0	3
6	OE – 2	Energy Auditing and Conservation/ Principles of Electric Power Utilization	3	0	0	3
7	PC Lab – 7	Control Systems and Simulation Lab	0	0	2	1
8	PC Lab – 8	Power Electronics and Simulation Lab	0	0	2	1
9	MC – 4	Personality Development &Behavioural Skills	2	0	0	1
10	PC -16	Utilization of Electrical Energy	3	0	0	3
		Total	**23**	**0**	**4**	**24**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

III Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Analyze the scope of managerialeconomics.
2. Apply managerial tools and techniques to attain optimaldecisions.
3. Analyze how production function is carried out to achieve maximumoutput.
4. Analyze changing business environment in post liberalizationscenario.
5. Evaluate and interpret the financial statements to make informeddecisions.

UNIT I
INTRODUCTION TO BUSINESS AND ECONOMICS:
Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.
Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT II
DEMAND AND SUPPLY ANALYSIS:
Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of DemandForecasting.
Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT III
PRODUCTION, COST, MARKET STRUCTURES & PRICING:
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale. Cost analysis: Types of Costs. Market **Structures**: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

UNIT IV
FINANCIAL ACCOUNTING:
Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, and Preparation of Final Accounts.

UNIT V
FINANCIAL ANALYSIS THROUGH RATIOS:
Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

TEXT BOOKS:
1. Business economics, theory and applications, D. D. Chaturvedi, S. L. Gupta, International Book House Pvt.Ltd.
2. Financial accounting, Dhanesh K Khatri, Tata McGrawHill.

REFERENCE BOOKS:
1. Financial accounting for management, Paresh Shah, Oxford Press, 2015- 2nd edition.
2. Financial accounting, S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Vikas Publications-5th edition.

SWITCHING THEORY AND LOGIC DESIGN

III Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray andBCD.
2. Manipulate simple boolean expressions using the theorems and postulates of boolean algebra and to minimize combinationalfunctions.
3. Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complexcircuits.
4. Design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complexcircuits.
5. To develop the state diagrams with the knowledge of Mealy and Moore circuits and algorithmic state machines for binarymultipliers.

UNIT I

NUMBER SYSTEM AND MINIMIZATION TECHNIQUES:

Number System: Review of number system and base conversion, complements, signed binary numbers, floating point number representation, Error detection (parity detection only).

Minimization techniques: Boolean Algebra, postulates ,basic logic gates, Canonical and Standard Form, NAND and NOR implementation, Minimization of switching function using theorem, The Karnaugh Map Method-Up to Five Variable Maps, Tabular Method.

UNIT II

COMBINATIONAL CIRCUITS:

Adders &Subtractor, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparators, Multiplexers, De-multiplexers, Decoders, Encoders and Code converters, Hazards and Hazard Free Relations.

UNIT III

SEQUENTIAL CIRCUITS-I:

Basic Architectural Distinctions between Combinational and Sequential circuits, Latches, Flip Flops: SR, JK, Race Around Condition in JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip-Flop, Timing and Triggering Consideration, Clock Skew, Conversion from one type of Flip-Flop to another.

UNIT IV

SEQUENTIAL CIRCUITS-II:

Synchronous – Asynchronous – Comparison, Design of Single mode Counter, Ripple Counter, Ring Counter, Shift Register, Shift Register Sequences, Ring Counter Using Shift Register, MOD Counters. Finite state machine-capabilities and limitations, Mealy and Moore models.

UNIT V

LOGIC FAMILIES AND SEMICONDUCTOR MEMORIES:

Logic Families: DCTL, RTL, DTL, TTL and CML Logic –gate realization - Comparison,

Semiconductor Memories: Introduction to ROM, PAL, PLA, CPLD, FPGA.

TEXT BOOKS:

1. Switching and finite automata theory, ZviKohavi&NirajK. Jha, Cambridge-3rdEdition.
2. Modern digital electronics – R. P. Jain, Tata McGraw-Hill-3rdEdition.

REFERENCE BOOKS:

1. Digital design, Morris Mano, PHI-4thEdition.
2. Introduction to switching theory and logic design, Fredriac J. Hill, Gerald R.Peterson, John Wiley & Sons Inc-3rdEdition.
3. Fundamentals of logic design- Charles H. Roth, Cengage Learning-5thEdition.

ELECTRICAL MACHINES-III

III Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand the construction and principle of operation of synchronous machine. Armature reaction, load characteristics, harmonics in generating EMFetc.
2. Solve regulation of synchronous generator using variousmethods.
3. Understand the concept of parallel operation of alternators, load sharing, change of excitation& prime-moverinput.
4. Understand the principle of operation of synchronous motor and working principle of a synchronous condenser in the system, powercircle.
5. Understand the use of special machines and theirperformances.

UNIT I
SYNCHRONOUS MACHINE & CHARACTERISTICS:
Constructional Features of round rotor and salient pole machines - Armature windings - Integral slot and fractional slot windings; Distributed and concentrated windings –Harmonics in generated EMF – suppression of harmonics –Excitation of Synchronous generators in thermal plants and Hydro plants- armature reaction - leakage reactance - synchronous reactance and impedance - experimental determination – phasor diagram - load characteristics.

UNIT II
REGULATION OF SYNCHRONOUS GENERATOR:
Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of Xd and Xq (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT III
PARALLEL OPERATION OF SYNCHRONOUS GENERATOR:
Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

UNIT IV
SYNCHRONOUS MOTORS:
Synchronous Motors: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed - hunting and its suppression – Methods of starting – V and inverted V curves.

UNIT V
SPECIAL MACHINES:
Principles of operation of Reluctance Motors, Stepper Motors, Permanent magnet Brushless DC Motors, Principle and operation of Servomotor.

TEXT BOOKS:

1. Electrical machinery, P.S. Bimbra, KhannaPublishers.
2. Theory and performance of electrical machines, J.B.Gupta, KatsonBooks.

REFERENCE BOOKS:

1. Electric machines, I. J. Nagrath& D. P. Kothari, Tata McGraw HillPublishers
2. Principles of electrical machines, V. K. Mehta, RohitMehta, S. ChandPublishing.
3. Electrical machines - III by M.V.BakshiU.A.Bakshi, TechnicalPublications.

POWER ELECTRONICS

III Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Understand about various power electronic devices and their commutationprocedure.
2. Analyze the operation of various phase-controlledconverters.
3. Analyze AC-AC converters and solve theproblems.
4. Analyze the operation of DC-DC converters understanding and solve theproblems.
5. Analyze the operation of DC-AC converters and understanding theproblems.

UNIT I
POWER SEMI CONDUCTOR DEVICES & COMMUNICATION CIRCUITS:
Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points. Two transistor analogy – SCR - UJT firing circuit - Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutationcircuits.

UNIT II
AC-DC CONVERTERS (1-PHASE CONTROLLED RECTIFIERS):
Phase control technique – Single phase Line commutated converters – Midpoint and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode –Numerical problems. Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numericalproblems.

UNIT III
AC-DC CONVERTERS (3-PHASE CONTROLLED RECTIFIERS):
Three phase converters – Three pulse and six pulse converters – Midpoint and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –NumericalProblems.
AC-AC CONVERTERS (AC VOLTAGE CONTROLLERS) & FREQUENCYCHANGERS (CYCLO-CONVERTERS): AC voltage controllers – Single phase two SCR's in anti-parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms – Firing circuits -Numerical problems -Cycloconverters – Single phase mid-pointcycloconverters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cycloconverter (Principle of operation only) – Waveforms.

UNIT IV
DC-DC CONVERTERS (CHOPPERS):
Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression, Jones chopper, AC Chopper, Problems. Switched Mode Regulator - SMPS (Basic Principle of Operation).

UNIT V
DC-AC CONVERTERS (INVERTERS):
Inverters – Single phase inverter – Basic series inverter, parallel inverter - operation and waveforms - Three phase inverters (180, 120 degrees conduction modes of operation) - Voltage control techniques for inverters, Pulse width modulation techniques - Numerical problems.

TEXT BOOKS:

1. Power electronics, Dr. P. S. Bimbhra, KhannaPublishers.
2. Power electronics, circuits, devices and applications, M. H. Rashid, Prentice Hall ofIndia.

REFERENCE BOOKS:

1. Power electronics devices, circuits and industrial applications, V. R. Moorthi, Oxford UniversityPress.
2. Power electronics, M. D. Singh &K. B. Kanchandhani, Tata McGraw - Hill Publishing Company.
3. Power electronics, VedamSubramanyam, New Age International (P) Limited,Publishers.

ELECTRICAL ENERGY CONSERVATION AND AUDITING
(Professional Elective-1)

III Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Understand the current energy scenario and importance of energyconservation.
2. Apply the concepts of energymanagement.
3. Evaluate energy efficiency in different electricalsystems.
4. Analyze the energy audit of different energysystems.
5. Analyze the energy audit of different energysystems.

UNIT I
ENERGY SCENARIO:
Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

UNIT II
BASICS OF ENERGY AND ITS VARIOUS FORMS:
Electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT III
ENERGY MANAGEMENT & AUDIT:
Definition, energy audit, need, types of energy audit. Energy management (audit) approach understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.
Energy Efficiency in Electrical Systems
Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

UNIT IV
ENERGY EFFICIENCY IN INDUSTRIAL SYSTEMS:
Compressed Air System: Types of air compressors, compressor efficiency, efficient compressor operation, Compressed air system components, capacity assessment, leakage test, factors affecting the performance and savings opportunities in HVAC, Fans and blowers: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Pumps andPumping System: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Cooling Tower: Types and performance evaluation, efficient system operation, flow control strategies and energy saving opportunities, assessment of cooling towers.

UNIT V

ENERGY EFFICIENT TECHNOLOGIES IN ELECTRICAL SYSTEMS:

Maximum demand controllers, automatic power factor controllers, energy efficient motors, soft starters with energy saver, variable speed drives, energy efficient transformers, electronic ballast, occupancy sensors, energy efficient lighting controls, energy saving potential of each technology.

TEXT BOOKS:

1. Guide books for national certification examination for energy manager/ energy auditors' book-1, general aspects.
2. Guide books for national certification examination for energy manager/ energy auditors' book-3, electricalutilities.

REFERENCE BOOKS:

1. Utilization of electrical energy and conservation, S. C. Tripathy, McGrawHill.
2. Success stories of energy conservation by BEE, NewDelhi.

ELECTRICAL ESTIMATION AND COSTING
(Professional Elective-I)

III Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Generalize estimation and costing aspects of all electricalequipment.
2. Determine the concepts of installation and designs to analyse the costviability.
3. Evaluate design aspects of wiring system, overhead and underground distribution lines, substations andilluminations.
4. Estimate the cost of various electrical designs andequipment.
5. Analyse overhead and underground transmission and distributionlines.

UNIT I

DESIGN OF SIMPLE ELECTRIC CIRCUITS:

Electrical diagrams- classification of diagrams according to purpose - methods of representation for wiring diagram. System of connection of appliances and accessories - schematic wiring and singleline diagram. Design and drawing of panel boards. Design conditions – standard sizes of boards – materialsused.

UNIT II

DESIGN CONSIDERATIONS OF ELECTRICAL INSTALLATIONS:

Electric Supply System - Three phase four wire distribution system - Protection of Electric Installation against over load - short circuit and Earth fault – Earthing - General requirements of electrical installations - testing of installations - Indian Electricity rules - Neutral and Earth wire.

UNIT III

Types of loads - Systems of wiring - Service connections - Service Mains- Sub-Circuits -Location of Outlets - Location of Control Switches - Location of Main Board and Distribution board - Guide lines for Installation of Fittings - Load Assessment - Permissible voltage drops and sizes of wires - Estimation and Costing of Electric installations.

UNIT IV

ELECTRICAL INSTALLATION FOR DIFFERENT TYPES OF BUILDINGS AND SMALL INDUSTRIES:

Electrical installations for residential buildings - estimating and costing of material - Electrical installations for commercial buildings - high rise buildings. Electrical installations for small industries.

UNIT V

OVERHEAD AND UNDERGROUND TRANSMISSION AND DISTRIBUTION LINES:

Introduction - Supports for transmission lines - Distribution lines - Materials used - Underground cables - Mechanical Design of overhead lines - Design of underground cables.

TEXT BOOKS:

1. Electrical design estimating and costing, K. B. Raina, S. K. Bhattacharya, New Age International Publisher-5thedition
2. Electrical installation estimating and costing, J.B.Gupta, S.K. Katria and Sons, New Delhi-8thedition.

REFERENCE BOOKS:

1. Guide for electrical layout in residential buildings, Indian StandardInstitution
2. Electrical installation buildings indian standard institution, IS:2032.
3. Electrical Installation, estimating and costing, J. B. Gupta, Katson,Ludhiana.

NON CONVENTIONAL ENERGY SOURCES
(Open Elective-1)

III Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Realize the importance of renewable energy sources for energyplanning.
2. Understand the value of solar energy potential and exploit the solar energy for real world applications.
3. Understand the potential of wind energy, types of wind mills, performance characteristics and Betz criteria.
4. Analyze the potential of both tidal and ocean thermal energies and learn the extraction methods.
5. Know the potential of geothermal, bio-mass energies and learn relevant extractionmethods.

UNIT I
PRINCIPLE OF RENEWABLE ENERGY:
Comparison of renewable and conventional energy sources-ultimate energy sources-natural energy currents on earth-primary supply to end use-spaghetti & pie diagrams-energy planning-energy efficient andmanagement.

UNIT II
SOLAR RADIATION:
Extraterrestrial and terrestrial solar radiation solar thermal conversion- solar thermal central receiver photovoltaic energy conversion-solar cell configurations.

UNIT III
WIND ENERGY:
Planetary and local winds-vertical and horizontal axis wind mills-principles of wind power-maximum power-actual power - wind turbine operation - Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

UNIT IV
ENERGY FROM OCEANS:
Ocean thermal energy -principles of OTEC plant operations-wave energy – devices for energy extraction-tides – types of tidal stations.

UNIT V
GEOTHERMAL AND BIO FUEL ENERGY:
Origin and types – Bio fuels – classification-direct combustion for heat and electricity generator-anaerobic digestion for biogas-biogas digester-power generation.

TEXT BOOKS:

1. Renewable energy sources, John Twidell&Timey&Weir.
2. Non-conventional energy sources, G.D. Rai, Khannapublications.

REFERENCE BOOKS:

1. Power plant technology, EL-Wakil, McGraw-Hill.
2. Renewable energy resources: basic principles and applications, G.N.Tiwari, M K. Ghosal, Narosa publishers.
3. Energy conversion systems, Rakosh das Begamudre, New age Internationalpublishers.

FUNDAMENTALS OF ELECTRICAL POWER GENERATION AND PROTECTION
(Open Elective-1)

III Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Interpret the operation of thermal power station through its schematicdiagram.
2. Observe the arrangement of hydroelectric power station through itscomponents.
3. Show various components of nuclear powerstation.
4. Describe the operation of gas and diesel power station through its schematicdiagram.
5. Differentiate various power system protectioncomponents.

UNIT I
THERMAL POWER STATIONS:
Introduction to Generating stations -Steam Power Stations-Advantages and disadvantages-Schematic arrangement of Steam power system - Choice of site of steam power station-Efficiency of steam power station-Equipment of steam powerstation.

UNIT II
HYDRO ELECTRIC POWER STATION:
Introduction–Advantages and Disadvantages-Schematic arrangement of Hydro Electric Power Station, Choice of site for Hydro Electric Power Station-Constituents of Hydro Electric Power Station-Pumped storageplants.

UNIT III
NUCLEAR POWER STATIONS:
Introduction-Advantages and Disadvantages-Selection of site for nuclear power station- - Nuclear Fission and Chain reaction. - Nuclear fuels. - Principle of operation of nuclear reactor- Schematic arrangement of nuclear power stations-Components of Nuclear Power plant- Radiation hazards: Shielding and Safety precautions.

UNIT IV
GAS AND DIESEL POWER STATION:
Gas Turbine Power Station: Introduction-Advantages and Disadvantages-Schematic arrangement of Gas turbine Power station.
Diesel Power station: Introduction-Advantages and Disadvantages-Schematic arrangement of Diesel Power station.

UNIT V
INTRODUCTION TO POWER SYSTEM PROTECTION COMPONENTS (ELEMENTARY TREATMENT ONLY):
Fuses-Definition-Advantages and Disadvantages of fuses-Desirable characteristics of fuse-fuse element materials-Important terms.
Circuit Breakers-Definition-Important terms-Comparison of fuse and Circuit breaker – Isolators-Protective relay-Requirement of Protective relay-Electrical Hazards – need of Earthing.

TEXT BOOKS:

1. Principles of power systems, V.K Mehta and RohitMehta S. Chand Company Pvt. Ltd, New Delhi-4thEdition.
2. A course in power systems, J.B.Gupta, S.K.Kataria& Sons.

REFERENCE BOOKS:

1. A text book of power system engineering, R.K.Rajput, Laxmi Publications (P)Limited.
2. Electrical Power Generation:Transmission and distribution, S.N.Singh,PHI.
3. Generation of electrical energy, B.R. Gupta,S.Chand.

ELECTRICAL MACHINES – II LAB

III Year ISemester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Understand the basic working principle of a transformer; obtain the equivalent circuit parameters, estimate efficiency & regulation at various loads of 1-Φtransformers.
2. Understand load sharing of transformers & conversion of 3- Φ to 2- Φsupply.
3. Determine the equivalent circuit parameters of a single phase induction motor, determine the performance characteristics and efficiency by direct and indirect methods of three phase inductionmotor.
4. Analyze the regulation of an alternator by various methods at different powerfactors.
5. Understand synchronous motor performance curves at various power factors and field currents.

Any Ten of the following experiments are required to be conducted.

1. Sumpner's test on a pair of single phasetransformer.
2. Separation of core losses of a single phasetransformer.
3. Scott connection of transformer and Parallel operation of single phasetransformer.
4. No-load & Blocked rotor tests on three phase inductionmotor.
5. Regulation of a three – phase alternate by synchronous impedance m.m.fmethods.
6. V and inverted V curves of a three – phase synchronousmotor.
7. Equivalent circuit of a single phase inductionmotor.
8. Determination of Xd and Xq of a salient pole synchronousmachine.

In addition to the above eight experiments alteast any two of the following experiments are required to be conducted from the following list.

9. Regulation of three phase alternator by Z.P.F. and A.S.Amethods.
10. Determination of sequence impedances of a three-phasealternator.
11. Determination of sequence impedances of a three-phasetransformer.
12. Speed control of three phase slip ring InductionMotor.

ADVANCED COMMUNICATION SKILLS (ACS)LAB
(Common to all branches)

III Year ISemester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Develop sound communication skills in various situations with the help of enriched vocabulary.
2. Practice reading techniques for a faster and bettercomprehension.
3. Exhibit strong writing skills to express ideaseffectively.
4. Demonstrate effective presentationskills.
5. Use appropriate verbal and non-verbal skills for a successfulcareer.

UNIT I
ACTIVITIES ON FUNDAMENTALS OF INTER-PERSONAL COMMUNICATION AND BUILDING VOCABULARY:
Starting a conversation – responding appropriately and relevantly – using the right body language - Role Play in different situations & Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

UNIT II
ACTIVITIES ON READING COMPREHENSION:
General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

UNIT III
ACTIVITIES ON WRITING SKILLS:
Structure and presentation of different types of writing – letter writing/ Resume writing/ Statement of purpose - E-correspondence/ Technical report writing / Portfolio writing – planning for writing – improving one's writing.

UNIT IV
ACTIVITIES ON PRESENTATION SKILLS:
Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.

UNIT V
ACTIVITIES ON GROUP DISCUSSION AND INTERVIEW SKILLS:
Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation. Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video – conference and Mock Interviews.

REFERENCE BOOKS:

1. Technical communication, Meenakshi Raman &Sangeeta Sharma, Oxford University-2nd Edition.
2. Functional english for success, OrientLongman.

QUANTITATIVE METHODS AND LOGICAL REASONING
(Common to all branches)

III Year ISemester

L	T	P	C
2	0	0	1

Course Outcomes: At the end of the course, the student should be able to
1. Perform well in various competitive exams and placementdrives.
2. Solve basic and complex mathematical problems in short time.
3. Become strong in quantitative aptitude and reasoning this can be applied for GRE, GATE, GMAT or CAT examalso.
4. Develop problem solving skills and analytical abilities, which play a great role in corporate and industry setup.

UNIT I
Number System: Speed Maths, Numbers, Factors, Prime & Co Primes, LCM & HCF, Divisibility Rules, Finding Unit Place Digit and Last Two Digits of an Expression
Ratio, Proportion and Variations: Definition of Ratio, Ratio of Proportion, Comparison of Ratios, Compound ratio, Direct and Indirect Proportion
Percentages: Converting Fractions and Decimal into Percentages, Successive Percentage, Populations, Expenditure andSavings
Profit and loss: Relation between Cost Price and Selling Price, Discount and Marked Price, Gain or Loss Percentages on Selling Price
Simple and Compound Interest: Problems on Interest (**I**), Amount (**A**), Principal (**P**) and Rate of Interest (**R**) difference between the Simple Interest and Compound Interest for 2 and 3 years.

UNIT II
Partnership: Relation between Partners, Period of Investment and Shares
Averages, Ages and Allegation : Average of Different Groups, Change in Averages by Adding, Deleting and Replacement of Objects, Problems on ages, Allegation Rule, Mean Value of the Mixture, Replacement of Equal Amount ofQuantity.
Time and Work: Men and Days, Work and Wages, Pipes and Cisterns, Hours and Work, Alternate Days Concept,
Time and Distance: Difference between the Average and Relative Speeds, Reaching the Destination Late and Early, Stoppage Time Per Hour, Time and Distance between Two Moving Bodies : Train Crossing Man - same and opposite directions, Speed of Boat and Stream,

UNIT III
Progressions and Quadratic Equations: Arithmetic, Geometric and Harmonic Progressions, Arithmetic Mean, Geometric Mean and Harmonic Mean and their Relations. General form of Quadratic Equation, Finding the Roots of Quadratic Equation, Nature of the Roots.
Permutation and Combination: Fundamental Rules, Problems on Permutations & combinations.
Probability: Definition of probability, Notations and Formulae, Problems on Probability.
Data Interpretation and Data Sufficiency: Tabular and Pie-charts, Bar and Line Graphs, Introduction to Data Sufficiency, Problems on Data Sufficiency.

UNIT IV
Deductions: Statements and conclusions using Venn diagram and Syllogism Method
Series completion: Number series, Alphabet series, Letter Series.
Coding and Decoding: Letter coding, Number coding, Number to letter coding, Matrix Coding, Substitution, Mixed Letter Coding, Mixed Number Coding, Deciphering Individual Letter Codes by Analysis.

Analytical Reasoning Puzzles:
Problems on Linear, Double line-up and Circular Aarrangements, Selections and Comparisons.

Blood Relations:
Defining the various Relations among the Members of a Family, Solving Blood Relation Puzzles by using Symbols and Notations. Problems on Coded Relations.

UNIT V
Direction sense Test: Sort of directions in puzzles distance between two points, problems on shadows, Application of triangulartriplets.
Clocks: Relation between Minute-Hour Hands, Angle vs Time, Exceptional Cases in Clocks **Calendars:** Definition of a Leap Year, Finding the Odd days, finding the Day of any Random Calendar Date, repetition of Calendar Years.
Cubes and Dices: Finding the Minimum and Maximum Number of Identical Pieces and Cuts, Painting of Cubes and cuts, Problems on Dice.
Venn Diagrams: Circular Representation of given words, Geometrical Representation of Certain class, Set theory based Problems.

TEXT BOOKS:

1. Verbal reasoning, GL Barrons, Pinterest-Latest Edition,2019
2. A modern approach to logical reasoning & quantitative aptitude, R S Agarwal, S. Chand, Publications, Revised edition,2019

REFERENCE BOOKS:

1. Quantitative aptitude, G.L Barrons, Pinterest,2019
2. Quantitative aptitude, AbhijitGuha, McGraw Hills- Edition2019
3. Quantitative aptitude, U. Mohan Rao, SCITECH

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Analyze all the types of measuring instruments and errorcompensations.
2. Discuss the operation of DC Crompton potentiometer; compare the CT and PT with phasor diagram.
3. Discuss and learn the concepts of power and energy measurement by using wattmeter and energymeter.
4. Outline the concept of DC and AC bridges for the measurement of resistance, inductance & capacitance.
5. Analyze the concepts of transducers and cathode rayoscilloscopes.

UNIT I

INTRODUCTION TO MEASURING INSTRUMENTS:

Classification-deflection, control and damping torques- Ammeters and Voltmeters- PMMC, moving iron type instruments- expression for the deflecting torque and control torque- Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters- electrometer type and attracted disc type.

UNIT II

POTENTIOMETERS& INSTRUMENT TRANSFORMERS:

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types, standardization- applications. CT and PT- Ratio and Phase angle errors (of CTonly).

UNIT III

MEASUREMENT OF POWER & ENERGY:

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of reactive power.

Single phase Induction type energy meter–driving and braking torques-errors and compensations – testing by phantom loading using RSS meter. Three phase energy meter- Maximum demand meters.

UNIT IV

D.C BRIDGES& A.CBRIDGES:

Method of measuring low, medium, high resistances – sensitivity of wheat- stone Bridge – carey foster's Bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance-loss of chargemethod

Measurement of Inductance – Q Factor – Maxwell's Bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle – Desauty Bridge. Wien's Bridge – ScheringBridge.

UNIT V

TRANSDUCERS & OSCILLOSCOPES:

Definition of transducers, classification of transducers, Advantages of Electrical transducers, characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers, LVDT Applications, Strain guage and its principle of operation, guage factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

CRO: Cathode ray oscilloscope – cathode ray tube – time base generator- horizontal and vertical amplifiers- Lissajous Patterns.

TEXT BOOKS:

1. A course in electrical and electronic measurements and instrumentation by A. K. Sawhney, PuneetSawhney, DhanpatRai&Co.
2. Electrical and electronic measurements and instrumentation, R.K.Rajput, S.Chand& company Ltd.

REFERENCE BOOKS:

1. Electrical measurements and measuring instruments, Golding E.W, Widdis F.C, Publisher: AH Wheeler &Company.
2. Electrical and electronic measurements, G.K. Banerjee, PHI Learning Pvt.Ltd.
3. Electrical Measurements and Measuring Instruments, N. V. Suryanarayana, Tata McGraw Hill.

COMPUTER METHODS IN POWER SYSTEMS

III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Demonstrate the knowledge and abilityto develop Y-bus and Z-busmatrices.
2. Know the importance of load flow studies and itsimportance.
3. Understand Per unit system
4. Compare various types of short-circuit faults.
5. Understand the power system steady state stability and transient statestability.

UNIT I

POWER SYSTEM NETWORK MATRICES:

Graph Theory: Definitions, Bus Incidence Matrix, Y-bus formation by Singular Transformation Methods and Direct Inspection methods, Numerical Problems.

FORMATION OF Z-BUS: Partial network, Algorithm for the Modification of Z-bus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Numerical Problems). Modification of Z-bus for the changes in network(Problems).

UNIT II

POWER FLOW STUDIES:

Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations, classification of Buses and their relevance to Power Flow.**LOAD FLOW SOLUTION USING GAUSS SEIDEL METHOD:** Acceleration Factor, Load flow solution without and with P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3- Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

NEWTON RAPHSON METHOD IN RECTANGULAR AND POLAR CO-ORDINATES FORM: Load Flow Solution without and with PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart (Max. 3-Buses).

DECOUPLED AND FAST DECOUPLED METHODS: Comparison of Different Methods – DC load Flow.

UNIT III

SHORT CIRCUIT ANALYSIS:

PER-UNIT SYSTEM OF REPRESENTATION: Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Needs and assumptions for short circuit analysis.

SYMMETRICAL FAULT ANALYSIS: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

SYMMETRICAL COMPONENT THEORY: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

UNSYMMETRICAL FAULT ANALYSIS: LG, LL, LLG faults without and with fault impedance, Numerical Problems.

UNIT IV

STEADY STATE STABILITY ANALYSIS:

Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State stability and methods to improve steady state stability.

UNIT V

TRANSIENT STABILITY ANALYSIS:

Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Case study – sudden loss of parallel lines, Critical Clearing Angle Calculation- Solution of Swing Equation: Point-by-Point Method. Methods to improveStability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

TEXT BOOKS:

1. Power system analysis, Dr. N. V. Ramana, Pearson EducationIndia.
2. Computer methods in power system analysis, Stagg and EL-Abiad, McGrawHill

REFERENCE BOOKS:

1. Modern power system analysis, I. J. Nagrath& D.P. Kothari, Tata McGraw Hill Publishing Company-4thEdition
2. Power system analysis, A. Nagoorkani, RBA Publications-3rdEdition
3. Power system analysis and stability, S. S. Vadhera, KhannaPublications

POWER SEMICONDUCTOR DRIVES

III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand the concepts of the dynamics of electric drives and speed control of different types of DC drives.
2. Analyze four quadrant operationto control speed of DCdrives using dual converters.
3. Examine four quadrant operationto control speed of DCdrives using choppers.
4. Discuss speed control of induction motor drives.
5. Study speed control of synchronous motor drives.

UNIT I

CONTROL OF DC MOTORS THROUGH PHASE CONTROLLED RECTIFIERS:

Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to DC separately excited and DC series motors -continuous current operation - output voltage and current waveforms- Speed and Torque expressions - Speed - Torque Characteristics- Problems on Converter fed DC motors. Three phase semi and fully controlled converters Connected to DC separately excited and DC series motors - output voltage and current waveforms - Speed and Torque expressions - Speed - Torque characteristics - Problems.

UNIT II

FOUR QUADRANT OPERATIONS OF DC DRIVES THROUGH DUAL CONVERTERS:

Introduction to Four quadrant operation - Motoring operations, Electric Braking - Plugging, Dynamic and Regenerative Braking operations, Four quadrant operation of D C motors by dual converters - Closed loop operation of DC motor (Block Diagram Only).

UNIT III

CONTROL OF DC MOTORS BY CHOPPERS (1, 2, 4 QUADRANT OPERATIONS):

Single quadrant, Two -quadrant and four quadrant chopper fed separately excited and series exacted motors - Continuous current operation - Output voltage and current wave forms - Speed torque expressions - speed torque characteristics - Problems on Chopper fed DC Motors - Closed Loop operation (Block Diagram Only).

UNIT IV

CONTROL OF INDUCTION MOTORS:

Variable voltage& Frequency Characteristics:

Control of Induction Motor by AC Voltage Controllers - Waveforms - speed torque characteristics. Variable frequency control of induction motor by Voltage source and current source Inverter and cyclo-converters- PWM control - Comparison of VSI and CSI operations - Speed torque Characteristics - numerical problems on induction motor drives - Closed loop operation of induction motor delves (Block Diagram Only).

Static rotor resistance control:

Slip power recovery - Static Scherbius drive – Static Kramer Drive - their performance and speed torque characteristics - advantages applications - problems.

UNIT V

CONTROL OF SYNCHRONOUS MOTORS:

Separate control &self-control of synchronous motors - Operation of self-controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor - Operation - Waveforms - speed torque characteristics - Applications -Advantages and Numerical Problems Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI. Principle of operation of BLDC motor drive.

TEXT BOOKS:

1. Fundamentals ofelectricaldrives, G. K. Dubey, Alpha Science International Limited-2nd Edition.
2. Power semiconductor drives, J.Gnanavadivel, AnuradhaPublications.

REFERENCE BOOKS:

1. Power semiconductor drives, PV Rao, BSPublications.
2. Thyristorcontrol of electric drives, VedamSubramanyam, Tata McGraw HillPublications.
3. A first course on electrical drives, S K Pillai, New Age International (P) Ltd-2ndEdition

SWITCH GEAR AND PROTECTION

III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Know basic working of circuit breaker and classification of circuitbreakers.
2. Make out the application of different types of circuits breakers in powersystems.
3. Understand Principle of operation of over current, directional, differential and distancerelays.
4. Device protection methods for alternators, transformers,bus-bars.
5. Gain concept of neutral grounding and protection Method list from different types ofsurge.

UNIT I

CIRCUIT BREAKERS:

Circuit Breaker (CB) – Elementary principles of arc interruption, Recovery– Restriking Voltage and Recovery voltages–Restriking phenomenon–Average and Max. RRRV–Numerical problems-Current chopping and Resistance switching–CB ratings and specifications: Types and Numerical problems-Auto reclosing. Description and operation of following types Circuit Breaker: Minimum Oil Circuit Breaker, Air Blast Circuit Breaker–Vacuum and SF6 circuit breakers.

UNIT II

ELECTROMAGNETIC, STATIC RELAYS & NUMERICAL RELAYS:

Principle of operation and construction of attracted armature– Balanced beam– induction disc and induction cup relays– Relays classification– Instantaneous– DMT and IDMT types– Applications of relays: Over current/under voltage relays– Directional relays– Differential relays and percentage differential relays.

Distance relays: Impedance– Reactance– Mho and offset Mho relays– Characteristics of distance relays Comparison of numerical relays & static relays with electromagnetic relays.

UNIT III

GENERATOR & TRANSFORMER PROTECTION:

Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples on percentage windings unprotected. Protection of transformers: Percentage differential protection– Numerical problems on Design of CT's ratio– Buchholz relay protection.

UNIT IV

FEEDER AND BUS BAR PROTECTION& GROUNDING PROTECTION OF LINES:

Over current– earth fault, Carrier current and three zone distance relay using impedance relays– Translay relay–Protection of bus bars– Differential protection.

NEUTRAL GROUNDING

Grounded & ungrounded neutral systems.-Effects of ungrounded neutral system performance. Methods of neutral grounding: Solid resistance, reactance-Arcing grounds& grounding practice.

UNIT V

PROTECTION AGAINST OVER VOLTAGE AND GROUNDING:

Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc–Oxide lighting arresters– Insulation coordination– BIL– impulse ratio–. Earthing Practices in Substations.

TEXT BOOKS:

1. Switchgear and protection, Sunil.S.Rao, Khannapublishers.
2. Power system protection and switchear gear, Badriram, D. N. Viswakarma Tata McGraw Hill Education-2ndEdition.

REFERENCE BOOKS:

1. Electrical power systems, C. L. Wadhwa, New age international (P) limited-4thEdition.
2. A Textbook on power system engineering, M. L. Soni, P. V. Gupta, U. S. Bhatnagar, A.Chakrabarthy, DhanapatRai& Copvt.ltd.
3. Principles of power system, V.K Mehtha&RohitMehtha, S.Chand company Pvt. Ltd-4th Edition.

INTEGRATED CIRCUITS AND APPLICATIONS
(Professional Elective-2)

III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Remember the characteristics of different integrated circuitsfamilies.
2. Infer the different applications of operational amplifiers under differentconfigurations.
3. Recognize the importance of special function integrated circuits on different engineering applications.
4. Interpret the need for data converters for real timeapplications.
5. Design and analysis of first order active filter and waveform generators using operational amplifiers.

UNIT I
INTEGRATED CIRCUITS:
Classification, chip size and circuit complexity, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT II
OP-AMP AND APPLICATIONS:
Basic information of OP-AMP, ideal and practical OP-AMP, internal circuits, OP-AMP characteristics, DC and AC characteristics, 741 OP-AMP and its features, modes of operation- inverting, non-inverting, differential. Basic application of OP-AMP, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, introduction to voltageregulators.

UNIT III
ACTIVE FILTERS & OSCILLATORS:
Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, saw tooth, square wave and VCO.

UNIT IV
TIMERS & PHASE LOCKED LOOPS:
Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT V
D-A AND A-DCONVERTERS:
Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and slope ADC. DAC and ADC specifications.

TEXT BOOKS:
1. Linear integrated circuit, D. Roy Chowdhary, New Age International(p) Ltd-2ndEdition
2. Op-amps and linear Integrated Circuits, RamakanthA. Gayakwad,PHI.

REFERENCES BOOKS:
1. Operational amplifiers and linear integrated circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational amplifiers and linear integrated circuits: Theory & Applications, Denton J. Daibey,TMH.
3. Digital fundamentals - Floyd and Jain, Pearson Education-8thEdition.

ARTIFICIAL INTELLIGENCE TECHNIQUES IN ELECTRICAL ENGINEERING
(Professional Elective-2)

III Year II Semester

L	T	P	C
3	0	0	3

Course Objectives:

1. To locate soft commanding methodologies, such as artificial neural networks, fuzzy logic and geneticalgorithms.
2. To observe the concepts of feed forward neural networks and about feedback neuralnetworks.
3. To practice the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control and to design the fuzzycontrol.
4. To analyze genetic algorithm, genetic operations and geneticmutations.

Course Outcomes: At the end of the course, the student should be able to

1. Understanding artificial neural networks.
2. Generalize feed forward neural networks, feedback neural networks and learningtechniques.
3. Identify fuzziness involved in various systems and fuzzy settheory.
4. Discover fuzzy logic control for applications in electricalengineering.
5. Interpret genetic algorithm for applications in electrical engineering.

UNIT I
ARTIFICIAL NEURAL NETWORKS:
Introduction, Models of Neuron Network-Architectures –Knowledge representation, Artificial Intelligence and Neural networks–Learning process-Error correction learning, Hebbian learning – Competitive learning-Boltzman learning, supervised learning-Unsupervised learning–Reinforcement learning-Learning tasks.

UNIT II
ANN PARADIGMS:
Multi-layer perceptron using Back propagation Algorithm (BPA), Self –Organizing Map (SOM), Radial Basis Function Network-Functional Link Network (FLN), Hopfield Network.

UNIT III
FUZZYLOGIC:
Introduction –Fuzzy versus crisp, Fuzzy sets-Membership function –Basic Fuzzy set operations, Properties of Fuzzysets –Fuzzy Cartesian Product, Operations on Fuzzy relations - Fuzzy logic–Fuzzy Quantifiers, Fuzzy Inference-Fuzzy Rule based system, Defuzzification methods.

UNIT IV
GENETIC ALGORITHMS:
Introduction-Encoding –Fitness Function-Reproduction operators, Genetic Modeling -Genetic operators-Cross over-Single site cross over, Two point cross over –Multi point cross over Uniform cross over, Matrix cross over-Crossover Rate-Inversion & Deletion, Mutation operator –Mutation – Mutation Rate-Bit-wise operators, Generational cycle-convergence of Genetic Algorithm.

UNIT V
APPLICATIONS OF AI TECHNIQUES:
Load forecasting, Load flow studies, Economic load dispatch, Load frequency control, Single area system and twoarea system, Reactive power control, Speed control of DC and AC Motors.

TEXT BOOKS:

1. Neural networks, fuzzy logic and genetic algorithms, S.Rajasekaran and G.A.V.Pai PHI, New Delhi.
2. Neural networks: A comprehensive foundation, Simon O Haykin, International Edition-2nd Edition.

REFERENCE BOOKS:

1. Neural computing theory & practice, P.D.Wasserman&Van Nostrand Reinhold, NewYork.
2. Neural network & fuzzy system, Bart Kosko, PrenticeHall.
3. Genetic algorithms, D.E.Goldberg, PearsonEducation.

ENERGY AUDITING & CONSERVATION
(Open Elective-2)

III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Realize the need for energy auditing and conservation. Get awareness on types of energy audit; represent energy flows and energy consumption in tabular and graphicalmethods.
2. Understand and exploit energy saving opportunities in energy efficient motors and power factor improvementmethods.
3. Learn energy auditing and conservation opportunities in HVAC systems with respect to energy efficientbuildings.
4. Analyze economic viability with respect to real world problems using depreciationmethods.
5. Know the check lists for energy conservation in boilers, heat pumps, cooling systems, compressors andfans.

UNIT I
BASIC PRINCIPLES OF ENERGY AUDIT:
Energy audit-definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes. Energy audit of industries, Energy saving potential, Energy audit of process industry, and thermal power station.

UNIT II
ENERGY EFFICIENT MOTORS, POWER FACTOR IMPROVEMENT& LIGHTING:
Energy efficient motors, factors affecting efficiency, variable speed, variable duty cycle systems, effect of Voltage variation on motors, motor energy audit. Power factor- methods of improvement, location of capacitors, Pf with nonlinear loads- Good Lighting system design and practice, lighting control, lighting energyaudit.

UNIT III
ENERGY EFFICIENT BUILDINGS:
Green Buildings, Intelligent Buildings, Rating of Buildings, Efficient use of Buildings, Ventilation Solar Passive Architecture. Adoption to sustainable resources such as PV modules, solar heating, Cooling Techniques, Energy audit and conservation opportunities.

UNIT IV
ECONOMIC ASPECTS AND ANALYSIS:
Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis-calculation of simple payback method, net present worth method-Applications of cycle costing analysis, return ofinvestment.

UNIT V
ENERGY CONSERVATION OPPORTUNITIES:
Energy conservation checklist, Energy conservation opportunities in boilers, Heat pumps and cooling systems, chilled water Plants and Central air- conditioning systems, Water Heaters and coolers, Compressors and Fans.

TEXT BOOKS:

1. Energy management, W.R. Murphy and G. McKay Butter worth, Heinemannpublications.
2. Energy efficient electric motors, John .C. Andreas, Marcel Dekker Inc Ltd-3rdEdition

REFERENCE BOOKS:

1. Energy management, Paul o' Callaghan, McGraw Hill Book company-1stEdition.
2. Energy management hand book, W.C.Turner, John Wiley and sons-7thEdition.
3. Energy management and good lighting practice: fuel efficiency - booklet1&2 - Great Britain Energy EfficiencyOffice.

PRINCIPLES OF ELECTRIC POWER UTILIZATION
(Open Elective - 2)

III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Understand terms and concepts ofillumination.
2. Apply the concepts of different electric lamps and good lighting Practices for artificial lighting systems.
3. Understands the methods of electric heating andwelding
4. Understands the concepts of different electric traction systems and existing traction system in India.
5. Analyze the mechanics of trainmovement.

UNIT I
ILLUMINATION FUNDAMENTALS:
Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

UNIT II
VARIOUS ILLUMINATION METHODS:
Discharge lamps, MV and SV lamps- comparison between tungsten filament lamps and fluorescent tubes, Basic Principles of Light Control, Types and design of lighting and flood lighting. Energy efficient Lights.

UNIT III
ELECTRIC HEATING & WELDING:
Advantages and methods of electric heating, resistance heating induction heating and dielectric heating. Electric Welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. welding.

UNIT IV
ELECTRIC TRACTION - I:
System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, Methods of electric braking-plugging Rheostatic braking and regenerative braking.

UNIT V
ELECTRIC TRACTION – II:
Mechanics of train movement, Speed-time curves for different services- trapezoidal and quadrilateral speed time curves.

TEXT BOOKS:

1. Utilization of electrical power,Er. R. K. Rajput, Laxmi Publications (P) Ltd-1stEdition.
2. Utilization of electric power and electric traction, J.B.Gupta, S.K.Kataria& Sons publication-10thEdition.

REFERENCE BOOKS:

1. Utilization of electric energy, E. Openshaw Taylor, Orient Longman (P)Ltd
2. Generation, distribution and utilization of electrical energy, C.L.Wadhwa, New Age International (P) Ltd-3rdEdition.
3. Utilization of electric power, N. V. Suryanarayana, New Age International (P)Ltd.

CONTROL SYSTEMS AND SIMULATION LAB

III Year II Semester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Examine the time response of second order systems, synchros, and truth tables verification by PLC.
2. Design of AC servomotor and DC servomotor to find out their transfer functionpractically.
3. Design of DC motor, DC generator, and finding out their transfer function practically.
4. Analyze magnetic amplifiercharacteristics.
5. Explain stability analysis through bode, Nyquist and root locus plots usingMATLAB.

Any Ten of the following experiments are to be conducted

1. Time response of Second ordersystem.
2. Characteristics ofSynchros.
3. Programmable logic controller Study and verification of truth tables of logic gates, simple. Boolean expressions and application of speed control ofmotor.
4. Effect of feedback on DC servomotor.
5. Transfer function of DCmotor.
6. Transfer function of DC Shuntgenerator.
7. Characteristics of magneticamplifiers.
8. Characteristics of AC servomotor.
9. Simulation of Op-Amp based Integrator and Differentiatorcircuits.
10. Linear system analysis (Time domain analysis, Erroranalysis).
11. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using simulationsoftware.
12. State space model for classical transfer function– Verification using simulationsoftware.

POWER ELECTRONICS AND SIMULATION LAB

III Year II Semester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Examine the characteristics of SCR, MOSFET, & IGBT, and analyze triggeringcircuits.
2. Analyze input and output chrematistics of AC-DCconverters.
3. Synthesize input and output chrematistics of cycloconverters.
4. Examine input and output chrematistics of DC-DCConverters.
5. Design of converters and inverters using P-Spicesoftware.

Any ten of the following experiments are required to be conducted.

1. Study of the characteristics of SCR, MOSFET &IGBT.
2. Gate Firing Circuits for SCRs (R- Triggering, RC Triggering & UJTTriggering).
3. Single Phase AC voltage Controller with R & RL Loads.
4. Single Phase fully Controlled Bridge Converter with R& RLLoads.
5. DC Jones Chopper with R & RLLoads.
6. Single Phase Parallel Inverter with R& RLLoads.
7. Single Phase Cyclo-Converter with R& RLLoads.
8. Single Phase Series Inverter with R& RLLoads.
9. Single Phase Half controlled converter with R Load.
10. Simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLEloads.
11. Simulation of resonant pulse commutation circuit and BuckChopper.
12. Simulation of single phase Inverter with PWMcontrol.

PERSONALITY DEVELOPMENT AND BEHAVIOURAL SKILLS
(Common to all branches)

III Year II Semester

L	T	P	C
2	0	0	1

Course Outcomes: At the end of the course, the student should be able to

1. Practice optimistic attitude for an efficient socially viable and multi-facetedpersonality.
2. Demonstrate functions of non-verbal communication in formalcontext.
3. Build effective individual & team dynamics for professionalaccomplishments.
4. Analyze appropriate strategic Interpersonal Skills for productive workplacerelationships.
5. Correspond in multiple contexts, for varied audiences, across genres andmodalities.

UNIT I
PERSONALITY DEVELOPMENT:
Definition Various Aspects of Personality Development Behavioural Traits. Importance of Soft Skills for personal and professional development - Success stories.

UNIT II
NON VERBAL COMMUNICATION:
Kinesics, Haptics, Proxemics, Vocalics, Oculesics
Body Language in formal contexts such as Group Discussions, Presentations and Interviews.

UNIT III
TEAM DYNAMICS:
Different Types of Teams Role of an individual communicating as a group or team leader. Individual Presentations/Team Presentation - Project Presentations- Case Studies.

UNIT IV
INTERPERSONAL SKILLS:
Time Management Stress Management Emotional Intelligence Conflict Management Relationship Management.

UNIT V
DIGITAL CORRESPONDENCE:
Role of Multimedia in Communication Communication in a Digital Edge (Video Conference Etc.) Social Networking: Importance and Effects.

TEXT BOOK:

1. Personality Development and Soft Skills, Preparing for Tomorrow, Shikha Kapoor-2nd Edition, 2020.

REFERENCE BOOKS:

1. Personality Development and Soft Skills, Barun, K Mitra, Oxford University Press-2nd Edition, 2016
2. Professional Ethics. R Subramanian, Oxford University Press-2nd Edition,2015

COURSE STRUCTURE

IV Year I Semester

S. No	Course Category	Course Title	L	T	P	Credits
1	PC -14	Microprocessors and Interfacing Devices	3	0	0	3
2	PC -15	Power Systems Operation and Control	3	0	0	3
3	PE - 3	Electric Vehicles/ Smart Grids	3	0	0	3
4	PE – 4	Electrical Distribution Systems/ Industrial Electrical Systems	3	0	0	3
5	OE-3	Electric Vehicles and Hybrid Vehicles/ Energy Storage Systems	3	0	0	3
6	PC Lab – 9	Microprocessors and Interfacing Lab	0	0	2	1
7	PC Lab – 10	Electrical Measurements Lab	0	0	2	1
8	PW-1	Mini Project	0	0	0	3
		Total	**15**	**0**	**4**	**20**

IV Year II Semester

S. No	Course Category	Course Title	L	T	P	Credits
1	PC -16	Utilization of Electrical Energy	3	0	0	3
2	PC -17	Renewable Energy and Energy Storage Technologies	3	0	0	3
3	TS	Technical Seminar	2	0	0	2
4	CVV	Comprehensive Viva Voce	0	0	0	2
5	PW-2	Major Project	0	0	0	10
		Total	**8**	**0**	**0**	**20**

COURSE STRUCTURE (for FAST TRACK)

IV Year I Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1	PC -14	Microprocessors and Interfacing Devices	3	0	0	3
2	PC -15	Power Systems Operation and Control	3	0	0	3
3	PE - 3	Electric Vehicles/ Smart Grids	3	0	0	3
4	PE – 4	Electrical Distribution Systems/ Industrial Electrical Systems	3	0	0	3
5	OE-3	Electric Vehicles and Hybrid Vehicles/ Energy Storage Systems	3	0	0	3
6	PC Lab – 9	Microprocessors and Interfacing Lab	0	0	2	1
7	PC Lab – 10	Electrical Measurements Lab	0	0	2	1
8	PW-1	Mini Project		0	0	3
9	PC - 17	Renewable Energy and Energy Storage Technologies	3	0	0	3
		Total	**18**	**0**	**4**	**23**

IV Year II Semester

S.No.	Course Category	Course Title	L	T	P	Credits
1	TS	Technical Seminar	2	0	0	2
2	CVV	Comprehensive Viva Voce	0	0	0	2
3	PW-2	Major Project	0	0	0	10
		Total	**2**	**0**	**0**	**14**

MICROPROCESSORS AND INTERFACING DEVICES

IV Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Illustrate the internal architecture of 8086 and8051.
2. Understand and apply the fundamentals of assembly level programming of microprocessors andmicrocontroller.
3. Explain the use of interrupts with suitableexamples.
4. Demonstrate the interfacing of various peripheral devices with the microprocessor8086.
5. Design electrical circuitry to the Microcontroller I/O ports in order to interface the controller to externaldevices.

UNIT I

8086 MICROPROCESSOR:

Introduction to 8085 microprocessor- 8086 architecture- Functional Diagram- Register Organization- Memory segmentation- Memory addresses- physical memory organization- Signal descriptions of 8086-common function signals- Minimum and Maximum mode operation- Timing diagrams- Interruptstructure.

UNIT II

ASSEMBLY LANGUAGE PROGRAMMING USING 8086:

Instruction formats- addressing modes- instruction set- assembler directives-procedures-macros- Simple programs.

UNIT III

INTERFACING WITH 8086 MICROPROCESSOR:

8255 Programmable Peripheral Interface-Various Modes of Operation-Interfacing Keyboard- Display- Stepper motor- ADC-DAC-8259 Programmable Interrupt Controller -8257 DMA controller.

UNIT IV

COMMUNICATION INTERFACE:

Serial communication standards- serial data transfer schemes- 8251 USART architecture and Interfacing- RS 232-TTL to RS 232C and RS 232C to TTL conversion. Simple programs on serial datatransfer-IEEE-488.

UNIT V

INTRODUCTION TO MICROCONTROLLERS:

Overview of 8051 microcontroller- Architecture- I/O ports and Memory organization- addressing modes and instruction set of 8051- Simple programs.

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals,A. K. Ray and K.M. Bhurchandi, TMH-3rd Edition2017.
2. The 8051 Micro controller, Kenneth. J. Ayala, Cengage Learning -3rdEdition.

REFERENCES:

1. The 8051Microcontrollers- Architecture and Programming and Applications,K.Uma Rao- AndhePallavi- Pearson-2009.
2. Micro Computer System 8086/8088 Family Architecture- Programming and Design, Liu and GA Gibson- PHI- 2ndEdition.
3. Microcontrollers and Application,Ajay. V. Deshmukh, TMGH-2005.

POWER SYSTEM OPERATION AND CONTROL

IV Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand economic operation of power systems.
2. Analyze and compute optimal loading of generators for a particular loaddemand.
3. Develop mathematical models of turbines and governors.
4. Address load frequency control problem.
5. Explain how series and shunt compensation helps in reactive power control.

UNIT I

ECONOMIC OPERATION OF POWER SYSTEMS:

Optimal operation of Generators in Thermal Power Stations heat rate Curve Cost Curve Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses Loss Coefficients, General transmission line loss formula.

UNIT II

HYDROTHERMAL SCHEDULING:

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems- Short term hydrothermal scheduling problem.

UNIT III

MODELING:

Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

Modeling of Governor: Mathematical Modeling of Speed Governing System - Derivation of small signal transfer function.

Modeling of Excitation System: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model

UNIT IV

LOAD FREQUENCY CONTROL:

Single Area Load Frequency Control: Necessity of keeping frequency constant. Definitions of Control area Single area control Block diagram representation of an isolated power system Steady state analysis Dynamic response Uncontrolled case.

Load frequency control of 2-area system uncontrolled case and controlled case, tie-line bias control.

Load Frequency Controllers: Proportional plus Integral control of single area and its block diagram representation, steady state response Load Frequency Control and Economic dispatch control.

UNIT V

REACTIVE POWER CONTROL:

Overview of Reactive Power control Reactive Power compensation in transmission systems advantages and disadvantages of different types of compensating equipment for transmission systems. Load compensation–Specifications of load compensator,Uncompensated and compensated transmission lines: Shunt and SeriesCompensation.

TEXT BOOKS:

1. Modern power system analysis, I.J. Nagarath& D.P. Kothari, Tata McGraw Hill Publishing Company Ltd -4th Edition.
2. Power systems analysis and stability, S.S Vadhera, Khanna Publications- 4thEdition.

REFERENCE BOOKS:

1. Power generation, operation and control, Allen J. Wood, Bruce F. Wollenberg, Gerald B. Sheble, Wiley -3rdEdition.
2. Power system stability and control, PrabhaKundur, McGraw Hill companies-IndeanEdition.
3. Power system operation and control, Dr.K.Uma Rao, Wiley IndiaPvt.Ltd.

ELECTRIC VEHICLES
(Professional Elective – 3)

IV Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Understand the components of Electric Vehicles and Fundamentals of ElectricVehicles.
2. Explain the types of batteries and principles of operation ofbatteries.
3. Pursue the basic principles of Electric motors which can be used in Electricvehicles.
4. Apprehend the transmission of the drive system and the components oftransmission.
5. Understand the concepts of hybrid vehicles and analyze the performance of hybridvehicles.

UNIT I
ELECTRIC VEHICLES:
Introduction to Electric Vehicles - History of Electric and Hybrid Vehicles – Components - vehicle mechanics - Roadway fundamentals - vehicle kinetics - Dynamics of vehicle motion - Propulsion System Design.

UNIT II
BATTERIES:
Basics - Types - Parameters - Capacity - Discharge rate - State of charge - State of Discharge - Depth of Discharge - Technical characteristics - Battery pack Design - Properties of Batteries.
Fuel Cells - Types - Fuel Cell Electric Vehicle.

UNIT III
DC & AC ELECTRICAL MACHINES (Speed control Techniques):
Motor and Engine rating - Requirements - Speed control techniques of DC machines in Electric Vehicles - Speed control techniques of three phase A/c machines - Induction machines - Permanent Magnet Machines, Switched Reluctance Machines.

UNIT IV
ELECTRIC VEHICLE DRIVE TRAIN:
Transmission configuration - Components - gears, differential, clutch, brakes regenerative braking- motor sizing- Gear Ratio - Torque speed characteristics - EV Motor Sizing Initial Acceleration - Rated Vehicle Velocity - Maximum Velocity - MaximumGradability.

UNIT V
HYBRID ELECTRIC VEHICLES:
Types of Hybrid Vehicles - series and parallel Hybrid Electric Vehicles, series- parallel configuration - Internal Combustion Engines - Reciprocating Engines - Practical and Air-Standard Cycles - Air-Standard Otto Cycle - Air-Standard Diesel Cycle - Example IC Engines in HEVs - Design - Drive train - sizing ofcomponents.

TEXT BOOKS:

1. Electric & hybrid vehicles - Design Fundamentals, Iqbal Hussain, CRC Press - 2ndEdition.
2. Electric vehicle technology explained, James Larminie, John Lowry, and Wiley& Sons-2nd Edition.

REFERENCE BOOKS:

1. Modern electric, hybrid electric, and fuel cell vehicles: fundamentals, theory and design, MehrdadEhsani, YiminGao, Ali Emadi, CRC Press - 2ndEdition.
2. Electric vehicle battery systems,Sandeep Dhameja - KindleEdition.

SMART GRIDS
(Professional Elective-3)

IV Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Report the features of SmartGrid.
2. Outline the smart gridarchitecture.
3. Optimize Transmission and Distribution systems.
4. Represent operation and importance of PMUs,WAMS.
5. Discover control techniques for micro grid and smartgrid.

UNIT I
INTRODUCTION TO SMART GRID:
Introduction to Smart Grid Working definitions of Smart Grid and Associated Concepts Smart Grid Functions Traditional Power Grid and Smart Grid New Technologies for Smart Grid Advantages Indian Smart Grid - Key Challenges for Smart Grid.

UNIT II
SMART GRID ARCHITECTURE:
Components and Architecture of Smart Grid Design - Review of the proposed architectures for Smart Grid, fundamental components of Smart Grid designs Transmission AutomationDistribution Automation Renewable energy Integration.

UNIT III
COMPUTATIONAL TECHNIQUES FOR SMART GRIDS:
Tools and Techniques for Smart Grid: Computational Techniques Static and Dynamic Optimization Techniques Computational Intelligence Techniques Evolutionary Algorithms Artificial Intelligence techniques.
Distribution Generation Technologies: Introduction to Renewable Energy Technologies Micro grids Storage Technologies Electric Vehicles and plug in hybrids Environmental impact and Climate Change Economic Issues.

UNIT IV
COMMUNICATION TECHNOLOGIES AND SMART GRID:
Introduction to Communication Technology - Synchro-Phasor Measurement Units (PMUs) Wide Area Measurement Systems (WAMS) Introduction to Internet of Things (IOT) Applications of IOT in Smart Grid.

UNIT V
CONTROL OF SMART POWER GRID SYSTEM:
Load Frequency Control (LFC) in Micro Grid System Voltage Control in Micro Grid System Reactive Power Control in Smart Grid. Case Studies and Test beds for the Smart Grids.

TEXT BOOKS:
1. Smart grids, infrastructure, technology and solutions, Stuart Borlase, CRC Press - 1stEdition.
2. Renewable and efficient electric power system, Gil Masters, Wiley–IEEE Press - 2ndEdition.

REFERENCE BOOKS:
1. Synchronizedphasor measurements and their applications, A.G.Phadke and J.SThorp, Springer - 2ndEdition.
2. Wind power in power systems, T. Ackermann, Hoboken, NJ, USA, John Wiley - 2ndEdition.

ELECTRICAL DISTRIBUTION SYSTEMS
(Professional Elective-4)

IV Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Distinguish between transmission and distribution systems. Classification of loads and their characteristics.
2. Understand design considerations of distribution feeders andsubstations.
3. Compute voltage drop and power loss infeeders.
4. Understand protection and coordination of distributionsystems.
5. Examine the power factor improvement and voltagecontrol.

UNIT I
INTRODUCTION & GENERAL CONCEPTS:

Introduction to distribution systems: Load modeling and characteristics. Coincidence factor, contribution factor, loss factor - Relationship between the load factor and loss factor.
Classification of Loads:
Residential, commercial, Agricultural, Industrial loads and their characteristics.

UNIT II
DISTRIBUTION FEEDERS & SUBSTATIONS:

Design Considerations Of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system.
Substations:
Rating of distribution substation, service area with in primary feeders. Benefits derived through optimal location of substations.

UNIT III
DISTRIBUTION SYSTEM ANALYSIS:
Voltage drop and Power-Loss Calculations - Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT IV
PROTECTIVE DEVICES & CO-ORDINATION:
Objectives of distribution system protection, types of common faults and procedure for fault calculations.
Protective Devices - Principle of operation of Fuses, Circuit reclosure, and line sectionalizers, and circuit breakers.
Coordination of Protective devices -General co-ordination procedure.

UNIT V
VOLTAGE CONTROL & POWER FACTOR IMPROVEMENT:
Equipment for voltage control, effect of series capacitors, line drop Compensation, effect of AVB/AVR. Power-factor control using different types of power capacitors, shunt and seriescapacitors, effect of shunt capacitors (Fixed and Switched), capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

TEXT BOOKS:

1. Electric power distribution system engineering, TuranGonen, CRC Press-3rdEdition.
2. Electrical distribution systems, Dr.S.Siva Naga Raju, Dr.K.Shankar, DanapathiRai Publications-2ndEdition.

REFERENCE BOOKS:

1. Electric power distribution, A.S. Pabla, Tata McGraw Hill Publishing Company - 7thEdition.
2. Electrical power distribution systems, V.Kamaraju, Tata McGraw Hill Publishing company - 2ndEdition.
3. Electrical power distribution hand book, G. Ram Murthy, University Press-2ndEdition.

INDUSTRIAL ELECTRICAL SYSTEMS
(Professional Elective-4)

IV Year ISemester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Review electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings,SLD.
2. Distinguish residential and commercial electricalsystems.
3. Identify various illuminationschemes.
4. Select industrial load, motor, transformer and othercomponents.
5. Carry out selection of industrial power backscheme.

UNIT I
ELECTRICAL SYSTEM COMPONENTS:
LT system wiring components, selection of cables, wires, switches, distribution box, metering system. Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

UNIT II
RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS:
Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing ofcomponents.

UNIT III
ILLUMINATION AND INDUSTRIAL ELECTRICAL SYSTEM AUTOMATION:
Illumination Systems:
Understanding various terms regarding light, lumen intensity, candle power, lamp efficiency,
specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

Industrial Electrical System Automation:
Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

UNIT IV
INDUSTRIAL ELECTRICAL SYSTEMS I:
HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction - kVAR calculations, types of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

UNIT V
INDUSTRIAL ELECTRICAL SYSTEMS II:
DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

TEXT BOOKS:

1. Electrical wiring, estimating & costing, S.L.Uppal and G.C.Garg, Khannapublishers-2008.
2. Electrical design, estimating & costing, K. B. Raina, New age International-2007.

REFERENCE BOOKS:

1. Web site for ISstandards.
2. Residential commercial and industrial systems, H. Joshi, McGraw HillEducation-2008.
3. Electrical estimating and costing, S. Singh and R. D. Singh,DhanpatRai andCo-1997

ELECTRIC VEHICLES AND HYBRID VEHICLES
(Open Elective – 3)

IV Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Understand the components of electric vehicles and fundamentals of electricvehicles.
2. Explain the types of batteries and principles of operation ofbatteries.
3. Pursue the basic principles of electric motors which can be used in electricvehicles.
4. Apprehend the transmission of the drive system and the components oftransmission.
5. Understand the concepts of hybrid vehicles and analyze the performance of hybridvehicles.

UNIT I
ELECTRIC VEHICLES:
Introduction to Electric Vehicles History of Electric Vehicles Components vehicle mechanics Roadway fundamentals vehicle kinetics Dynamics of vehicle motion Propulsion System Design.

UNIT II
BATTERIES:
Basics Types Parameters Capacity Discharge rate State of charge state of Discharge Depth of Discharge Technical characteristics Battery pack Design Properties of Batteries. Fuel Cells Types Fuel Cell Electric Vehicle.

UNIT III
DC & AC ELECTRICAL MACHINES (Basics Principle of Operation Only):
Motor and Engine rating Requirements DC machines three phase A/c machines -Induction machines Permanent Magnet Machines, Switched Reluctance Machines.

UNIT IV
ELECTRIC VEHICLE DRIVE TRAIN:
Transmission configuration Components gears, differential, clutch, brakes regenerative braking- motor sizing- Gear Ratio Torque speed characteristics EV Motor Sizing Initial Acceleration - Rated Vehicle Velocity - Maximum Velocity - MaximumGradability.

UNIT V
HYBRID ELECTRIC VEHICLES:
Types of Hybrid Vehicles series and parallel Hybrid Electric Vehicles, series- parallel configuration Internal Combustion Engines Reciprocating Engines Practical and Air-Standard Cycles Air- Standard Otto Cycle Air-Standard Diesel Cycle Example IC Engines in HEVs Design Drive train sizing ofcomponents.

TEXT BOOKS:

1. Electric & hybrid vehicles - design fundamentals, Iqbal Hussain, CRC Press 2ndEdition.
2. Electric vehicle technology explained, James Larminieand JohnLowry, Wiley&Sons- 2ndEdition.

REFERENCE BOOKS:

1. Modern electric, hybrid electric, and fuel cell vehicles: fundamentals,theory and design, MehrdadEhsani, YiminGao, Ali Emadi,", CRC Press - 2ndEdition.
2. Electric vehicle battery systems, Sandeep Dhameja - KindleEdition.

ENERGY STORAGE SYSTEMS
(Open Elective – 3)

IV Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Understand electrical energy storagetechnologies.
2. Explain the needs for electric energystorage.
3. Analyze the characteristics and features of energy from varioussources.
4. Classify various types of energy storage and various devices used for thepurpose.
5. Apply the same concepts to real time solutions like electric vehicles, smart grid andSCADA.

UNIT I
ELECTRICAL ENERGY STORAGE TECHNOLOGIES:
Characteristics of electricity the roles of Electric Energy Storage - High generation cost during peak demand periods - Need for continuous and flexible supply - Long distance between generation and consumption- Congestion in power grids Transmission by cables.

UNIT II
NEEDS FOR ELECTRICAL ENERGY STORAGE:
Emerging needs for Electric Energy Storage Utilization of more renewable energy less fossil fuel Smart Grid uses the roles of electrical energy storage technologies the roles from the view point of a utility, from the view point of consumers, from the view point of generators of renewableenergy.

UNIT III
FEATURES OF ENERGY STORAGE SYSTEMS:
Classification of Electric Energy Storage systems Mechanical storage systems Pumped Hydro Storage (PHS) Compressed Air Energy Storage (CAES) Flywheel Energy Storage (FES) Electrochemical storage systems Secondary batteries Flow batteries Chemical energy storage, Hydrogen (H2) Synthetic Natural Gas (SNG).

UNIT IV
TYPES OF ELECTRICAL ENERGY STORAGE SYSTEMS:
Electrical storage systems Double-layer capacitors (DLC) Superconducting magnetic energy storage (SMES) Thermal storage systems Standards for Electric Energy Storage Technical comparison of EEStechnologies.

UNIT V
APPLICATIONS:
Present status of applications Utility use (conventional power generation, grid operation & service) Consumer use (uninterruptable power supply for large consumers) New trends in applications Renewable energy generation Smart Grid Smart Micro grid, Smart House Electric vehicles Management and control hierarchy of storage systems Internal configuration of battery storage systems External connection of EES systems Aggregating EES systems and distributed generation (Virtual Power Plant) Battery SCADA -Aggregation of many dispersed batteries.

TEXT BOOKS:

1. Electrical energy storage, IEC Market StrategyBoard.
2. Energy storage benefits and market analysis,James M.Eyer, Joseph J.Jannucci and Garth. P.Corey, Sandia Nationallaboratories,2004.

REFERENCE BOOKS:

1. Energy storage for the electricity grid-benefits and market potential assessment guide, Jim Eyer, Garth Corey, Sandia National laboratories,2010.
2. Power system energy storage technologies, Paul Breeze, AcademicPress.
3. Electric energy storage systems, PrzemyslawKomarnicki,PioLombardi,ZbigniewStyczynski Springer.

MICROPROCESSORS AND INTERFACING LAB

IV Year ISemester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Apply the fundamentals of assembly level programming of microprocessor and microcontrollers.
2. Build a program on a microprocessor using instruction set of 8086 and8051.
3. Evaluate assembly language program for 8086 and 8051 microcontroller to interface peripheral devices for simple applications.
4. Understand the development of prototype using combination of hardware andsoftware.
5. Develop assembly language programs for various applications using 8051microcontroller.

Note: Minimum of 12 experiments to be conducted.
8086 MICROPROCESSOR:

1. Arithmetic Operations (addition, subtraction, multiplication and division)
2. Addition of two BCDnumbers.
3. Ascending order/Descending order of an array ofnumbers.
4. Finding Largest/Smallest numbers in an array ofnumbers.
5. Generation of Fibonacciseries.
6. Hexadecimal to Decimalconversions
7. ASCII to Decimalconversion
8. Program for sorting an array for8086.
9. Program for searching for a number or character in a string for8086.
10. Program for string manipulations for8086.

MASM PROGRAMMING:

1. Arithmetic Operations (addition, subtraction, multiplication anddivision)
2. Addition of two BCDnumbers.
3. Ascending order/Descending order of an array ofnumbers.
4. Finding Largest/Smallest numbers in an array ofnumbers.
5. Generation of Fibonacciseries.
6. Hexadecimal to Decimalconversions.

ELECTRICAL MEASUREMENTS LAB

IV Year ISemester

L	T	P	C
0	0	2	1

Course Outcomes: Upon the completion of Laboratory course, the student should be able to

1. Calibrate voltmeters, ammeters and single phase energymeter.
2. Design the scale of PMMC voltmeter, LPF wattmeter, LVDT and resistance straingauge.
3. Calculate resistance, inductance and capacitance usingbridges.
4. Compute 3-Φ reactive power.
5. Test single phase energy meter and dielectric strength of oil oftransformers.

Any ten of the following experiments are required to be conducted

1. Calibration and Testing of single phase energyMeter.
2. Calibration of dynamometer type power factormeter.
3. Crompton D.C. Potentiometer - Calibration of PMMC ammeter and PMMCvoltmeter.
4. Kelvin's double Bridge - Measurement of resistance - Determination ofTolerance.
5. Dielectric oil testing using H.T. testingKit.
6. Schering Bridge & AndersonBridge.
7. Measurement of 3 Phase reactive power with single-phasewattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammetermethods.
9. LVDT and capacitance pickup - characteristics andCalibration.
10. Resistance strain gauge - strain measurements andCalibration.
11. Transformer turns ratio measurement using A.C.Bridge.
12. Measurement of ratio error and phase angle of given C.T. bycomparison.

INDUSTRY ORIENTED MINI PROJECT

IV Year I Semester

L	T	P	C
0	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Undertake problem identification, formulation and solution.
2. Know the key stages in the devolvement of the project.
3. Inculcate software / hardware implementation skills
4. Understand methodologies and professional way of documentation and communication
5. Extend / use the idea of mini project for major project.

Three or four students constituting a batch, work on an industry oriented topic approved by the head of the department and prepare a comprehensive mini project report after completing the work to the satisfaction.

The progress of the project is evaluated based on a minimum of two reviews. The review committee may be constituted by the Head of the Department comprising of senior faculty covering all the domains of electrical and electronics engineering. The student is required to submit a mini project report at the end of the semester.

The project work done by the student is evaluated based on the report submitted along with an oral presentation, jointly by external and internal examiners constituted by the Head of the Department.

UTILIZATION OF ELECTRICAL ENERGY
(Professional Core – 16)

IV Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to
1. Study illumination methods &solutions forillumination.
2. Acquire knowledge of methods of electrical heating & welding and relatedproblems.
3. Understand various electrical drives, their characteristics &applications.
4. Analyze electric tractionmovement.
5. Observe the effect of varying acceleration and brakingretardation.

UNIT I
ILLUMINATION:
Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

Various Illumination Methods:
Discharge lamps, MV and SV lamps comparison between tungsten filament lamps and fluorescent tubes, Energy Efficient Lamps -principle of operation, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT II
ELECTRIC HEATING &WELDING:

Electric Heating:
Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.
Electric Welding:
Resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding

UNIT III
ELECTRIC DRIVES:
Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT IV
ELECTRIC TRACTION-I:
System of electric traction and track electrification. Review of existing electric traction systems in India, Magnetic Levitation - Bullet Trains. Special features of traction motor, advantages of electric braking. Mechanics of train movement, Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT V
ELECTRIC TRACTION-II:
Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation, adhesive weight and coefficient of adhesion.

TEXT BOOKS:

1. Utilisation of electric power, Er. R.K. Rajput, Laxmi Publications-2nd Edition
2. Utilisation of electric energy , E.Openshaw Taylor, Orient Longman-1st Edition

REFERENCE BOOKS:

1. Utilization of electrical power including electric drives and electrictraction, N.V.Suryanarayana, New Age International (P) Limited Publishers,1996.
2. Generation, distribution and utilization of electrical energy ,C.L. Wadhwa, NewAge International (P) Limited-Revised 1st edition
3. Utilization of electric power & electric traction, J. B. Gupta, Katson Series,2013

RENEWABLE ENERGY AND ENERGY STORAGE TECHNOLOGIES
(Professional Core- 17)

IV Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, the student should be able to

1. Discuss the energy scenario and the consequent growth of the power generation from renewable energysources.
2. Explain the basicphysics of wind and wind generationtopologies
3. Describe the basics of solar powergeneration
4. Express the power electronic interfaces for solar PVgeneration.
5. Generalize the issues related to the grid-integration of solar and wind energysystems.

UNIT I

PHYSICS OF WIND POWER:

History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distributionfunctions.

UNIT II

WIND GENERATOR TOPOLOGIES:

Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent- Magnet Synchronous Generators, Power electronics converters. Generator-Converter configurations, ConverterControl.

UNIT III

THE SOLAR RESOURCE:

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

Solar thermal power generation:

Technologies - Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementary analysis

UNIT IV

SOLAR PHOTOVOLTAIC:

Technologies - Amorphous, mono crystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms. Converter Control.

UNIT V

ENERGY STORAGE TECHNOLOGIES:

Role of Electrical Energy storage system -Electro chemical storage systems, secondary batteries, Management and control hierarchy of storage systems - Internal configuration of battery storage systems, design of electric energy storage system for solar and wind plants (block diagram).

TEXT BOOKS:

1. Renewable energy technologies:Apractical guide for beginners, Chetan Singh Solanki, PHI,2008
2. Wind power in power systems, T. Ackermann, John Wiley and Sons Ltd.,2005.

REFERENCE BOOKS:

1. Solar energy: Principles of thermal collection and storage, S.P.Sukhatme, McGraw Hill, 1984.
2. Grid integration of wind energy conversion systems, H. Siegfried and R. Waddington, John Wiley and Sons Ltd.,2006.
3. Renewable energy applications, G. N.Tiwari and M. K. GhosalNarosa Publications,2004.

TECHNICAL SEMINAR

IV Year II Semester

L	T	P	C
2	0	0	2

Course Outcomes: At the end of the course, the student should be able to

1. Identify promising new direction of various cutting edge technologies in electrical and electronics domain.
2. Do literature survey using library resources, internet, and technical journals for a thrust area.
3. Prepare a technical report and present with the latest tools of presentations.
4. Enhance the skills of self-study and lifelong learning.

METHOD OF EVALUATION:

During the seminar session each student is expected to prepare and present a topic on engineering / technology, for duration of about 8 to 10 minutes. In a session of two periods per week, 15 students are expected to present on the topic chosen and approved. Each student is expected to present before the end of the semester and his/her performance is evaluated based on the choice of the topic, content of the presentation, preparation of the presentation and quires answered. At the end of the semester, he / she have to submit a report on his / her topic of seminar for evaluation. A Faculty guide is to be allotted for guidance and monitoring the progress of the work done by the student. Evaluation is 100% internal.

COMPREHENSIVE VIVA VOCE

IV Year II Semester

L	T	P	C
0	0	0	2

Course Outcomes: At the end of the course, the student should be able to

1. Acknowledge the understanding level in various areas of electrical and electronics engineering.
2. Prepare comprehensively to answer question from all the courses studied.
3. Attain oral presentation skills by answering question in precise and concise manner.
4. Preparedness to face interviews both in the academic and industrial sector.
5. Gain self-confidence and inter personal skills.

Comprehensive Viva-Voce will be conducted by a committee consisting of head of the department and two senior faculty members of the department. The comprehensive Viva-Voce is intended to assess the student's understanding of the subjects he / she studied during the course of study.

MAJOR PROJECT

IV Year II Semester

L	T	P	C
0	0	0	10

Course Outcomes: At the end of the course, the student should be able to

1. Develop comprehensive solution to issues identified in previous semester project work.
2. Formulate and develop a design proposal on a problem in area of interest.
3. Apply technical / managerial skills for analysis, design, simulation and modeling of various real time problems in the domain of electrical and electronic engineering.
4. Synthesize the results of detailed analytical studies conducted.
5. Present he or her work in a conference or publish work in a peer reviewed journal

Three or four students constituting a batch, work on a topic approved by the head of the department under the guidance of a faculty member and prepare a comprehensive project report after completing the work to the satisfaction of the supervisor.

The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is submitted by the student before the end of the semester. The project work is evaluated based on the project report submitted along with an oral presentation on the work done jointly by external and internal examiners constituted by the Head of the Department.

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

An Autonomous Institution

Aziznagar Gate, C.B. Post, Hyderabad - 500 075, Telangana.

Syllabus (R15)

for

B.Tech Four Year Degree Programme (EEE)

(Applicable for the batches admitted from the Academic Year 2015-2016 onwards)

ELECTRICAL AND ELECTRONICS ENGINEERING R15

I YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A11001	English-I	2	0	0	2	2	100
A11002	Mathematics - I	4	1	0	3	4	100
A11003	Engineering Physics-I	3	1	0	3	4	100
A11502	C Programming – I	3	1	0	3	4	100
A11004	Engineering Chemistry	3	1	0	3	4	100
A11303 /A11201	Engineering Graphics / Electrical circuits	2	0	3	3	5	100
A11081	English Language Communication Skills Lab-I	0	0	3	2	3	75
A11582	C Programming Lab – I	0	0	3	2	3	75
A11083	Engineering Physics and Chemistry Lab	0	0	3	2	3	75
A11084	IT & Engineering Workshop	0	0	3	2	3	75
	Total	**17**	**7**	**15**	**25**	**35**	**900**

I YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A12005	English-II	2	0	0	2	2	100
A12202/ A12306	Electrical Circuits Theory / Engineering Graphics	3	1	0	3	4	100
A12007	Engineering Physics-II	3	1	0	3	4	100
A12503	C Programming – II	3	1	0	3	4	100
A12006	Mathematics – II	4	1	0	3	4	100
A12009	Mathematics – III	3	1	0	3	4	100
A12085	English Language Communication Skills Lab-II	0	0	3	2	3	75
A12584	C Programming Lab –II	0	0	3	2	3	75
A12088	Engineering Physics Lab	0	0	3	2	3	75
	Total	**18**	**5**	**9**	**23**	**31**	**825**

Note: All End Examinations (Theory and Practical) are of three hours duration.

L – Lecture **T – Tutorial** **P – Practical** **D – Drawing**

L T/P/D C
2 0 0 2

ENGLISH-I
(COMMON TO ALL BRANCHES)

MAIN OBJECTIVES:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

B Tech I Year I Semester

Unit-I: 'Wit and Humor' from 'Skills Annexe' -Functional English for Success
Objectives:

- To enable students to develop their listening skills to improve their pronunciation

L-Listening For Sounds, Stress and Intonation

- To make students aware of the role of speaking in English and its contribution to their success.

S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations).

- To develop an awareness in the students about the significance of silent reading for subject and theme.

R- Reading for Subject/ Theme

- To equip the students with the components of different forms of writing

W- Writing Paragraphs

Unit –II: 'Mokshagundam Visvesvaraya' from "Epitome of Wisdom
Objectives:

- To enable the students to use phrasal verbs, expressions, idioms, collocations, pre-fixes and suffixes, and linking words.

G-Types of Nouns and Pronouns
V-Homonyms, homophones synonyms, antonyms

Unit-III: 'Cyber Age' from "Skills Annexe -Functional English for Success
Objectives:

- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

L – Listening for themes and facts

- To enable students to express themselves fluently and appropriately in social and professional contexts

S -Apologizing, Interrupting, requesting and making polite conversation

- To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

R - For theme and gist

- To equip them with the components of different forms of writing.

W - Describing People, Places, Objectives, Events,

Unit-IV: 'Three Days to See' from "Epitome of Wisdom
Objective:

- To enable the Students to use a wide range of grammatical structures appropriately and accurately in written and spoken English including vocabulary

G- Verb &Verb forms
V- Adjective and Adverb

Unit-V: Human Values & Professional Ethics from "Skills Annexe
Objective:

- To equip the students with the components of different forms of writing..

W- Note-Making, Note-Taking

TEXTBOOKS PRESCRIBED:
For Detailed study:
First Textbook: "*Skills Annexe -Functional English for Success*",
Published by Orient Black Swan, Hyderabad
For Non-detailed study:

Second text book *"Epitome of Wisdom"*, Published by Maruthi Publications, Guntur.

MATHEMATICS-I

L	T/P/D	C
4	1/-/-	3

(COMMON TO CE, EEE, ME, ECE, CSE & IT)

UNIT-I: Matrices and System of Linear Equations

Matrices and Systems of Linear Equations: Real matrices Symmetric, Skew symmetric, Orthogonal, Complex matrices: Hermitian, Skew Hermitian and Unitary Elementary transformations-Rank-Echelon form, Normal form System of Linear equations Direct Methods (Gauss Elimination, Gauss Jordan).

UNIT-II: Eigen Values and Eigen Vectors

Eigen values, Eigen vectors properties, Clayey-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Clayey-Hamilton theorem Diagonolization of matrix. Linear Transformation Orthogonal Transformation, Quadratic forms-Nature, Index and Signature.

UNIT-III: Functions of Single Variable and Functions of several variables

Rolle's Theorem Lagrange's Mean Value Theorem Cauchy's mean value Theorem Generalized Mean Value theorem (all theorems without proof) Geometrical interpretation of Mean value theorems. Functions of several variables Partial Differentiation and total differentiation (left as an exercise to student) Functional dependence-Jacobian Determinant- Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT-IV: Improper Integration and Multiple Integrals:

Gamma and Beta Functions-Relation between them, their properties evaluation of improper integrals using Gamma / Beta functions. Multiple integrals - double and triple integrals – change of order of integration- change of variables

UNIT-V: Laplace transform and its applications to Ordinary differential equations:

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Srimanta Pal, Subodh C. Bhunia, (2015) ,Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House
3. Ramana B.V (2010), Engineering Mathematics, New Delhi, Tata McGraw Hill Publishing Co. Limited
4. Mathematical Methods: S.R.K. Iyengar and R.K. Jain, Narosa Publishing House.

OBJECTIVES:

1. This course helps in translating a physical or other problem in mathematical model.
2. The course intends to provide an overview of Matrices which occur in physical and engineering problems.
3. To provide an overview of discovering the experimental aspect of modern applied mathematics.
4. This course creates the ability to model, solve and interpret any physical or engineering problem.
5. To gain knowledge about Laplace Transforms, Double integrals and Triple integrals to apply in engineering and technologies.

L	T	C
3	1	3

ENGINEERING PHYSICS – I
(COMMON TO ALL BRANCHES)

OBJECTIVES:

1. To know about crystals, their structures, properties and applications.
2. Able to understand light and LASER phenomena and their applications.
3. To know the fundamentals of Statistical Mechanics and understand about Dielectric and Magnetic materials.

OUTCOMES:

1. Students analyze and apply the studies for scientific applications of crystal in various fields.
2. Ability to interpret the applications of Dielectric and Magnetic materials in technology and daily life.
3. Able to experiment on nature of light and applications of LASER in various fields.

UNIT- I

Crystal Structures

Inter atomic force Cohesive energy of diatomic molecule (Qualitative), Space lattice, unit cell and Lattice parameters, Crystal systems Bravais lattices. Structures, Atomic radius, co-ordination number and packing fractions of Simple Cubic, Body Centered Cubic, Face Centered Cubic lattices, Structure of Diamond.

Crystal directions, planes and X- Ray diffraction

Crystal planes and directions – Miller Indices, Inter planar spacing of orthogonal crystal systems, X-ray Diffraction: Bragg's law, Determination of lattice constant by XRD (Powder method), Crystal defects: Point and Line defects (Qualitative) Burger's Vector.

UNIT- II

Interference, Diffraction and Polarization

Superposition principle, Interference, Coherence, Interference in thin films, Newton's Rings –Experiment, determination of wavelength of monochromatic source. Diffraction Fraunhofer and Fresnel diffraction, Diffraction due to single slit, Diffraction grating (Qualitative). Polarization- Double refraction, Nicol's Prism, applications of Polarization.

UNIT – III

Elements of statistical mechanics

Introduction, Phase space, Definition of Ensembles, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (Qualitative), Planck's law of black body radiation Deduction of Wien's law and Rayleigh-Jeans law from Planck's law.

Lasers

Characteristics of Lasers, Spontaneous and Stimulated Emission of radiation, meta stable state, Population inversion, lasing action, Einstein's coefficients and relation between them, Ruby Laser, Helium-Neon Laser, applications of Lasers.

UNIT – IV

Magnetism and Magnetic materials

Introduction – Basic definitions, Origin of magnetic moment, Bohr magneton, Dia, Para, Ferro, Antiferro and Ferri magnetism, Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials and their applications.

UNIT- V

Dielectric Properties

Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Ionic and Electronic Polari abilities, Internal Fields in Solids, Clausius Mossotti Equation. Piezo, Pyro and Ferro electricity, applications of ferroelectric materials.

TEXT BOOKS:

(1) Engineering Physics by P K Palanisamy: Scietech publication.
(2) Solid State Physics by M Armugam; Anuradha Publications.

REFERENCE BOOKS:

(1) Introduction to Solid State Physics by Charles Kittel: John Wiley & Sons.
(2) Engineering Physics by R.K. Gaur and S.L. Gupta; Dhanpat Rai and Sons.
(3) Engineering Physics by V Rajendran; McGraw hill education private ltd.
(4) A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar: S Chand.
(5) Engineering Physics by K Malik, A K Singh: Tata McGraw hill book publishers.
(6) Engineering Physics by M.R. Srinivasan, New Age Publishers.

L T/P/D C
3 1/-/- 3

C PROGRAMMING –I
(ECE, EEE)

OBJECTIVES:

- To understand the various steps in program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs.
- To learn to write Programs in C to solve programs using structured programming approach.
- To introduce the students the basic concepts as input output statements, loops, functions, arrays.

OUTCOMES:

- Students will demonstrate a depth of knowledge and apply the methods of C Language to solve the mathematical problems.
- Ability to apply and develop logical skills and problem solving using C Programming Language.

UNIT-I
Introduction to Computers: Computer System, Computing Environments, Generations of Computer Languages, Software Development Life Cycle, Algorithms and Flowchart.
Data Representation: Decimal, Binary, Octal, Hexadecimal number systems and Inter-Conversions, ASCII values.

UNIT-II
Introduction to C language: Background, Structure of C program, Creating and Running a C-Program, Input/ Output statements, C tokens, Data types, Operators, Operator Precedence and Associatively, Expression evaluation, Type Casting and Type Conversion, C Programming examples.

UNIT-III
Control Structures: Selection Statements: if and switch statements, Iterative Statements/Loops: while, for, do-while statements, goto, break and continue statements, C Programming examples.

UNIT-IV
Arrays: Introduction to one dimensional and two dimensional Arrays- Declaration, Initialization and Accessing array elements, Array applications, C programming examples.
Strings: Introduction, String Input/output functions, Declaration, Initialization and Accessing Strings, Array of Strings, String Manipulation functions- strlen(), strcat(), strcmp(), strcpy(), strrev(), C programming examples.

UNIT- V
Functions: Introduction to functions, Types of functions, Categories of functions, Recursion, Scope and Extent, Storage classes- auto, register, static, extern, Parameter passing techniques, Preprocessor Directives, C programming examples.

TEXT BOOKS

1. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F.Gilberg, Third Edition, Cengage Learnimng.

REFERENCE BOOKS

1. Let Us C, Yashavant P. Kanetkar, BPB Publications.
2. Computer System & Architecture, M. Marris Mano , 3 rd Edition , Pearson Education.
3. Programming in C Reema Thareja, 2 nd Edition Oxford University Press 2015.

L	T/P/D	C
3	1/-/-	3

ENGINEERING CHEMISTRY

Course objectives:
To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics. To enable students to apply the knowledge acquired in improving the properties of engineering materials. To provide the students with the necessary knowledge to solve the problems and make decisions with regards to the application of materials in a variety of engineering disciplines. To equip the students with the required fundamentals of engineering chemistry carry out in the interdisciplinary research such that the finding benefit the common man. After the completion of the course, the student would understand about the important chemistry of water, corrosion and its control, polymer chemistry, electro chemistry (including batteries) and advanced engineering materials.

UNIT I: WATER: Hardness of water, expression of hardness ($CaCO_3$ equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler troubles: priming and foaming, boiler corrosion, scales, sludges and caustic embrittlement. Boiler feed water and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (zeolite process and ion exchange process), Numerical problems on softening of water.

UNIT II: ELECTROCHEMISTRY: Conductance and its types. Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Normal Hydrogen Electrode , calomel electrode, glass electrode and quinhydrone electrode), Nernst equation Numerical problems. Potentiometric titrations. Concentration cells, classification with examples.
BATTERIES: Introduction to cell and battery, characteristics of a cell. Primary (dry cell and lithium cell) and secondary cells, (lead-Acid cell, Ni-Cd cell and Lithium ion cells,). Solar battery, engineering applications of batteries. Fuel cells Hydrogen Oxygen fuel cell, advantages and engineering applications of fuel cells.

UNIT III: CORROSION AND ITS CONTROL Introduction, types of corrosion : chemical and electrochemical corrosion, mechanism of chemical and electrochemical corrosion, galvanic, water line and pitting corrosion, factors affecting the rate of corrosion: nature of the metal , galvanic series, purity of metal, nature of corrosion product , nature of environment : effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings: metallic coatings (anodic and cathodic), methods of application on metals, hot dipping (galvanizing), cladding, cementation, electroplating (of copper) electroless plating (of nickel). Organic coatings paints, its constituents and their functions.
UNIT IV: POLYMER CHEMISTRY: Introduction, classification of polymers, types of polymerization (addition and condensation, *mechanisms not included*). Plastics- types of plastics-thermoplastics and thermosetting plastics. Compounding and moulding of plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, butyl rubber, Thikol rubber. Conducting polymers: classification, mechanism of conduction, Poly acetylene preparation and effects of doping on conduction. Applications of conducting polymers.

UNIT V: ADVANCED ENGINEERING MATERIALS: Biodegradable polymers, types, examples: Polyhydroxy butyrate (PHB) ,Poly-Hydroxybutyrate-co-b-Hydroxy valerate (PHBV) ,Polyglycolic acid (PGA) , Polylactic acid (PLA), Poly (Î-caprolactone) (PCL). Applications of biodegradable polymers. Composite materials: Constituents of composite materials. Types of composite materials. Advantages and engineering applications of composite materials. Nano materials: Introduction, basic methods of preparation and applications of nano meterials. Insulators- Classification, characteristics of thermal & electrical insulators and applications. Biofuels biodiesel, general methods of preparation and advantages.

Text Books:
1. Engineering Chemistry by NYS.Murthy, Pearson, India.
2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpat Rai Publishing Company

Reference Books:
1. Text Book of Engineering Chemistry by Shasi Chawla, Dhantpat Rai publishing Company,
2. Engineering Chemistry by C.Daniel Yesudian , Anuradha publications

L	**T/P/D**	**C**
2	**-/ 3**	**3**

ENGINEERING GRAPHICS
(C.S.E, IT, E.C.E & E.E.E)

1. Objectives: To know about different types of Drawing Instruments and about different types of lines.
2. To know about different types of curves and projections.
3. To know projections of points, straight lines, solids etc.
4. To analyze the conversion of isometric projection to orthographic projection and vice versa.

Outcomes:

1. Student gets knowledge on various drawing instruments and its usage.
2. Students capable to draw various curves like conic curves, cycloid curves and involutes. Student can understand about orthographic projection and able to draw points, lines, planes and solids according to orthographic projections.
3. Student can convert and draw the given orthographic view to isometric view and vice versa.

UNIT - I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, use of pencils, Lettering, Rules of dimensioning. Construction of polygons: Inscription and superscription of polygons given the diameter of circle. Curves used in Engineering Practice and their Constructions: Conic Sections: Ellipse, Parabola, Hyperbola including the Rectangular Hyperbola General method only. Cycloidal curves Cycloid, Epicycloid and Hypocycloid Involutes.

UNIT - II

Drawing of Projections or Views (Orthographic Projection in First Angle Projection Only): Principles of Orthographic Projections Conventions First and Third Angle Projections, Projection of Points, Projection of Lines inclined to both planes, True lengths. (Mid points & Traces are eliminated).

UNIT - III

Projections of Planes: Projections of regular Planes – Inclined to both planes. Projections of Solids: Projections of Regular Solids – Regular Polyhedra, solids of revolution, Axis inclined to both planes – Change of position.

UNIT –IV

Isometric Projections/views: Principles of Isometric Projection Isometric Scale Isometric Views Conventions Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.

UNIT –V

Conversion of Orthographic Views to Isometric Views of simple objects. Transformation of Projections: Conversion of isometric views to orthographic views of simple objects.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhatt / Charotar publishers
2. Engineering Drawing, K.L.Narayana and Kannaiah / Scietech publishers.

REFERENCES:

Engineering Drawing, N.S. Parthasarathy/Vela Murali, Oxford University Press.
Engineering Drawing, Basant Agarwal, TMH

L P C
0 3 2

English Language Communication Skills Lab-I

Objectives

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussion and public speaking.

Learning Outcomes:

1. Better Understanding of nuances of language through audio-visual experience and group activities.
2. Neutralization of accent for intelligibility.
3. Speaking with clarity and confidence thereby enhancing employability skills of the students.

Syllabus: English Language Communication Skills Lab shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab:

Exercise-I

CALL Lab: Introduction to Phonetics
Speech Sounds
Vowels and Consonants

Exercise-II

ICS Lab: Ice-Breaking activity and JAM session
Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise-III

CALL Lab: Structure of Syllables
Past Tense Marker and Plural Marker
Weak Forms and Strong Forms
Consonant Clusters.

Exercise-IV

ICS Lab: Situational Dialogues -Role-Play- Self-introduction and introducing others-Greetings- Apologies- Requests.

Exercise-V

ICS Lab: Social and Professional Etiquette and Telephone Etiquette-Tenses-Non-Verbal Communications.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
4. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)
5. **Lab Manual:** A Manual entitled "**English Language Communication Skills (ELCS) Lab Manual- cum- Work Book**", published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

L	T/P/D	C
0	-/3/-	2

C PROGRAMMING LAB – I
(ECE, EEE)

OBJECTIVES:

- To provide and understanding the concept of programming Languages.
- To write programs in C to solve the mathematical problems.
- To understand how to use the input output statements, loops, functions, arrays
- To learn debugging concepts.

OUTCOMES:

- Understand and analyze different syntax of C.
- Design a program for a given Problem.
- To analyze and design C Program for a particular problem.

Week 1:
Familiarity with Basic Linux Commands

Week 2:
Using vi editor – Creation of text files

Week 3:
Write simple programs using scanf() and printf() functions and familiarity with format strings.

Week 4:
Write programs to illustrate Operators

Week 5:
Write programs to illustrate If statements

a) To find largest and smallest of given numbers
b) To find the roots of the quadratic equation.

Week 6:

a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
b) Write a C program to calculate the following Sum:

$$Sum=1-x^2/2! + x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$$

Week 7:
Write programs on while and do..while loops

a) Program to find the sum of the individual digits of a given positive integer.
b) Program to generate the first n terms of the Fibonacci sequence
c) Program to check the given no is Palindrome or not

Week 8:
Write programs on for loop and nested loops.

a) To generate sum of n natural numbers
b) To generate Pascal triangle
c) To generate all the prime numbers between 1 and n

Week 9 & 10:

a) Program to find the minimum and maximum element of an array.
b) Program to search for given element in an array.
c) Program to convert Binary number to Decimal number and vice-versa.

Week 11:

a) Program to perform Addition of Two Matrices
b) Program to perform Multiplication of Two Matrices

Week 12:

a) Implement string manipulation functions
b) Write a C program to accept a string of any characters and display the number of vowels in that string
c) Display number of words and characters in a string.

Week 13 & 14:

a) Implement categories of user defined functions
b) Implement recursive and non recursive functions
   i. To find the factorial of a given integer.
   ii. To find the GCD (greatest common divisor) of two given integers.

Week 15:
Implementation of parameter passing Techniques

a) Call by value
b) Call by reference

Week 16:

Review and Revision

TEXT BOOKS:

1. C Programming & Data Structures, E. Balagurusamy, 4th Edition, TMH.
2. A Structured Programming Approach using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

REFERENCE BOOKS:

1. Let Us C, Yashavant P. Kanetkar, BPB Publications.
2 Computer System & Architecture, M.Morris Mano, 3rd Edition 2006.
3. Programming in C, Reema Thareja , 2nd Edition Oxford University Press 2015.

L	P	C
0	3	2

ENGINEERING PHYSICS AND CHEMISTRY LAB

(EEE, ECE, CSE and IT)

Engineering Physics Lab:

Any Five Experiments from the following:

1. Torsional Pendulum Experiment – Determination of rigidity modulus of material of wire
2. Melde's experiment
3. Newton's Rings
4. Dispersive Power of the material of a Prism using Spectrometer
5. Stewart & Gee's experiment
6. LED Characteristics
7. Diffraction Grating – Determination of wavelength of monochromatic light
8. RC Circuit – Decay of Charge

ENGINEERING CHEMISTRY LAB

Any six experiments are to be performed

1. Fundamentals of volumetric analysis : (a) Determination of strength of an acid (HCl)
2. Estimation of ferrous iron by dichrometry
3. Estimation of hardness of water by EDTA method.
4. Determination of alkalinity of water.
5. Determination of free chlorine or chlorides in water.
6. Estimation of copper by colorimetric method.
7. Estimation of HCl by conductometry using standard NaOH solution.
8. Estimation of HCl by potentiometry using standard NaOH solution.
9. Determination of viscosity of sample oil by Redwood/Oswald's viscometer
10. Determination surface tension of lubricants.

TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis.
2. Essentials of experimental engineering chemistry, Shashi Chawla, Dhanpat Rai & Co.
3. Laboratory manual of engineering chemistry, S.K.Bhasin and Sudha Rani , Dhanpat Rai & Co.
4. A text book on experiments and calculations. S.S. Dara, S. Chand & Co.

L	T/P/D	C
0	-/3	1

IT & Engineering Workshop
(ECE, EEE, ME & CIV)

Objectives:
The IT Workshop for engineers is a training lab course spread over 20 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, and Power Point.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations. (**Recommended to use Microsoft office 2007 in place of MS Office 2003)**

OUTCOMES:

- Getting enough knowledge to assemble a computer and identifying various components.
- To get hands on experience in software installation.
- Ability to understand the troubleshooting problems.
- To learn the tools PowerPoint, documentation, tabulation and calculations.
- To get exposure how to use internet and World Wide Web.

PC Hardware
Task 1: Identify the peripherals of a computer, components in a System Cabinet and its functions. Block diagram of the computer along with peripherals.
Task 2: Disassemble and assembling the PC.

MS Word
Task 3: Microsoft (MS) word 2007: Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. Give a task covering to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Inserting table, using Drawing toolbar in word.

MS Excel
Task 4: MS office 2007 Excel as a Spreadsheet tool covering Accessing, overview of toolbars, saving excel files, Using help and resources., Also give a task that is covering the features like Gridlines, Format Cells, Summation, auto fill, Formatting Text.

MS Power Point
Task 5: MS power point:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power point.

REFERENCES:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech.
2. The Complete Computer upgrade and repair book,3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware and A+Handbook Kate J. Chase PHI (Microsoft).
5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. CISCO Press, Pearson Education.

L	T/P/D	C
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ENGINEERING WORKSHOP

Objective: To impart basic knowledge of various tools and their use in different sections of manufacture such as carpentry, Tin-smithy and house wiring.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Tin-smithy and development of jobs carried out and soldering.
3. House-wiring

2. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing
2. Power tools in construction, wood working, electrical engineering and mechanical engineering.

TEXT BOOKS:

1. Work shop manual P.Kannaiah / K.L Narayana/scitech publishers.
2. Workshop manual by Venkat Reddy.

Part – C

Syllabi of

B.Tech., I Year II Semester

(ECE and EEE)

English– II

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(COMMON TO ALL BRANCHES)
Semester II

Unit –I: **Last Leaf** by O Henry
G –Tense & Aspect
V – Synonyms and Antonyms

Unit-II G: **Risk Management** from Skills Annex -Functional English for Success L - Listening for specific details and information
S- Narrating, expressing opinions and telephone interactions R -Reading for specific details and information

W- Writing formal letters and CVs
Unit-III: The Secret of Work by Swami Vivekananda from “Epitome of Wisdom”
G- Prepositions and Concord, Voice and Reported Speech
V-Collocations and Technical Vocabulary

Unit-IV: **Sports and Health** from “Skills Annex -Functional English for Success
Critical Listening and Listening for speaker’s tone/ attitude
S- Group discussion and Making presentations
R- Critical reading, reading for reference
W-Project proposals; Technical Reports, Project Reports and Research Papers

Unit-V: **Convocation Speech** by Narayan Murthy, from “Epitome of Wisdom”
G- Writing Memos, Minutes of Meeting, Transcription (Translating from the mother tongue to English), V-Vocabulary - idioms and Phrasal verbs, One-Word Substitutes

REFERENCES:

1. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson.
2. Technical Communication, Meenakshi Raman, Oxford University Press
3. Murphy’s English Grammar with CD, Murphy, Cambridge University Press.
4. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.

ELECTRICAL CIRCUIT THEORY
(For EEE students only)

Objective:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic concepts of circuits which includes single phase circuits, resonance, magnetic circuits, network topology and network theorems.

UNIT –I:
Introduction to Electrical Circuits: Circuit Concept, R-L-C Parameters, Voltage and Current Sources, Independent and Dependent Sources, Source Transformation, Voltage – Current relationship for Passive Elements (for different input signals –Square, Ramp, Saw tooth and Triangular). Kirchhoff's Laws, Network Reduction Techniques – Series, Parallel, Series Parallel, Star –to-Delta or Delta-to-Star Transformations, Nodal Analysis, Mesh Analysis, Super node and Super mesh for DC Excitations.

UNIT –II:
Single Phase A.C. Circuits: R.M.S. and Average values and form factor for different periodic wave forms, Steady State Analysis of R, L and C (in Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Phase and Phase difference, Concept of Power Factor, Real and Reactive powers, J-notation, Complex and Polar forms of representation, Complex power.

UNIT –III:
Resonance, Locus diagrams& Magnetic circuits-: Resonance-series, parallel circuits, concept of band width and Q factor. Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters. Magnetic circuits-Faraday's laws of electromagnetic induction-concept of self and mutual inductance-dot convention-coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits.

UNIT –IV: Network Topology: Definitions, Graph, Tree, Basic cutest and Basic Tie set Matrices for Planar Networks, Loop and Nodal methods for analysis of Networks with Dependent & Independent Voltage and Current Sources, Duality & Dual Networks.

UNIT –V:
Network Theorems (With A.C. & D.C): Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for D.C and A.C excitations.

TEXT BOOKS:

1. Circuit Theory(Analysis&Synthesis) A.Chakrabarhty, Dhanipat Rai & Sons.2014,6th Edition
2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.2011
3. Network Analysis –M.E.Van Valkenburg,PMI Publication.2014,3rd Edition

REFERENCE BOOKS:

1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.2011, 8th Edition.
2. Electric Circuit Analysis - K.S.Suresh Kumar, Pearson Education.2013
3. Fundamentals of Electrical Circuits - David A.Bell, Oxford University Press. 2009, 7th Edition.
4. Network Analysis and Circuits - M.Arshad, Infinity Science Press.2010
5. Network Analysis and Synthesis –Ravish R Singh, Mc Graw Hill Education.2013
6. Electrical Circuits: An Introduction - KCA Smith & RE Alley, Cambridge University Press.1992.

Outcome:
After studying this course the student gets a thorough knowledge on basics of circuit concepts, electrical parameters, single phase AC circuits, magnetic circuits, resonance, Network topology which is important in modeling of power system components and network theorems which he/she can apply to the conceptual things in real-world problems and applications.

L	T	C
3	1	3

ENGINEERING PHYSICS – II
(COMMON TO ALL BRANCHES)

OBJECTIVES:
1. To know fundamentals of Quantum Mechanics, Free Electron Theory of Metals and Band Theory of solids.
2. To know basics of semiconductors and semiconductor devices.
3. To understand superconductivity, applications of optical fibers and fundamentals of Nanoscience.

OUTCOMES:
1. To get an idea to apply Classical and Quantum mechanics in various engineering fields.
2. Able to construct circuits with semiconductor devices and consolidate applications of Nanoscience in the field of Engineering and Technology.
3. To interpret the importance of superconductivity and applications of Optical fiber.

UNIT – I

Free electron theory of metals

Classical Theory– Explanation of Electrical Conductivity and Ohm's Law – Drawbacks, Sommerfeld theory (Qualitative).

Principles of Quantum Mechanics

Waves and Particles, de-Broglie hypothesis Matter waves, Davisson and Germer experiment, Schrodinger Time Independent Wave Equation Wave function and its Physical Significance, Particle in one dimensional potential box (wave functions, probability densities and energy states), Density of States.

UNIT II

Band theory of solids

Electron in a periodic potential – Bloch Theorem, Kronig-Penney model (Qualitative), Origin of energy band formation in solids, Classification of materials into Conductors, Semiconductors & Insulators. Concept of effective mass of an electron.

Fiber optics

Basic principle of optical fiber, Acceptance angle, Acceptance cone, Numerical aperture (Quantitative), Types of optical fiber, Applications of Optical Fiber.

UNIT III

Semiconductor Physics

Intrinsic and Extrinsic Semiconductors, Fermi level in Intrinsic and Extrinsic semiconductors, Carrier Concentration in Intrinsic and Extrinsic Semiconductors. Hall effect, P-N junction diode, Tunnel diode, LED and Photodiode.

UNIT - IV

Superconductivity

Introduction, Heat capacity, Isotopic effect, Persistent currents, Critical fields, Meissner effect, Type I and Type II superconductors, BCS Theory, Josephson effect SQUIDS, Basics of High Temperature Superconductors, Applications of Superconductors.

UNIT V

Fundamental of Nanoscience:

Introduction Basic definitions: Nanoscale, Nanoscience and Nanotechnology, Types of Nanomaterials, Surface to Volume Ratio, Quantum confinement, Synthesis of Nanomaterials Top down & Bottom up approaches: sol-gel, Ball milling and CVD methods, Applications.

TEXT BOOKS:
1. Engineering Physics by P K Palanisamy: Scietech publication.
2. Solid State Physics by M Armugam; Anuradha Publications

REFERENCE BOOKS:
1. Introduction to Solid State Physics by Charles Kittel: John Wiley & Sons.
2. Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons.
3. Engineering Physics by V Rajendran; McGraw hill education private ltd.
4. A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar; S Chand.
5. Engineering Physics by K Malik, A K Singh; Tata Mc Graw hill book publishers.
6. Engineering Physics by M.R.Srinivasan, New Age Publishers.

L	T/P/D	C
3	1/-/-	3

C PROGRAMMING – II
(ECE, EEE)

OBJECTIVES:

- To understand the basic concepts such as Abstract data types Linear and Non Linear Data Structures.
- To understand the notations used to analyze the performance of algorithms.
- To understand the behavior of Data Structures such as Unions, Pointers, Files, Stacks and Queues and their representation.
- To choose the appropriate data structure for a specified application.
- To understand and analyze various searching and sorting algorithms.
- To write programs in C to solve problems using Data Structures such as pointers, Strings, Arrays, Searching and sorting and Linear Lists and Linked Lists.

OUTCOMES:

- Learn how to use Pointers, Files and Enumerated data concepts for realistic problems.
- Ability to understand the concept of data structures and its usage.
- Ability to demonstrate the practical applications of Stacks and Queues.
- Ability to solve problems independently and think critically.

UNIT – I

Searching and Sorting – Basic concepts, Searching-Linear and Binary search, Sorting- Selection sort, Bubble sort, & Insertion sort.

UNIT – II

Pointers: Introduction, Declaration and Initialization, Pointer Operators, Pointer to Pointer, Pointer Expressions, Pointers and Arrays- Pointer to Array, Array of Pointers, C programming examples.
Dynamic Memory Allocation Functions- malloc ( ), calloc( ), realloc( ), free()

UNIT – III

Derived types The Type Definition (typedef), Enumerated types, Structures - Declaration, Initialization, Accessing structures, Operations on Structures, Nested Structures, Structures through Pointers, Structures and Functions, Self Referential Structures, Unions ,Bit fields ,C programming examples.

UNIT – IV

File Management Basic concepts, working with text files and binary files, State of a file, Opening and Closing files, File Input / Output functions (standard library input / output functions for files), File status functions (error handling), Positioning functions, Command Line Arguments, C programming examples.

UNIT - V

Linear Data Structures- Stack- Push and Pop operations, Queue- Insertion and Deletion operations, singly linked list- Insertion, deletion operations.

TEXT BOOKS:

1. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F.Gilberg, Third Edition, Cengage Learnimng.

REFERENCE BOOKS:

1. Understanding pointer in C, Yashavant P.Kanetkar, 3rd Edition,BPB Publications 2006.
2. Programming in C, Reema Thareja, 2nd Edition, Oxford University 2015.
3. Theory and Problems of Data Structures, Seymour Lipschutz, Mc Graw Hill, 1986.

MATHEMATICS-II
(COMMON TO CE, EEE, ME, ECE, CSE & IT)

L	T	P	C
4	1	0	3

Pre Requisites: Nil

OBJECTIVES:
1. This course creates the ability to model, solve and interpret any physical or engineering problem
2. To gain knowledge about vector calculus, Fourier series and Fourier transforms to apply in engineering and technologies
3. The course intends to provide an overview of Matrices which occur in physical and engineering problems.
4. This course enhances the conceptual understanding of the learners about the solutions of engineering problems
5. Acquire knowledge about different methods of solution to solve a physical problem.

OUTCOMES:
At the end of the course, the student will be able to:
1. Gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.
2. Become familiar with the application of ordinary differential equations and vector calculus to engineering problems.
3. Verify the integral theorems.

UNIT-I: Differential Equations of first order and their Applications:
Differential equations of first order and first degree: exact, linear and Bernoulli, Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-II: Higher Order Linear Differential Equations and their Applications:
Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) = $e^{ax}, \sin ax, \cos ax \; and \; x^k, e^{ax}V(x), x^kV(x)$ .Method of variation of parameters. Equations reducible to constant coefficients-Cauchy's and Lagrange's differential equations. Applications - Bending of beams, Electrical circuits, simple harmonic motion.

UNIT-III: Fourier series:
Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT-IV: Fourier Transforms:
Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms properties inverse transforms Finite Fourier transforms.

UNIT-V: Vector Calculus:
Gradient- Divergence- Curl and their related properties - Potential function Laplacian and second order operators. Line integral work done Surface integrals Flux of a vector valued function and Volume integral. Vector integrals theorems: Green's Stoke's and Gauss's Divergence Theorems (Only Statements & their Verifications).

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Srimanta Pal, Subodh C. Bhunia, (2015), Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Integral Transforms by A.R.Vasista,Krishana Prakashan Private Limited
4. Schaum's outline series on Vector Analysis; Linear Algebra.
5. Larry C. Andrews and Bhimsen K. Shivamoggi, Integral Transforms for Engineers, Prentice – Hall of India Private Limited, New Delhi.

MATHEMATICS-III
(COMMON TO EEE, ECE, CSE & IT)

L	T	P	C
3	1	0	3

Pre Requisites: Nil

OBJECTIVES

1. The objective is to find the relation between the variables x and y out of the given data (x,y).
2. The aim to find such relationships which exactly pass through data or approximately satisfy the data under the condition of least sum of squares of errors.
3. The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data.
4. This topic deals with methods to find roots of an equation and solving a differential equation.
5. The numerical methods are important because finding an analytical procedure to solve an equation may not be always available.
6. In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very much required.
7. The aim at forming a partial differential equation (PDE) for a function with many variables and their solution methods. Two important methods for first order PDE's are learnt. While separation of variables technique is learnt for typical second order PDE's such as Wave, Heat and Laplace equations

OUTCOMES:

At the end of the course, the student will be able to:

1. Apply the numerical methods to find a root of algebraic and transcendental equations.
2. Apply the numerical methods to find the solutions of ordinary differential equations.
3. Find the solutions of one dimensional wave equation, two dimensional wave equation and one dimensional heat conduction equation.

UNIT-I: Solution of Non- Linear Equations and Linear System of Equations:

Solution of Algebraic and Transcendental Equations the Bisection Method the Method of False Position the Iteration Method Newton-Raphson Method. Solving system of non-homogeneous equations by L-U Decomposition method (Crout's Method) Jacobi's and Gauss-Seidel Iteration method,

UNIT-II: Interpolation:

Introduction Errors in Polynomial Interpolation Finite differences Forward Differences Backward differences Central differences Symbolic relations and separation of symbols Newton's formulae for interpolation Central difference interpolation Formulae Gauss Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT-III: Numerical Integration & Curve Fitting:

Generalized Quadrature (Newton's Cote's formula), Trapezoidal, Simson's and Weddle's rules andproblems. Curve fitting: Fitting a straight line Second degree curve exponentional curve-power curve by method of least squares.

UNIT – IV: Numerical Solution of IVP's in ODE:

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods.

UNIT-V: Partial Differential Equations:

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations, Charpits Method, Method of separation of Variables for second order equations. Classification of general second order partial differential equations. Applications of Partial Differential Equations One dimensional wave equation, Heat equation.

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley Publications.

REFERENCE BOOKS:

1. Srimanta Pal, Subodh C. Bhunia, (2015), Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Introductory Methods of Numerical Analysis. S.S. Sastry, Prentice Hall.
4. Numerical Analysis (Paper IV), First Edition 2010, Telugu Akademi, Hyderabad.
5. Schaum's outline series on Matrices.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

L	T/P/D	C
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English Language Communication Skills Lab-II

Objectives

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency in spoken English and neutralize mother tongue influence.
5. To train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes:

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking with clarity and confidence thereby enhancing employability skills of the students

Syllabus: English Language Communication Skills Lab shall have two parts:

1. **Computer Assisted Language Learning (CALL) Lab**
2. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the English Language Communication Skills Lab

Exercise-I

CALL Lab: Minimal Pairs
Word accent and Stress Shifts
Listening Comprehension

Exercise-II

ICS Lab: Descriptions- Narrations- Giving Directions and Guidelines
Question Tags and One-Word Substitutes
Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise-III

CALL Lab: Intonation and Common Errors in Pronunciation.-Neutralization of Mother Tongue Influence and Conversation Practice.

Exercise-IV

ICS Lab: Extempore- Public Speaking
Active and Passive Voice,
Common Errors in English,
Idioms and Phrases

Exercise-V

ICS Lab: Information Transfer
Oral Presentation Skills
Reading Comprehension
Job Application with Resume preparation.

Books Suggested

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation.
2. Nambiar, K.C. 2011. Speaking Accurately. A Coursein International Communication.

L	T/P/D	C
0	-/3	2

C PROGRAMMING II LAB
(ECE, EEE)

OBJECTIVES:

- To write and execute programs in C to solve problems using data structures such as Unions, Pointers, Files, Stack and Queue.
- To write and execute programs in C to implement various sorting and searching methods.

OUTCOMES:

- Ability to identify the appropriate data structure for given problem.
- Able to design and analyze the time and space complexity of algorithm and program.
- Ability to effectively use compilers includes library functions, debuggers and trouble shooting.

Week 1:

a) Implementation of Linear Search
b) Implementation of Binary Search.

Week 2:

a) Implementation of Linear Search & Binary Search using Recursion.
b) Implementation of Bubble Sort.

Week 3:

a) Implementation of Selection Sort
b) Implementation of Insertion Sort

Week 4:

Write programs to illustrate pointers

a) To implement pointer arithmetic
b) To implement pointer to pointer
c) To implement array of pointers

Week 5:

Write C program to illustrate String Handling functions using pointers- to copy, concatenate, compare, reverse and length.

Week 6:

Basic programs in structures- student details, employee details, Inventory management using array of structures.

Week 7:

a) Write C program that uses functions to perform the following operations:
- Reading a complex number
- Writing a complex number
- Addition of two complex numbers
- Multiplication of two complex numbers

(Note: represent complex number using a structure.)

b) Write a C program to illustrate Nested structures

Week 8:

Review and Revision.

Week 9:

a) Write C programs to illustrate Unions
b) Write C programs to illustrate Enumerated data type

Week 10:

a) Write C program to display the contents of a file.
b) Write C program to count the no. of characters ,words and lines of a text file
c) Write C program to implement Command line arguments

Week 11:

a) Write C program to merge two files into a third file (i.e., the contents of the first file Followed by those of the second are put in the third file)
b) Write C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line.)

Week 12:

a) Write C program to illustrate Stack operations using arrays
b) Write C program to illustrate Queue operations using arrays

Week 13:

Write C program to implement the operations of Single Linked List

Week 14:

a) Write C program to illustrate Stack operations using Linked List.

b) Write C program to illustrate Queue operations using Linked List

Week 15:

Review and Revision.

TEXT BOOKS:

1. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F.Gilberg, Third Edition, Cengage Learnimng.

REFERENCE BOOKS:

1. Understanding Pointers in C, Yashavant P.Kanetkar, 3rd Edition, BPB Publications. 2006.
2. Programming in C, Reema Tahreja, 2nd Edition,Oxford University Press 2015.
3. Theory and Problems of Data Structures, Seymour Lipschutz, Mc Graw Hill, 1986.

L	P	C
0	3	2

ENGINEERING PHYSICS LAB -II
(EEE and ECE)

The following experiments are to be performed.

1. Numerical Aperture of an Optical Fibre
2. Single slit diffraction – Measurement of wavelength of monochromatic light
3. To determine the diameter of a thin wire by interference in a wedge shape air film.
4. Moment of inertia of fly wheel.
5. Frequency of A.C. mains using sono-meter.
6. Characteristics of Photodiode
7. LCR circuit – Series and Parallel resonance
8. Energy gap of semiconductor

ELECTRICAL AND ELECTRONICS ENGINEERING R15

II YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A13012	Mathematics-IV	3	1	0	3	4	100
A13401	Electronic Devices & Circuits	3	1	0	3	4	100
A13204	Network Theory	4	1	0	4	6	100
A13205	Electro Magnetic Fields	4	1	0	4	5	100
A13206	Electrical Machines –I	4	1	0	4	6	100
A13011	Environmental Science	2	1	0	2	3	100
A13281	Basic Simulation Tools Lab	-	-	3	2	3	75
A13282	Electrical Circuits Lab	-	-	3	2	3	75
MC-I	Mandatory Course –I	**2**	**0**	**0**	**0**	**2**	**75**
	Total	**22**	**8**	**6**	**24**	**36**	**825**

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A14407	Electronic Circuits	3	1	0	3	4	100
A14408	STLD	3	1	0	3	4	100
A14311	Fluid Mechanics and Hydraulic Machines	3	1	0	3	4	100
A14208	Electrical Machines-II	4	1	0	4	5	100
A14209	Power Systems-I	3	1	0	3	4	100
A14210	Control Systems	4	1	0	4	5	100
A14283	Electrical Machines Lab-I	-	0	3	2	3	75
A14484	Electronic Devices and Circuits lab	-	0	3	2	3	75
MC-II	Mandatory Course –II	**2**	**0**	**0**	**0**	**2**	**75**
	Total	**22**	**6**	**6**	**24**	34	825

L – Lecture T – Tutorial P – Practical D – Drawing **II Year B.Tech. EEE I-Sem.**

MATHEMATICS-IV

(COMMON TO EEE & ECE)

(SPECIAL FUNCTIONS AND FUNCTIONS OF A COMPLEX VARIABLE)

L	T /P/D	C
3	1 0	3

Pre Requisites: Nil

Course Objectives: To learn

1. Series solutions for Legendre differential equation, analyzing the properties of Legendre polynomials.
2. Differentiation and Integration of complex valued functions.
3. Evaluation of integrals using Cauchy's integral formula.
4. Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions.
5. Evaluation of integrals using residue theorem.
6. Transform a given function from z - plane to w – plane.
7. Identify the transformations like translation, magnification, rotation and reflection and inversion.
8. Properties of bilinear transformations.

Course Outcomes: After going through this course the student will be able to:

1. Identify Bessel equation and solve it under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Legendre polynomials.
2. Analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem,
3. Expansion of a given function as a Taylor's and Laurent series
4. Solving Real Definite Integrals using Cauchy's Residue Theorem.

UNIT-I

Legendre's Polynomials

Introduction to series solution of differential equations. Legendre's Differential equation, General solution of Legendre's equation, Legendre's polynomials and their Properties: Rodrigue's formula – Recurrence relations, generating function of Legendre's polynomials – Orthogonality.

UNIT-II

Complex Functions –Differentiation

Complex functions and its representation on argand plane, Concepts of limit Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions– Milne – Thompson method, complex potential functions, stream functions and velocity functions.

UNIT-III

Complex Integration & Complex Power series

Complex Integration:

Line integral evaluation along a path, Cauchy's integral theorem, Cauchy's integral formula – Generalized integral formula.

Complex Power series

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent's series. Singular point –Isolated singular point – pole of order m – essential singularity.

UNIT-IV

Residue and Contour Integration

Residue – Evaluation of residue by formula and by Laurent's series – Residue theorem.
Evaluation of integrals of the type:

(a) $\int_0^{2\pi} f(\cos\theta,\sin\theta)\,d\theta$ (b) Improper real integrals $\int_{-\infty}^{\infty} f(x)\,dx$ (c) Indetation by Contour Integration.

UNIT-V

Conformal mapping

Transformation of z-plane to w-plane by a function, conformal transformation. Standard Transformations-Translation; Magnification and rotation; inversion and reflection, Transformations likee^z, log z, z^2, and bilinear transformation. Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given.

TEXT BOOKS

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.
3. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.

REFERENCES

1. Complex Variables Principles and Problem Sessions by A.K.Kapoor, World Scientific Publishers
2. A Text Book of Engineering Mathematics by N P Bali, Manesh Goyal
3. Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Edit. 2013, Chapman & Hall/CRC
4. Advanced Engineering Mathematics, Michael Greenberg, Second Edition, Person Educations.
5. Schaum's Outline Series on Complex Variables

II Year B.Tech. EEE I-Sem

ELECTRONIC DEVICES AND CIRCUITS

L	T	P	C
3	1	0	3

Course Objectives:

This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers. This course focuses:

1. To familiarize the student with the principle of operation, analysis and design of Junction diode, BJT and FET transistors and amplifier circuits.
2. To understand diode as rectifier. To study basic principle of filter circuits and various types.

Course Outcomes:

1. After going through this course the student will be able to:
2. Understand and analyze the different types of diodes, operation and its characteristics Design and analyze the DC bias circuitry of BJT and FET Design biasing circuits using diodes and transistors.
3. To analyze and design diode application circuits, amplifier circuits and oscillatorsemploying BJT, FET devices.

UNIT -I: P-N Junction Diode:

Qualitative Theory of P-N Junction, P-N Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of VI characteristic, Ideal versus Practical – Resistance levels (Static and Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics.

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode, SCR and Semiconductor Photo Diode, UJT and Characteristics.

UNIT-II: Rectifiers and Filters:

The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, π- Section Filters, Comparison of Filters, Voltage Regulation using Zener Diode.

UNIT-III: Bipolar Junction Transistor:

The Junction Transistor, BJT Symbol, Transistor Current Components, Transistor Construction, BJT Operation, Common Base, Common Emitter and Common Collector Configurations, Comparison of CB, CE, and CC Amplifier Configurations, Transistor as an Amplifier, Limits of Operation , BJT Specifications,

BJT Small Signal Model: BJT Hybrid model, Determination of h-parameters from Transistor Characteristics, Analysis of a Transistor Amplifier Circuit using h- Parameters.

UNIT-IV: Transistor Biasing and Stabilization:

Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector - Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{be} and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability,

UNIT-V: Field Effect Transistor and Biasing:

Field Effect Transistor: The Junction Field Effect Transistor (Construction, principle of operation, symbol) – Pinch-off Voltage - Volt-Ampere characteristics, FET as Voltage Variable Resistor, The

JFET Small Signal Model, MOSFET (Construction, principle of operation, symbol), MOSFET Characteristics in Enhancement and Depletion modes. Biasing FET, Comparison of BJT and FET.

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit, 2 Ed., 1998, TMH.
2. Electronic Devices and Circuits – Mohammad Rashid, Cengage Learing, 2013.
3. Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford.

REFERENCES:

1. Integrated Electronics – J. Millman and Christos C. Halkias, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI.
3. Electronic Devices and Circuits – B. P. Singh, Rekha Singh, Pearson, 2Ed, 2013.
4. Electronic Devices and Circuits - K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt. Ltd.
6. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 Ed., 2008, TMH.

II Year B.Tech. EEE I-Sem

NETWORK THEORY

L	T	P	C
4	2	0	4

Course Objective:

This course introduces the basic concepts of circuit analysis which is the foundation for all of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes three phase circuits, two port networks, transient analysis, Filters and Fourier analysis.

Course Outcomes:

After going through this course the student will be able to understand

- Fundamentals on Calculation of power in three phases balanced and unbalanced networks.
- How to find Transient response of different circuits using Laplace and differential for simple electrical circuits.
- Behavior of linear circuits using Laplace transform and transfer function of single port and two port networks, Design of filters, Fourier analysis of AC circuits.

UNIT –I:Three Phase Circuits

Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems- Analysis of balanced and unbalanced three phase circuitsMeasurement of active and reactive power.

UNIT-II: D.C and A.C Transient Analysis

Transient response of R-L, R-C, R-L-C circuits (series and parallel) for D.C excitation- Initial conditions- Solution method using differential equation and Laplace transforms .
Transient response of R-L, R-C, R-L-C circuits (series and parallel) for sinusoidal excitation- Initial conditions- Solution method using differential equation and Laplace transforms.

UNIT-III: Network Functions

The concept of complex frequency, Physical interpretation of complex frequency, Transform impedance and Transform circuits, Series and Parallel combination of elements, Terminal pairs or ports, Network functions for the one port and two port, poles and zeros of network functions, Significance of poles and zeros, Properties of driving point functions, Properties of transfer functions, Necessary conditions for driving point function, Necessary conditions for transfer functions, Time domain response from pole-zero plot.

UNIT-IV: Network Parameters

Two port network parameters- Z, Y, ABCD and Hybrid parameters and their inter relations. Series, parallel and cascaded connection of two port networks, Concept of transformed network-Two port network parameters using transformed variables.

UNIT-V: Filters and Fourier analysis of AC Circuits

Low pass, High pass, Band pass, Band Elimination, Prototype filter design. The Fourier theorem, consideration of symmetry, trigonometric and exponential form of Fourier series, line spectra and phase angle spectra.

TEXT BOOKS

1. Circuit Theory Analysis &Synthesis - *A.Chakrabarthy*, Dhanpat Rai & Sons, 2010.
2. Circuits & Networks: Analysis and Sythesis- *A.Sudhakar and Shyammohan S.Palli*, Tata McGraw Hill, 2015, 5th Edition.

REFERENCE BOOKS

1. Electric Circuit analysis - *B.Subrahmanyam*, I.K International
2. *Network* analysis -Mahmood Naqvi,*Joseph Edminister*, Schaum's Outlines, 4th edition, McGraw-Hill Companies, Incorporated, 2003.
3. Network Analysis - *M.E Van Valkenberg*. Prentice-Hall, 1974.
4. Electric circuit analysis - C.*L.Wadhwa*, New Age International, 2006.
5. Electrical circuits theory-K.*Rajeswaran,* Pearson Education, 2004.
6. Basic circuit's analysis - *D.R Cunningham. & J.A. Stuller*, Jaico Publications, 1993.

II Year B.Tech. EEE I-Sem

ELECTRO MAGNETIC FIELDS

L	T	P	C
4	1	0	4

Course Objective:

The objective of this course is to introduce the concepts of electric field and magnetic fields and their advantages & applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

Course Outcomes:

After going through this course the student will be able to understand

- Ability to apply vector mathematics and physics to calculate parameters electromagnetic problems.
- Properties and behavior of conductors, dielectrics & capacitance.
- Magneto statics and Physical laws of electro magnetism, Force in magnetic fields, Magnetic potential and its properties.
- Calculation of inductance, Basic concepts on time varying fields in Integral form and point form.

UNIT – I: Electrostatics

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems – Divergence theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential– Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law. Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

UNIT – II: Conductors, Dielectric & Capacitance

Conductors –Insulators – Semiconductors – Behaviour of conductors in an electric field – Behaviour of Insulators in an electric field – Electric Dipole – Dipole moment – Polarization – potential and EFI due to an electric dipole and Torque.

Dielectric – Conductor and Dielectric to Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT – III: Magneto Statics, Ampere's circuital law

Static magnetic fields – Biot-Savart's law – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation.

Ampere's circuital Law & Applications:

Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law-Curl-Stroke's Theorem – Maxwell's third equation, Field due to a circular, rectangular and square loops.

UNIT –IV: Force in Magnetic fields, Magnetic Potential

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

UNIT – V: Inductance, Time Varying Fields

Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation – Statically and dynamically induced EMFs – Simple problems Modification of Maxwell's equations for time varying fields – Displacement current – Pointing Theorem and pointing vector.

TEXT BOOKS

1. Engineering Electromagnetic - *William H. Hayt & John. A. Buck* McGraw Hill Companies, 7th Edition, 2012.
2. Electromagnetic Fields - *Sadiku*, Oxford Publications, 7th edition, 2006.

REFERENCE BOOKS

1. Introduction to Electro Dynamics - *D J Griffiths*, Prentice-Hall of India Pvt. Ltd, 2nd editon, 1989.
2. Electromagnetic - *J P Tewari*, Khanna Publishers, 2nd edition, 2005.
3. Electromagnetics - *J. D Kraus,* McGraw Hill Inc, 4thedition 1992.
4. Electromagnetic fields - *S. Kamakshaiah*, Right Publishers, 2007.

II Year B.Tech. EEE I-Sem

ELECTRICAL MACHINES-1

L	T	P	C
4	2	0	4

Course Objective:

The objective of the course is to provide the student with lucid and comprehensive treatment of the most important Direct Current machines (motors and generators). This course emphasizes the physical understanding of the basic principles underlying the operation and performance of DC machines.

Course Outcomes:

After going through this course the student will be able to understand

- Construction of D.C machine, different types of DC generators their characteristics, industrial applications, effect of armature reaction and its assessment.
- The principle of DC motor, electrical characteristics and industrial applications, purpose of starter and its design, speed control methods.
- Various losses, different tests in DC machines and calculation of their efficiency. **Unit – I:**

D.C. Generators – Construction & Operation

Electromechanical Energy conversion – force and torque in magnetic field systems – energy balance- D.C. Generators – Principle of operation – Action of commutator – constructional features – classification of DC generators – separately excited and self excited generators – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Armature reaction and commutation – cross magnetizing and demagnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

Unit –II: Operating Characteristics of D.C. Generators

Build up of EMF – magnetization curve/occ characteristics – critical field resistance and critical speed – causes for failure of self excitation – remedial measures – internal and external characteristics of d.c shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing. Different applications of D.C Generators

Unit – III: D.C. Motors

D.C Motors – Principle of operation – Back E.M.F. - Torque equation

Unit IV: Types of D.C Motors and Speed Control

Types of D.C Motors (shunt, series and compound) – classification of motors (shunt, series and compound) – principle of operation of 3 point and 4 point starters with protective devices – Speed control of D.C. Motors: armature voltage and field flux control methods – Ward-Leonard system.
Different applications of D.C Motors.

Unit – V: Testing of D.C. Machines

Testing of D.C. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency

Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a D.C. motor test.

TEXT BOOKS

1. Electric Machinery- *P.S. Bimbra*, Khanna Publishers, 7th edition, 2010,
2. Theory and performance of Electrical machines – *J.B Gupta*, S.K Kataria & Sons publishers, 2009.

REFERENCE BOOKS

1. Electrical Machines – *S.K. Bhatta Charya*, McGraw Hill Companies, 2007.
2. Electrical Machines - *I.J. Nagrath & Kothari*, McGraw Hill Companies, 3rd edition, 2004.
3. Electric Machines – *M.V. Deeshpande*, Wheeler Publishing, 1997.
4. Electrical machinery - *A.E. Fritzgerald C. Kingsley and S. Umans*, McGraw Hill Companies, 5th edition, 2010.

ENVIRONMENTAL SCIENCE

Common to all Branches

L	T	P/D	C
2	1	0	2

Course Objectives

- Develop an understanding on the importance of environmental protection.
- Understanding the significance of ecological balance for sustainable development.
- The ability to apply quantitative reasoning and practical skills to environmental problems.

Course Outcomes:

At the end of the course, the student will be able to:

- To enable the students to realize the importance of the sustainable use of natural resources.
- To make the students aware of the impacts of human actions on environment and measures to minimize and mitigate them.
- To enable the students to become aware of the current issues and problems pertaining to the environment.

UNIT I:

Ecosystems:
Definition, Scope and Importance of ecosystem; Classification of ecosystems, Structure and Functions of ecosystem: Food chains, Food Web and Ecological Pyramids, Flow of energy; Bioaccumulation and Biomagnifications; Ecosystem Value services and Carrying Capacity. **Biodiversity and Biotic Resources**: Introduction, Definition, levels of Biodiversity, Value of biodiversity, Hot spots of biodiversity, Threats to biodiversity, conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT II:

Natural Resources: Classification of Resources, **Water resources**: use and over utilization of surface and ground water, Floods and Droughts, Dams: benefits and problems. **Energy resources**: growing energy needs, Renewable Energy Sources – Solar, Hydro-Power, Wind, Tidal, GeoThermal, Biomass, Bio-fuels, Hydrogen as a fuel and Biogas and Non Renewable Energy – Coal,
Petroleum, LPG, Natural Gas, SNG, CNG. **Land resources**: land as a resource, land degradation – Landslide and Soil Erosion; **Forest Resources – Uses and Exploitation.**

UNIT III:

ENVIRONMENTAL POLLUTION AND CONTROL: Types of Pollution, Sources, Effects and Control measures and Quality Standards for

1. Air Pollution
2. Water Pollution
3. Soil Pollution

4. Noise Pollution

Solid, Hazardous, Biomedical and e-Waste Management and Handling Rules, Nuclear Hazards – Case Studies. **Waste water treatment methods**: Effluent treatment plants (ETP), Sewage treatment plants (STP), Common and combined effluent treatment plants (CETP).

UNIT IV:

Global Environmental Problems And Global Efforts: Green house effect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment; Ozone depletion and Ozone depleting substances (ODS); Aid Rains, Deforestation and Desertification.

Environmental Impact Assessment (EIA): Definition of Impact: classification of impacts, Methods of baseline data acquisition. Impacts on different environmental components; Environmental Impact Statement (EIS). Environmental Management Plan (EMP) - Rain Water Harvesting, Water Shed Management and Bioremediation.

UNIT V:

Environmental Policy, Legislation, Rules And Regulations: Environmental Protection act, Legal aspects Air (Prevention and Control of pollution) Act- 1981, Water (Prevention and Control of pollution) Act-1974, Forest Conservation Act, Wildlife Act 1972. **Towards Sustainable Future**: Concept of Sustainable Development, Threats to Sustainability: Population and its explosion, Crazy Consumerism, Over-exploitation of resources; Environmental Education, Role of Civil Societies, Role of IT in Environment, Smart Cities, Concept of Green Building, Low Carbon Lifestyle, Life cycle assessment and Ecological Foot Print.

TEXT BOOKS:

1. Text Book of Environmental Studies by Anubha Kaushik (4^{th} Edition), New age International Publishers.
2. Environmental studies by Erach Bharucha 2005, University Grants Commission, University Press.
3. Environmental studies, from crisis to cure by R. Rajagopalan, 2005.

REFERENCE BOOKS:

1. Environmental Science: Towards a Sustainable Future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Science by Daniel B. Botkin & Edward A. Keller, Willey INDIA Edition.
3. Text book of Environmental Science and Technology by M. Anji Reddy 2007.

BASIC SIMULATION TOOLS LAB

L	T	P	C
0	0	3	2

Any Ten experiments should be conducted

Demo of basic commands & operators of MAT LAB & study of PSPICE.

Using MATLAB Software

1. Development of MATLAB Program for Matrix multiplication and inversion
2. Mesh and nodal analysis of circuit excited by DC Source.
3. Analysis of RL series circuit using simulink model on DC and AC Excitation.
4. Analysis of RC series circuit using simulink model on DC and AC Excitation.
5. Analysis of RLC series circuit using simulink model on DC and AC Excitation.
6. Simulink model of diode.
7. Simulink model of SCR.
8. Determination of band width and quality factor of a Series RLC circuit.

Using PSPICE Software

1. Development of PSPICE program to determine the Thevenins voltage of given network Development of PSPICE program of 1- half wave rectifier.
2. Development of PSPICE program of 1- full wave rectifier.
3. Transient response of RL series circuit excited by DC and AC Source.
4. Transient response of RC series circuit excited by DC and AC Source DC Source.
5. Transient response of RLC series circuit excited by DC and AC Source DC Source.

II Year B.Tech. EEE II-Sem.

II Year B.Tech. EEE I-Sem

ELECTRICAL CIRCUITS LAB

L	T	P/D	C
0	0	3	2

Any Ten experiments should be conducted

1) Measurement of Voltage, Current and Equivalent Resistance of Various Circuits and verification of Kirchhoff's laws.
2) Verification of Thevenin's Theorem &Verification of Norton's Theorem.
3) Verification of Maximum Power Transfer Theorem on DC and AC Excitation for different loads(R,RL,RLC)
4) Verification of Compensation Theorem &Verification of Superposition theorem.
5) Verification of Reciprocity Theorem &Verification Millmann's Theorem.
6) Resonance in series and parallel R, L, C Circuits.
7) Determination of Self inductance, Mutual inductance and Coefficient of coupling
8) Current locus Diagrams of RL and RC Series Circuits
9) Calculation of RMS, Average Value, Form Factor and Peak Factor of Complex wave
10) Determination of Z & Y Parameters
11) Determination of Transmission & Hybrid Parameters
12) Measurement of Active power for star and delta connected balanced loads
13) Measurement of Reactive power for star and delta connected balanced loads

Part – C

Syllabi of

B.Tech., II Year II Semester

II Year B.Tech. EEE II-Sem.

II Year B.Tech. EEE II - Sem.

ELECTRONIC CIRCUITS

L	T	P	C
3	1	0	3

Course Objectives:

1. To introduce circuit realizations with components such as diodes, BJTs and transistors studied earlier.
2. To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

Course Outcomes:

1. After going through this course the student will be able to:
2. Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.
3. Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth,
4. Input and Output interfacing Impedances.
5. Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
6. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to
generate sustained oscillations.

UNIT – I:

Single Stage and Multi Stage Amplifiers

Single Stage Amplifiers: Classification of Amplifiers – Distortion in amplifiers, Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, Miller's Theorem and its dual.
Multi Stage Amplifiers: Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, and Different coupling schemes used in amplifiers- RC Coupled amplifiers, Transformer Coupled amplifiers and Direct Coupled amplifiers.

UNIT – II:

BJT Amplifiers and FET Amplifiers

BJT Amplifiers: Logarithms, Decibels, General frequency considerations, Frequency response of BJT amplifier – Analysis at low and high frequencies,effect of coupling and bypass capacitors, The Hybrid- pi (□) – Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, Single stage CE transistor amplifier response, Gain-bandwidth product, Equivalent Circuit of Emitter Follower at higher frequencies.

FET Amplifiers: Basic Concepts, Analysis of CS, CD, CG JFET Amplifiers, Common Source Amplifier with Source resistance.

UNIT –III:

Feedback Amplifiers and Oscillators
Feedback Amplifiers: Classification of amplifiers, Concepts of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.
Oscillators: Classification of oscillators, Condition for oscillations, RC-phase shift and Wienbridge oscillators. Generalized analysis of LC oscillators- Hartley and Colpitts Oscillators, Crystal Oscillator, stability of oscillators

UNIT – IV:

Large Signal Amplifiers:
Classification of Power Amplifiers, Class A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Class B Power Amplifier, Efficiency of Class B Amplifier, Push Pull and Complimentary Symmetry Class B and Class AB Power Amplifiers – Principle of operation of class – C Amplifier, Distortion in power amplifiers, Transistor Power Dissipation, Heat Sinks.

UNIT – V:

Tuned Amplifiers
Introduction, Q-Factor, Small Signal Tuned Amplifiers with coupling techniques, Effect of Cascading single Tuned amplifiers on Bandwidth, Effect of Cascading Double Tuned amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned amplifiers'

TEXT BOOKS:

1.Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
2.Electronic Devices and Circuits, David A. Bell – 5th Editions, Oxford.
3.Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, AVallvaraj, 2nd Edition, TMH.

REFERENCES:

1. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
2. Microelectronic Circuits – Sedra / Smith – 5th Edition – Oxford, 2009
3. Electronic Circuit Analysis – K. Lal Kishore, BS Publications, 2004.
4. Electronic Devices and Circuits, Anil.K. Maini, Varsha Agrawal, 1st Edition, WILEY.
5. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson Education.

II Year B.Tech. EEE II-Sem.

SWITCHING THEORY AND LOGIC DESIGN

L	T	P	C
3	0	0	3

Course Objectives:

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To implement simple logical operations using combinational logic circuits
4. To design combinational logic circuits, sequential logic circuits.
5. To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
6. To implement synchronous state machines using flip-flops.

Course Outcomes:

After going through this course the student will be able to:

1. Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray and BCD.
2. Manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
3. Design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
4. Design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

UNIT-I: Number System and Boolean algebra And Switching Functions:
Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT-II: Minimization and Design of Combinational Circuits:
Introduction, The Minimization of switching function using theorem, The Karnaaugh Map MethodUp to Five Variable Maps, Don't Care Map Entries, Tabular Method, VEM method, Design of Combinational Logic: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Decoders, Encoders and Code converters, Hazards and Hazard Free Relations.

UNIT-III: Sequential Machines Fundamentals and Applications:
Introduction: Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, Latches, Flip Flops: SR, JK, Race Around Condition in JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Design of a Clocked Flip-Flop, Timing and Triggering Consideration, Clock Skew, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers, Data Transmission in Shift Registers, Operation of Shift Registers, Shift Register Configuration, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation Of Asynchronous And Synchronous Counters.

UNIT-IV: Sequential Circuits-I:

Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity-bit Generator, Design of Asynchronous Counters, Design of Synchronous Modulo N-Counters.

UNIT-V: Sequential Circuits-II:

Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

Algorithmic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

1. Switching and Finite Automata Theory- ZviKohavi&Niraj K. Jha, 3rdEdition, Cambridge.
2. Digital Design-Morris Mano, MachaelCilette, Pearson Education, 2013.
3. Switching Theory and Logic Design – An Anand Kumar, PHI, 2013.

REFERENCES:

1. Digital Design- Morris Mano, PHI, 3rd Edition.
2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.
3. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
4. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier
5. Fundamentals of Logic Design- Charles H. Roth, Cengage LEanring, 5th, Edition, 2004.
6. Digital Logic Applications and Design- John M. Yarbrough, Thomson Publications, 2006.
7. Digital Logic and State Machine Design – Comer, 3rd, Oxford, 2013.

CONTROL SYSTEMS

L	T	P	C
4	1	0	4

Course Objective:

In this course it is aimed to introduce to the students the principles and applications of control systems in day to day life. The basic concepts of block diagram reduction, time domain analysis, solutions to time invariant systems, different aspects of stability analysis of systems in frequency domain and time domain are dealt with.

Course Outcomes:

After going through this course the student will be able to understand

- The basic concepts and applications of control systems in day to day life.
- The transfer function analysis in mathematical modeling of control system which helps mainly in stability and designing of control systems.

UNIT – I: Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems.
Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II: Transfer Function Representation and Time Response Analysis

Transfer Function of DC Servo motor - AC Servo motor- Synchro Transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction uses Mason's gain formula.
Feed-Back Characteristics, Effects of feedback, standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT –III: Stability Analysis in S-Domain

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique:

The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT – IV: Frequency Response and Stability Analysis In Frequency Domain

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain marginStability Analysis from Bode Plots. Nyquist Plots-Stability Analysis.

UNIT – V: Classical Control Design Techniques and State Space Analysis of Continuous Systems

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

Concepts of state, state variables and state model, derivation of state models - Solving the Time invariant state Equations- State Transition Matrix and its Properties

TEXT BOOKS:

1. Control Systems Engineering – I.J.Nagrath and M.Gopal, New Age International (P) Limited, Publishers, 2nd edition, 2009.
2. Automatic Control Systems - B. C. Kuo, John wiley and sons. 8th edition, 2003.

REFERENCE BOOKS:

1. Modern Control Engineering –Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
2. Control Systems-N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. -– John wiley, NISE, 4rd edition, 2007.
4. Control Systems – Nagoorkani, 1998.

FLUID MECHANICS AND HYDRAULIC MACHINES

L	T	P/D	C
3	1	0	3

Course Objective:

1. Understanding the properties of fluids and Calculating forces on a submerged structure in a static fluid.
2. Applying the mass conservation, Energy and Momentum principle, using the control volume approach, to engineering problems.
3. Calculating surface resistance in laminar, turbulent flows and lift and drag forces on moving bodies.
4. Students should know the inter relationship between thermodynamics and fluid mechanics in context to their respective departments.
5. To prepare students, will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.
6. To train the students will be familiar in applying software methods to analyze mechanical engineering problems.

Course Outcomes:

1. Solving numerical problems related to pressure measuring instruments, identifying and solving forces on submerged and floating bodies.
2. Practical application of Bernoulli's equation and principles in various disciplines including pressure variation study in atmospheric science.
3. Ability to apply conservation laws for mass, momentum and mechanical energy in combination to control volumes in ideal fluids and hence calculate hydraulic and energy grade lines.
4. Calculation of local and overall skin friction drag in laminar and turbulent flat plate boundary layers, using approximate empirical formula (only basic knowledge).
5. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice with the concept of Hydraulic Machinery and Systems.

UNIT – I

Fluid Properties and Fluid Statics: Density, Specific weight, Specific gravity, viscosity, Vapour pressure, compressibility, Surface tension Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydro static law, Piezometer, Simple and differential manometers.

UNIT - II

Fluid Kinematics: Stream line, path line, streak line, stream tube, classification of flows, steady,unsteady, uniform, non-uniform, laminar, turbulent, rotational, irrigational flows, one, two and three dimensional flows.

Fluid Dynamics: Surface and Body forces, Euler's and Bernoulli's equation derivation, Application of Bernoulis Equation: Venturimeter, Orifice meter, Pitot tube, Navier stokes equation (explanation only), Momentum equation – applications.

UNIT - III

Close Conduit Flow: Reynolds Experiment, Darcy's equation, Minor losses - pipes in series, pipes in parallel, total energy line and hydraulic gradient line, numerical problems.

Boundary Layer Concepts: Definition, thicknesses, characteristics along thin plate, laminar and turbulent layers (No Derivation) boundary layer in transition, separation of boundary layer submerged objects drag and lift.

UNIT – IV

Impact Of Water Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and a tip-velocity triangles at inlet and outlet expressions for work done and efficiency, Series vanes, Radial flow turbines.

Hydraulic Turbines: Overshot and undershot water wheels, classification of Water turbines, Pelton Wheel, work done and working proportions, Francis, Kalpan turbines, draft tubes, types & its efficiency.

Performance Of Turbines: Performance under unit head, unit quantities, performance under specific conditions, specific speed, performance characteristic curves, model testing of turbines, cavitation, governing of turbines, surge tanks. Water hammer.

UNIT – V

Centrifugal Pumps : Types Component parts and working, work done by the impeller, Manometric head losses and efficiencies, minimum starting speed, loss of head due to reduced or increased flow, diameters of impeller and pipes, Specific speed, Model testing of pumps, Multistage Pumps, Pumps in parallel, performance of pumps, characteristics curves, NPSH, Cavitation, priming devices, pump troubles and remedies.

Reciprocating Pumps: Main components and working of a reciprocating pump, types of reciprocating pumps, power required driving the pump, coefficient of discharge and slipping indicator diagram.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hyraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES:

1. Fluid Mechanics and fluid power Engineering by D.S Kumar, Kotaria & sons.
2. Fluid Mechanics and machinery by D. Rama Durgaiah, New Age international.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

ELECTRICAL MACHINES – II

L T P C
4 1 0 4

Course Objective:

As an extension of Electrical machines I course this subject facilitates to learn the performance of Transformers and Induction motors which are having very wide applications in the field and industry.

Course Outcomes:

After going through this course the student can be able to understand

- Construction, working principle, operating characteristics of single phase and3-phase transformers. Able to solve the problems about regulation, efficiency, Sharing of load in parallel operation.
- Construction, working principle, speed torque characteristics of 3-phase induction motors, solution of problems at different loads, speed control methods and their applications.
- Upon completing the course, students will be able to understand the construction and operation of single phase induction motors and their applications.

UNIT-I: Single phase transformers:

Principle of operation –Turns Ratio-Types - constructional details- Losses: Hysterisis, Eddy currentcopper losses. Minimization of hysteresis and eddy current losses- E.M.F equation - operation on no load and on load - phasor diagrams.
Equivalent circuit – efficiency-Condition for maximum efficiency- All day efficiency -voltage regulation for different loads (power factors) - effect of variations of frequency & supply voltage on iron losses.

Testing of transformers: OC and SC tests –Drawing of Equivalent Circuit- Sumpner's test - predetermination of efficiency and voltage regulation-separation of losses.

UNIT II:

Three phase Transformers

Three phase poly-phase connections - Y/Y, Y/□, □/Y, □/□ and open□, Third harmonics in phase voltages-three winding transformers-tertiary windings. Determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

Parallel Operation and Autotransformers

Parallel operation of Single Phase Transformers with equal and unequal voltage ratios. Auto transformers-equivalent circuit - comparison with two winding transformers.

UNIT III: Three Phase Induction Motors

Construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf. at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed. Torque equation- expressions for maximum torque and starting torque - torque slip characteristics - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging.

UNIT IV: Performance of Three Phase Induction Motors

Circle diagram-no load and blocked rotor tests-predetermination of performance. Methods of starting. Calculations of torque, efficiency at different loads from circle diagram.

Speed control-change of frequency- change of poles and methods of consequent poles; cascade connection, injection of an emf into rotor circuit (qualitative treatment only)-induction generatorprinciple of operation.

UNIT V: Single Phase Induction Motors:

Single phase Induction motor – Constructional features- Cross field theory, Double revolving field theory Equivalent circuit- spilt –Phase motors- Capacitor start Capacitor run motors.

TEXT BOOKS:

1. Electric Machinery- *P.S. Bimbra*, Khanna Publishers, 7th edition, 2010.
2. Theory and Performance of Electrical Machines - *JB Gupta*, SK Kataria & ISons, 2009.

REFERENCE BOOKS:

1. Performance and Design of AC Machines - *MG.Say*, BPB Publishers, 1968.
2. Theory of Alternating Current Machinery- *Langsdorf*, Tata McGraw Hill Companies, 2nd edition, 2001.
3. Electro mechanics-II (transformers and induction motors) - *S. Kamakashaiah,* Hitech publishers.
4. Electric Machines – *I.J.Nagrath & D.P.Kothari*,Tata McGraw Hill, 7th Edition, 2005.
5. A Text Book of Electrical Technology – *B.L. Theraja and A.K. Theraja,Vol2,*S.Chand Publications

II Year B.Tech. EEE II-Sem | | L | T | P | C |
|---|---|---|---|---|
| | | 3 | 1 | 0 | 3 |

POWER SYSTEMS-I

Course Objective:

Electrical Power plays significant role in day to day life of entire mankind. This course deals with the generation and distribution of power along with the economic aspects.

Course Outcomes:

After going through this course the students will be able to understand

- *How the electrical power will be generated from different sources.*
- *Layout of substations, their Equipments and distribution systems.*
- *The economical aspects of power generation and different types of tariffs.*

UNIT-I:ThermalPowerStations:

Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components-Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

NuclearPowerStations:

NuclearFissionandChainreaction,Nuclearfuels,Principle of operation of Nuclear reactor, Reactor Components- Moderators,Controlrods,ReflectorsandCoolants, Radiationhazards-ShieldingandSafetyprecautions,TypesofNuclearreactorsandbriefdescriptionofPWR,BWR andFBR.

Gas Power Stations:

Principle of Operation and Components(BlockDiagram ApproachOnly).

UNIT-II:GeneralAspects of D.C & A.C Distribution Systems:D.C Distribution Systems:

ClassificationofDistributionSystems - ComparisonofDCvs.ACandUnder-Groundvs.Over - HeadDistributionSystems- RequirementsandDesignfeaturesofDistribution Systems- Voltage, Drop Calculations (Numerical Problems inD.CDistributorsforthefollowingcases:RadialD.C Distributorfedoneend and at the both the ends (equal/unequal voltages) and Ring Main Distributor.

A.C Distribution Systems:

Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to related load voltages.

UNIT-III:

AirInsulated&GasInsulated(GIS)Substations: Classificationofsubstations: - Indoor&Outdoorsubstations:Substationslayoutshowingthe location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams.

Gas Insulated Substations(GIS): Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, busbar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV:

Power Factor & Voltage Control:

Causes of low power factor -Methods of Improving power factor -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical power factor for constant KW load and constant KVA type loads, Numerical Problems.

Dependency of Voltage on Reactive Power flow- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

UNIT-V:

Economic Aspects of Power Generation & Tariff:

Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity,

utilization and plant use factors- Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. DesirableCharacteristicsofaTariffMethod-TariffMethods:FlatRate,Block- Rate,two-part,threepart,andpowerfactortariffmethodsandNumericalProblems. ”

TEXT BOOKS:

1. PrinciplesofPowerSystemsbyV.KMehtaandRohitMehtaS.ChandCompany Pvt. Ltd, New Delhi2004.
2. Electrical Power Systems, PSR. Murty, BS Publications.
3. A course in Power Systems by J.B.Gupta S.K.Kataria & Sons-2016

REFERENCEBOOKS:

1. A Text book of Power system Engineering, R.K. Rajput,LaxmiPublications (P) Limited.
2. Electrical Power Generation,TransmissionandDistribution,S.N.Singh',PHI.
3. EledthcalPowerSystemsbyC.L.WadhawaNewAgeInternational (P) Liffiited,Publishers.
4. GenerationofElectricalEnergy,Dr.B.R.Gupta,S.Chand.

<u>II Year B.Tech. EEE II-Sem</u>

ELECTRICAL MACHINES –I LAB

L	T	P	C
0	0	3	2

Any 10 experiments out of 12

1. Magnetization characteristics of a DC shunt generator.
2. Load test on DC shunt generator.
4. Load test on DC compound generator.
5. Load test on DC series generator.
6. Brake test on DC shunt motor.
7. Brake test on DC compound motor.
8. Hopkinson's test on DC Shunt machines.
9. Field's test on DC Series machines.
10. Separation of losses in DC shunts motor.
11. Retardation test on DC shunt motor.
12. Speed control of DC shunt motor.
13. Swinburne's test on DC shunt machine.

II Year B.Tech. EEE II-Sem.

ELECTRONIC DEVICES AND CIRCUITS LAB

L	T	P	C
0	0	3	2

PART-A: (Only for Viva-voce Examination)

Electronic Workshop Practice (In 3 Lab Sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers,Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
    a. Multimeters (Analog and Digital).
    b. Function Generator.
    c. Regulated Power Supplies.
    d. CRO.

PART B: Minimum of 10 experiments

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Half Wave Rectifier with & without filters.
4. Full Wave Rectifier with & without filters.
5. Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
6. Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
7. FET characteristics.
8. Lissajous patterns using CRO.
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier.
12. SCR characteristics.
13. UJT Characteristics.

INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS Second year B.Tech (Mandatory subject)

Course Objectives:

1. To make students familiar with Intellectual Property Rights.
2. To understand innovations in engineering and other domains.
3. To be familiar with patents, copyrights and various acts related to innovations.

UNIT - I:

Introduction to Intellectual property Rights (IPR):

Introduction, Types of Intellectual Property Rights, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

UNIT - II:

Trade Marks:

Purpose And Function of Trademarks, Acquisition of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT - III:

Copy rights Law:

Fundamental of Copy Right Law, originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law.

Patents Law:

Foundation of Patent Law, Patent Searching Process, Ownership Rights And Transfer

UNIT - IV:

Trade Secrets:

Trade Secrete Law, Determination of Trade Secrets Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secret Litigation.

Unfair competition: Misappropriation Right of Publicity, False Advertising.

UNIT - V:

Cyber Law:

Cyber Crime, Information Security, Cyber Criminals, Classification of Cyber Criminals- Legal Perspectives- Indian Perspectives- Cyber Crimes And Indian ITA 2000, Global Perspective On Cyber Crime- Cyber Crime Era.

Course Outcomes:

Upon completion of the course, the students are expected to:

1. To define various terms related to Intellectual Property Rights.
2. To understand the process of patent, copyrights and related procedures.
3. To analyze the situation of IPR in the Indian context with that of global scenario.
4. To understand the patenting process through various case studies.

TEXT BOOKS & REFERENCES:

1. Deborah, E. Bo Choux, Intellectual Property Right, Cengage Learning
2. Prabuddha Ganguli, Intellectual Property Right - Unleashing the Knowledge Economy, Tata Mc Graw Hill Publishing Company Ltd.
3. Nina Godbole and Sunitha Belapure, “Cyber Security” Wiley India 2012.

PROFESSIONAL ETHICS, HUMAN VALUES AND SELF DEVELOPMENT

(MANDATORY COURSE)

	L	T	P/D	C
Course Objectives:	2	0	0	0

a. To offer the students an appropriate set of values to live by
b. To help them achieve a balanced life with appropriate attitudes and behavior
c. To ensure harmonious life with sustained happiness and prosperity
d. To create awareness on Ethical human conduct, Engineering Ethics, Social responsibility as an engineer.

Course Outcomes:

1)Cultivate the habit of Introspection; Inspirations from within and outside and journal writing to become Successful Engineers with hopes of a better human being 2) Ethical Responsibilities of Engineers while - dealing with the issues.
3) To maintain work life –balance and societal well being
4) Develop Right thinking and understanding

UNIT – I

Course Introduction to Values: Need, Guidelines, Content and Educational Process, Application of values, Universal values. Natural Acceptance. Self Exploration – Meditation- self exploration. Continuous Happiness and Prosperity - Right thinking and understanding. Ambition and Aspiration.

UNIT - II:

Harmony in the Human Being:

Harmony in Myself! : Human being as a co-existence of 'I' and the material 'Body'. Needs of Self ('I') and 'Body'. The Body as an instrument of 'I' (I being the Doer, Seer and Enjoyer). Harmony of I with the Body, Correct Appraisal of Physical needs

UNIT - III:

Harmony in the Family, Society and in Nature:

Harmony in Human - Human Relationships: Harmony in the Family, Values in Human - Human Relationships,Trust, Respect and other Salient Values in Relationships. Harmony in the Society, Universal Harmony Order.

Harmony in the nature and Existence: Whole existence as Co-existence: Inter-connectedness and Mutual fulfillment among the four orders of nature - Recyclability and Self-regulation in nature.

UNIT - IV:

Professional Ethics:

Introduction, Profession, Professionals, Professionalism, Professional's- roles and risks, Professional Accountability, Ethics in Engineering Profession, Roles of Engineers, Balanced outlook on Law and Responsibilities as Citizens, Professional Responsibilities, Professional Rights.

UNIT - V:

Self Development:

Behavior and Attitude, Stress Management- Types of Stress, Self Management, Choices we make, Excellence.

Meditation: Importance of Meditation, Observation, Introspection, Contemplation, Concentration, Relaxation, Systematic Practice of Meditation.

Inner Cleaning, Need to purify our Conscience and develop Purity in Thoughts and Actions Journal Writing: Uses and Self Development.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, g p Bagaria, 2009, A foundation course in human values and p rofessional ethics.
2. Professional ethics by R Subramanian Oxford press
3. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd
4. Self development modules from heartfulness institute (content.heartfulness.org)
5. Prof. K Subba Raju 2013, Success secrets for engineering students , Smart student publication 3rd edition.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

PROFESSIONAL COMMUNICATION
(MANDATORY COURSE)

L	T	P	C
0	0	3	2

Introduction:

The world is in need of effective and efficient professionals. Technical students are to be equipped with Professional Communication skills to enable them to face the growing employment demands. The course has been introduced to bridge the gap between communication skills of ELCS and ACS.

Course Objectives:

- speak & write intelligible English
- understand professional etiquette and learn appropriate mannerism
- learn about leadership, team building skills and to solve problems by taking decisions ➢to present effectively
- knowing his/her strengths and overcoming weaknesses

Course Outcomes:

A student learns:

- to speak and write appropriate English
- the professional demands
- to solve problems and take decisions
- requisite professional skills

Unit: I

Academic Vocabulary and Grammar

Exercises on: Correction of sentences Tenses,
Articles, Prepositions, etc.
Synonyms, Antonyms, One word substitutes, Idioms & Phrases

Unit: II

Self Appraisal

Self Introduction,
SWOT Analysis,
Goal setting
Personality Development

Unit: III

Professional Etiquette

Etiquette
Mannerism
Positive Attitude
Behavioural Traits

Unit: IV

Team Building

Leadership skills
Team Work
Decision Making/ Problem Solving / Conflict managements
Case Study

Unit: V

Presentation Skills

Poster Presentation
Oral Presentation

References:

1) Rao,M.S. *Soft Skills Enhancing Employability*. New Delhi: I.K.Publishing House,2010.
2) Rao, Nageshwar. *Communication Skills*. New Delhi: Himalaya Publishing House Pvt.Ltd, 2008
3) Ashrif Rizvi. *Effective TechnicalCommunication*, Tata Mc Grahill, 2011.
4) Daniel G. Riordan & Steven E. Pauley. *Technical Report Writing Today*, Biztantra Publishers, 2005.
5) David A McCurry & Joanne Buckely, *Handbook for Technical Writing* CENGAGE Learning 2008.
6) *Raymond Murphy's English Grammar* with CD, Murphy, Cambridge University Press, 2012.
7) William Standard. *Living English Structures*- Allen-Pearson, 2011.
8) S M Guptha. *Current English Grammar and Usage*, PHI, 2013.
9) Krishna Swami. *Modern English Grammar*-, McMillan, 2009.
10) Anjana Agarwal. *Powerful Vocabulary Builder*, New Age International Publishers, 2011

DISASTER MANAGEMENT
(MANDATORY COURSE)

L	T	P/D	C
2	0	0	0

Course Objectives:

- To provide knowledge related to the broad field of environmental risk assessment
- Steps involved in the risk assessment process, including statistical characterization of observed data
- Knowledge about tools that can be used in defining environmental risks, particularly as related to human health.
- To develop practical skills in disaster mitigation, planning, response and post disaster rehabilitation, particularly related to health and public health.

Course Outcomes:

- Develop an understanding of the key concepts, definitions a key perspectives of all Hazards Emergency Management
- Understand the Emergency/Disaster Management Cycle
- Have a basic understanding for the history of Emergency Management
- Develop a basic under understanding of Prevention, Mitigation, Preparedness, Response and Recovery
- Develop a basic understanding for the role of public and private partnerships

UNIT-I
Introduction to the Different Types Of Disasters:
Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.
Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-II
Environment and Disasters:
Environment, ecosystem and disasters. Climate change – issues and concerns. Industrial hazards and safety measures. Post disaster impact on environment. Impact of developmental projects on disaster risk. Aspects of environmental management for disaster risk reduction. Environmental Impact Assessment (EIA).

UNIT-III
Disaster Risk Mitigation:

Disaster risk assessment (Hazard-Vulnerability-Capacity analysis), Hazard mapping and forecasting. Principles and aspects of Disaster prevention Disaster mitigation Preparedness for damage mitigation and coping with disasters. Capacity building for disaster/damage mitigation (structural and non-structural measures). Contingency planning for damage mitigation of different hazards.

UNIT-IV

Disaster Management:
Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster responses; Police and other organizations.

UNIT-V

Planning For Disaster Rescue and Risk Reduction:
Community-hazard profile of the disaster site. DM cycle, Different phases of Disaster Management: Predisaster stage, Emergency stage, Post disaster stage. Implementation of different disaster management phase and Relief mechanism during different disaster stages including cyclones, earthquakes, fire accidents, Tsunami, landslides etc. Disaster Management Act (2005); Disaster Management Policy (2009).

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni, (2013)
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning (2009).

Part – D

Syllabi of

MANDETORY COURSES

INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS

Course Objectives:

4. To make students familiar with Intellectual Property Rights.
5. To understand innovations in engineering and other domains.
6. To be familiar with patents, copyrights and various acts related to innovations.

UNIT - I:

Introduction to Intellectual property Rights (IPR):

Introduction, Types of Intellectual Property Rights, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

UNIT - II:

Trade Marks:

Purpose And Function Of Trademarks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT - III:

Copy rights Law:

Fundamental of Copy Right Law, Originality of Material, Rights of Reproduction, Rights to Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice of Copy Right, International Copy Right Law.

Patents Law:

Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer

UNIT - IV:

Trade Secrets:

Trade Secrete Law, Determination Of Trade Secrets Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secret Litigation.

Unfair competition: Misappropriation Right Of Publicity, False Advertising.

UNIT - V:

Cyber Law:

Cyber Crime, Information Security, Cyber Criminals, Classification Of Cyber Criminals- Legal Perspectives- Indian Perspectives- Cyber Crimes And Indian ITA 2000, Global Perspective On Cyber Crime- Cyber Crime Era.

Course Outcomes:

Upon completion of the course, the students are expected to:

1. To define various terms related to Intellectual Property Rights.
2. To understand the process of patent, copyrights and related procedures.
3. To analyze the situation of IPR in the Indian context with that of global scenario.

14.To understand the patenting process through various case studies.

TEXT BOOKS & REFERENCES:

1. Deborah, E. Bo Choux, Intellectual Property Right, Cengage Learning.
2. Prabuddha Ganguli, Intellectual Property Right - Unleashing The Knowledge Economy, Tata Mc Graw Hill Publishing Company Ltd.,
3. Nina Godbole and Sunitha Belapure, “Cyber Security” Wiley India 2012.

PROFESSIONAL ETHICS, HUMAN VALUES AND SELF DEVELOPMENT

	L	T	P/D	C
Course Objectives:	2	0	0	0

a. To offer the students an appropriate set of values to live by
b. To help them achieve a balanced life with appropriate attitudes and behaviour
c. To ensure harmonious life with sustained happiness and prosperity
d. To create awareness on Ethical human conduct, Engineering Ethics, Social responsibility as an engineer.

Course Outcomes:

1. Cultivate the habit of Introspection; Inspirations from within and outside and journal writing to become Successful Engineers with hopes of a better human being.
2. Ethical Responsibilities of Engineers while - dealing with the issues.
3. To maintain work life –balance and societal well being.
4. Develop Right thinking and understanding

UNIT – I

Course Introduction to Values: Need, Guidelines, Content and Educational Process, Application of values, Universal values. Natural Acceptance. Self Exploration – Meditation- self exploration. Continuous Happiness and Prosperity - Right thinking and understanding. Ambition and Aspiration.

UNIT - II:

Harmony in the Human Being:

Harmony in Myself: Human being as a co-existence of 'I' and the material 'Body'. Needs of Self ('I') and 'Body'. The Body as an instrument of 'I' (I being the Doer, Seer and Enjoyer). Harmony of I with the Body, Correct Appraisal of Physical needs

UNIT - III:

Harmony in the Family, Society and in Nature:

Harmony in Human - Human Relationships: Harmony in the Family, Values in Human - Human Relationships,Trust, Respect and other Salient Values in Relationships. Harmony in the Society, Universal Harmony Order.

Harmony in the nature and Existence: Whole existence as Co-existence: Inter-connectedness and Mutual fulfillment among the four orders of nature - Recyclability and Self-regulation in nature.

UNIT - IV:

Professional Ethics:

Introduction, Profession, Professionals, Professionalism, Professional's- roles and risks, Professional Accountability, Ethics in Engineering Profession, Roles of Engineers, Balanced outlook on Law and Responsibilities as Citizens, Professional Responsibilities, Professional Rights.

UNIT - V:

Self Development:

Behavior and Attitude, Stress Management- Types of Stress, Self Management, Choices we make, Excellence.

Meditation: Importance of Meditation, Observation, Introspection, Contemplation, Concentration, Relaxation, Systematic Practice of Meditation.

Inner Cleaning, Need to purify our Conscience and develop Purity in Thoughts and Actions Journal Writing: Uses and Self Development.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, g p Bagaria, 2009, a foundation course in human values and professional ethics.
2. Professional ethics by R Subramanian Oxford press
3. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
4. Self development modules from heartfulness institute (content.heartfulness.org).
5. Prof. K Subba Raju 2013, Success secrets for engineering students, Smart student publication 3rd edition.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

PROFESSIONAL COMMUNICATION

L	T	P	C
0	0	3	2

Introduction:

The world is in need of effective and efficient professionals. Technical students are to be equipped with Professional Communication skills to enable them to face the growing employment demands. The course has been introduced to bridge the gap between communication skills of ELCS and ACS.

Course Objectives:

To enable a student:

- speak & write intelligible English
- understand professional etiquette and learn appropriate mannerism
- learn about leadership, team building skills and to solve problems by taking decisions ➢to present effectively
- knowing his/her strengths and overcoming weaknesses

Course Outcomes:

A student learns:

- to speak and write appropriate English
- the professional demands
- to solve problems and take decisions
- requisite professional skills

Unit: I

Academic Vocabulary and Grammar

Exercises on: Correction of sentences Tenses,
Articles, Prepositions, etc.
Synonyms, Antonyms, One word substitutes, Idioms & Phrases

Unit: II

Self Appraisal

Self Introduction,
SWOT Analysis,
Goal setting
Personality Development

Unit: III

Professional Etiquette

Etiquette
Mannerism

Positive Attitude
Behavioral Traits

Unit: IV

Team Building

Leadership skills
Team Work
Decision Making/ Problem Solving / Conflict managements
Case Study

Unit: V

Presentation Skills

Poster Presentation
Oral Presentation

References:

1. Rao,M.S. Soft Skills Enhancing Employability.New Delhi: I.K.Publishing House,2010.
2. Rao, Nageshwar. Communication Skills. New Delhi: Himalaya Publishing House Pvt. Ltd, 2008.
3. Ashrif Rizvi. Effective Technical Communication, Tata Mc Grahill, 2011.
4. Daniel G. Riordan & Steven E. Pauley. Technical Report Writing Today, Biztantra Publishers, 2005.
5. David A McCurry & Joanne Buckely, Handbook for Technical Writing CENGAGE Learning 2008.
6. Raymond Murphy's English Grammar with CD, Murphy, Cambridge University Press, 2012.
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8. S M Guptha. Current English Grammar and Usage, PHI, 2013.
9. Krishna Swami. Modern English Grammar-, McMillan, 2009.
10. Anjana Agarwal. Powerful Vocabulary Builder, New Age International Publishers, 2011.

DISASTER MANAGEMENT

L	T	P/D	C
2	0	0	0

Course Objectives:

- To provide knowledge related to the broad field of environmental risk assessment.
- Steps involved in the risk assessment process, including statistical characterization of observed data.
- Knowledge about tools that can be used in defining environmental risks, particularly as related to human health.
- To develop practical skills in disaster mitigation, planning, response and post disaster rehabilitation, particularly related to health and public health.

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- Develop a basic understanding for the role of public and private partnerships

UNIT-I

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UNIT-IV

Disaster Management:

Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster responses; Police and other organizations. (2009).

UNIT-V

Planning for Disaster Rescue and Risk Reduction:

Community-hazard profile of the disaster site. DM cycle, Different phases of Disaster Management: Predisaster stage, Emergency stage, Post disaster stage. Implementation of different disaster management phase and Relief mechanism during different disaster stages including cyclones, earthquakes, fire accidents, Tsunami, landslides etc. Disaster Management Act (2005); Disaster Management Policy (2009).

TEXT BOOKS:

1. Disaster Mitigation: Experiences and Reflections by Pradeep Sahni, (2013).
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning (2009).

B.TECH EEE III YEAR COURSE STRUCTURE

S. No.	Code	Subject	L	T/P	Credits
III Year I Semester					
1	**A15017**	Managerial Economics and Financial Accounts	3	1	3
2	**A15212**	Power Electronics	3	1	3
3	**A15213**	Power Systems-II	3	1	3
4	**A15214**	Electrical Machines-III	3	1	3
5	**Open Elective-1**	**A15218 -** Non Conventional Energy Sources **A15219 -** Energy Management	3	1	3
6	**Professional Electives**	**A15215** -High Voltage Engineering **A15216** - Advanced Control Systems **A15217**- Linear Systems Analysis	3	1	3
7	**A15285**	Electrical Machines Lab-II	0	2	2
8	**A15286**	Control Systems & Simulation Lab	0	2	2
9	**MC-III**	Personality Development & Behavioral Skills	2	0	2
		Total Credits	**20**	**10**	**24**
III Year II Semester					
1	**A16421**	IC Applications	3	1	3
2	**A16221**	Electrical Measurements & Measuring Instruments	3	1	3
3	**A16222**	Power Semiconductor Drives	3	1	3
4	**A16223**	Switchgear & Protection	3	1	3
5	**Open Elective-2**	**A16227 -** Energy Auditing & Conservation **A16228 -** Principles of Electric Power Utilization	3	1	3
6	**Professional Electives**	**A16224** - Renewable Energy Sources **A16225** - Reliability Engineering and Application to Power Systems **A16226** - Digital Control Systems	3	1	3
7	**A16287**	Power Electronics and Simulation Lab	0	2	2
8	**A16090**	Advanced Communication Skills Lab	0	2	2
9	**MC-IV**	Quantitative Methods & Logical Reasoning	2	0	2
		Total Credits	**20**	**10**	**24**

III Year B.Tech. EEE - I Sem

L	T/P/D	C
3	1/-/-	3

POWER ELECTRONICS

Objective:
With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

UNIT - I
Power Semi-Conductor Devices:
Family of Thyristor – Silicon Controlled Rectifiers (SCR's) –Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points. Two transistor analogy- BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors .
Firing & Commutation Circuits:
SCR - UJT firing circuit –– Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT - II
AC-DC Converters 1-Phase Controlled Rectifiers:
Phase control technique – Single phase Line commutated converters – Midpoint and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode –Numerical problems. Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Freewheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems- Dual converters (single phase).
3-Phase Controlled Rectifiers:
Three phase converters – Three pulse and six pulse converters – Midpoint and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (three phase) - Waveforms –Numerical Problems.

UNIT - III
AC-AC Converters (AC Voltage Controllers) & Frequency Changers (Cyclo-Converters): AC voltage controllers – Single phase two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms – Firing circuits -Numerical problems - Cyclo converters – Single phase midpoint cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms.

UNIT - IV
DC-DC Converters (Choppers):
Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression, Jones chopper, AC Chopper, Problems.

UNIT - V
DC-AC Converters (Inverters):
Inverters – Single phase inverter – Basic series inverter, parallel inverter - operation and waveforms - Three phase inverters (180, 120 degrees conduction modes of operation) - Voltage control techniques for inverters, Pulse width modulation techniques - Numerical problems.

TEXT BOOKS:

1. Power Electronics, Dr. P. S. Bimbhra, Khanna Publishers
2. Power Electronics Devices, Circuits and Industrial applications, V. R. Moorthi, Oxford University Press.

REFERENCE BOOKS:

1. Power Electronics; Circuits, Devices and Applications, M. H. Rashid, Prentice Hall of India.
2. Power Electronics, M. D. Singh & K. B. Kanchandhani, Tata Mc Graw - Hill Publishing Company.
3. Power Electronics, Vedam Subramanyam, New Age International (P) Limited, Publishers.
4. Elements of Power Electronics, Philip T. Krein, Oxford University Press.
5. Power Electronics, M. S. Jamil Asghar, PHI Private Limited.
6. Power Electronics, P. C. Sen, Tata Mc Graw-Hill Publishing.
7. Power Electronics, K. Hari Babu, Scitech Publications India Pvt. Ltd.
8. Principles of Power Electronics, John G. Kassakian, martin F. Schlect, Geroge C. Verghese, Pearson Education.

9. Thyristorised Power Controllers, G. K. Dubey, S. R. Doradra, A. joshi and R. M. K. Sinha, New Age International (P) Limited Publishers.

Outcomes:

After going through this course the student gets a thorough knowledge on construction operation V-I characteristics commutation firing and protection of various power semiconductor devices, focused analysis of thyristor device, nature of the R, RL and RLE loads for different power inputs, AC-to-DC power conversion through 1-phase & 3-phase controlled rectifiers, DC-to-DC power conversion through step-up and step-down choppers, AC-to-AC power conversion through AC voltage controllers, Frequency conversion through cyclo-converters, DC-to-AC power conversion through 1-phase & 3-phase inverters, different types of PWM (pulse-width modulation) techniques, steady-state and transient state analysis of all the power converters, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE I-Sem | L T P C: 3 1 0 3

POWER SYSTEMS-II - A15213

Objective:

This course is an extension of Power systems-I course. It deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

UNIT – I

Transmission Line Parameters:

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT – II

Performance of Short and Medium Length Transmission Lines:

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT-III

Power System Transients & Factors Governing The Performance of Transmission Lines:

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT – IV

Overhead Line Insulators & Sag and Tension Calculations:

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT – V

Underground Cables:

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading, HV Cables.

TEXT BOOKS:

1. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers.
2. Power System Engineering, I.J.Nagarath and D.P.Kothari, TMG.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. A Text Book of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
3. Electrical Power Generation, Transmission and Distribution S. N. Singh, PHI.
4. Principles of Power Systems, V. K. Mehta and Rohit Mehta S. Chand Company Pvt. Ltd.
5. Electrical Power Systems, PSR, Murthy, BS Publications.
6. Power System Analysis and Design, Dr. B. R. Gupta, S. Chand & Company Limited.
7. Power System Analysis, Operation and control, Abhijit Chakrpabarti, Sunitha Halder, PHI, 3/e, 2010

8. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC Press (Taylor & Francis Group) Special Indian Edition, 2/e.

Outcome:

After going through this course the student gets a thorough knowledge on calculation of transmission line parameters, performance analysis of short medium long length transmission lines and factors affecting the performance analysis of transmission lines, transients in power systems, operation of different types of overhead line insulators, sag and tension calculation of transmission lines and detailed analysis of underground cables for power transmission and distribution, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III EEE B.TECH I-SEM

L	C	T/P/D
4	3	1/-/-

ELECTRICAL MACHINES-III

Objective:
This subject is an extension of previous machines courses. It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in house hold appliances and control systems.

UNIT – I
Synchronous Machine & Characteristics
Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated EMF – suppression of harmonics –Excitation of Synchronous generators in thermal plants and Hydro plants-armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination – phasor diagram – load characteristics.

UNIT – II
Regulation of Synchronous Generator
Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of Xd and Xq (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT – III
Parallel Operation of Synchronous Generator
Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

UNIT – IV
Synchronous Motors
Synchronous Motors: Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed.

Power Circles: Excitation and power circles – hunting and its suppression – Methods of starting – synchronous Machines & induction motor.

UNIT – V
SPECIAL MACHINES
Principles of operation of Reluctance Motors, Stepper Motors, Universal Motors, Shaded Pole Motors, A.C. Series Motors, Permanent magnet Brushless DC Motors.

TEXT BOOKS:

1. Electrical Machines – by P.S. Bimbra, Khanna Publishers.
2. Electric Machines, I. J. Nagrath & D. P. Kothari, Tata Mc Graw Hill Publishers.
3. Performance and Design of AC Machines, MG. Say, BPB Publishers.

REFERENCE BOOKS:

1. Electro-machanics - III (Synchronous and single phase machines), S. Kamakashiah, Right Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.
3. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw-Hill Companies.
4. Electric machinery, A.E. Fitzerald, C. Kingsley and S. Umans, Mc Graw Hill Companies.
5. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
6. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
7. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
8. Electrical Machines, R. K. Srivastava, Cengage Learning.
9. Brushless Permanent magnet and Reluctace Motor Drives, J.E. Miller, Calrendon Press Oxford, 1989.
10. Stepping Motors- A Guide to Motor Theory and practice,by P.P. Aearnley, Peter perengrinus, London,1982

Outcome:
After going through this course the student gets a thorough knowledge on, construction operation characteristics regulation parallel-operation power circles starting & speed control methods of synchronous machines and construction operation

characteristics of single-phase motors and special machines, with which he/she can able to apply the above conceptual things to real-world electrical and problems and applications.

III EEE B.TECH I-SEM

L	C	T/P/D
3	3	1/-/-

HIGH VOLTAGE ENGINEERING
(Professional Elective-I)

Objective:
This subject deals with the detailed analysis of breakdown occurring in gaseous, liquids and solid Dielectrics. Information about generation and measurement of High voltage and current. In addition High voltage testing methods are also discussed.

UNIT-I
Introduction to High Voltage Engineering
Electric Field Stresses, Gas/Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Surge voltages, their distribution and control, Gases as insulating media, collision process, ionization process.

UNIT-II
Break Down in Dielectric Materials
Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solids dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT-III
Generation & Measurement of High Voltages & Currents
Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators. Measurement of High Direct Current voltages, measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse.

UNIT-IV
Over Voltages & Insulation Co-Ordination & DC measurements:
Natural causes for over voltages- Lighting phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems, Measurements of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

UNIT-V
Testing & Applications Electrical Apparatus:
Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, testing of Transformers, Testing of Surge Arresters, and Radio Interference measurements, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

TEXT BOOKS:

1. High Voltage Engineering, M.S. Naidu and V. Kamaraju, TMH Publications.
2. High Voltage Engineering, C.L. Wadhwa, New Age Internationals (P) Limited.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals, E.Kuffel, W.S. Zaengl, J.Kuffel by Elsevier.
2. High Voltage Insulation Engineering, Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited.
3. High Voltage Engineering, Theory and practice, Mazen Abdel Salam, Hussein Anis, Ahdan, Ahdan El- Morshedy, Roshdy Radwan, Marcel Dekker.

Outcome:
After going through this course the student gets a thorough knowledge on, basics of high voltage engineering , break-down phenomenon in different types of dielectrics, generation and measurement of high voltages and currents, the phenomenon of over voltages, concept of insulation coordination, testing of various materials and electrical apparatus used in high voltage engineering, with which he/she can able to apply the above conceptual things to real- world electrical and electronics problems and applications.

III EEE B.TECH I-SEM **L T/P/D C**
3 1/- 3

ADVANCED CONTROL SYSTEMS
(Professional Elective-I)

Objective:
This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability.

UNIT - I
State Space Analysis of Continuous time Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties, Canonical Forms –Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

UNIT - II
Controllability and Observability: Tests for controllability and observability for continuous time systems, Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement, Full order observer and reduced order observer.

UNIT - III
Describing Function Analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT - IV
Phase-Plane Analysis: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

UNIT - V
Stability Analysis: Stability in the sense of Lyapunov, Lyapunov's stability and Lypunov's instability theorems. Direct method of Lypanov, generation of Lyapunov functions-Variable gradient method, Krasooviski's method.

TEXT BOOKS:

1. Advanced Control Systems, B. N. Sarkar, PHI Learning Private Limited.
2. Modern Control System Theory, M. Gopal, New Age International Publishers.

REFERENCE BOOKS:

1. Control systems, A.Ananad Kumar, PHI.
2. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
3. Modern Control Engineering, Yaduvir Singh, S. Janardhanan, Cengage Learning.
4. Modern Control Engineering, K. Ogata, Prentice Hall of India, 3d edition.

4 Modern Control Engineering, D. Roy Choudhury, PHI Learning.

5. Modern Control Systems An introduction, S.M.Tripathi, Jones & Bartlett Publishers.

Outcomes:
After going through this course the student gets a thorough knowledge on, basics of advanced control systems, state space analysis of continuous time systems and concept of controllability and observability, non-linear systems, describing functions, phase-plane analysis, stability analysis through Lypanov stability, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE –I Sem **L T P C**
3 1 0 3

LINEAR SYSTEMS ANALYSIS
(Professional Elective-I)

Objectives:
This subject gives basic knowledge of signals which is required by all the engineers. This course focuses on:

- To get an in-depth knowledge about signals, systems and analysis of the same using various transforms.

UNIT - I
Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT – II
Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Typers of Sampling - Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT – III
Signal Transmission Through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time.

UNIT – IV
Convolution and Correlation of Signals: Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto Correlation of functions, Properties of Correlation function, Energy density spectrum, Parseval's Theorem, Power density spectrum, Relation between Auto Correlation function and Energy/Power spectral density function, Relation between Convolution and Correlation, Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

UNIT – V
Z–Transforms: Fundamental difference between Continuous and Discrete time signals, Discrete time signal representation using Complex exponential and Sinusoidal components, Periodicity of Discrete time signal using complex exponential signal, Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 Ed., PHI.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2 Ed.
2. Signals and Signals – Iyer and K. Satya Prasad, Cengage Learning
3. Signals and Systems – A.Rama Krishna Rao – 2008, TMH.
4. Introduction to Signal and System Analysis – K.Gopalan 2009, Cengage Learning.
5. Fundamentals of Signals and Systems - Michel J. Robert, 2008, MGH International Edition.
6. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, 3 Ed., 2004, PE.

Outcomes:
Upon completing this course the student will be able to:

- Represent any arbitrary signals in terms of complete sets of orthogonal functions and understands the principles of impulse functions, step function and signum function.
- Express periodic signals in terms of Fourier series and express the spectrum and express the arbitrary signal (discrete) as Fourier transform to draw the spectrum.
- Understands the principle of linear system, filter characteristics of a system and its bandwidth, the concepts of auto correlation and cross correlation and power Density Spectrum.

- Can design a system for sampling a signal.
- For a given system, response can be obtained using Laplace transform, properties and ROC of L.T.
- Study the continuous and discrete signal relation and relation between F.T., L.T. & Z.T, properties, ROC of Z Transform.

III Year B.Tech I Sem

L	T	P	C
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ELECTRICAL MACHINES LAB – II

Any Ten of the following experiments are required to be conducted.

1. O.C & S.C tests on single phase transformer.
2. Sumper's test on a pair of single phase transformer.
3. Brake test on three phase induction motor.
4. No-load & Blocked rotor tests on three phase induction motor.
5. Regulation of a three – phase alternate by synchronous impedance m.m.f methods.
6. V and inverted V curves of a three – phase synchronous motor.
7. Equivalent circuit of a single phase induction motor.
8. Determination of Xd and Xq of a salient pole synchronous machine.

In addition to the above eight experiments alteast any two of the following experiments are required to be conducted from the following list.

9. Regulation of three phase alternator by Z.P.F. and A.S.A methods
10. Scott connection of transformer and Parallel operation of single phase transformer.
11. Separation of core losses of a single phase transformer.
12. Load characteristics of three phase Induction Generator.

Reference books:

1. Electric machinery- P.S. Bimbra, Khanna Publishers, 7thedition, 2010.
2. Theory and Performance of Electrical Machines- JB. Gupta, S.K. Kataria and ISons, 2009.
3. Electro mechanics (transformers and induction motors) – S.Kamakshiah , Hitech publishers 2009.

III Year B.Tech. EEE I-Sem **L T P C**
0 0 3 2

CONTROL SYSTEMS AND SIMULATION LAB

Any Ten of the following experiments are to be conducted

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Transfer function of DC Shunt generator
7. Characteristics of magnetic amplifiers
8. Characteristics of AC servo motor
9. PSPICE Simulation of Op-Amp based Integrator and Differentiator circuits.
10. Linear system analysis (Time domain analysis, Error analysis).
11. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system.
12. State space model for classical transfer function– Verification.

REFERENCE BOOKS

1. MATLAB and Tool books user's manual and- Math Works, USA.
2. PSPICE A/D Users Manual-Microsim,USA
3. PSPICE reference Guide –Microsim, USA.
4. Simulation of Electrical and Electronics Circuits Using P-Spice- By MH. Rashid, M/s PHI publications.

Part – C

Syllabi of

B.Tech., III Year II Semester

III Year B.Tech. EEE II-Sem

L	T	P	C
3	1	0	3

IC APPLICATIONS

UNIT - I:

Integrated Circuits: Classification, chip size and circuit complexity, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT - II:

OP-AMP and Applications: Basic information of OP-AMP, ideal and practical OP-AMP, internal circuits, OP-AMP characteristics, DC and AC characteristics, 741 OP-AMP and its features, modes of operation-inverting, non-inverting, differential.

Basic application of OP-AMP, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Intergrators, Comparators, introduction to voltage regulators.

UNIT - III:

Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.

UNIT - IV:

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT - V:

D-A and A-D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and slope ADC. DAC and ADC specifications.

TEXT BOOKS:

1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International (p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCES BOOKS:

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Intergrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
3. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw Hill.
4. Digital Fundamentals - Floyd and Jain, Pearson Education.

III Year B.Tech. EEE II-Sem **L T P C**
3 1 0 3

ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

Objectives:
Electrical Measurements & Measuring Instrumentscourse introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters, voltage, current, power factor, power, energy, frequency and magnetic measurements. It also introduces transducers and oscilloscopes- CRO.

UNIT-I
Introduction to Measuring Instruments:
Classification-deflection, control and damping torques- Ammeters and Voltmeters- PMMC, moving iron type instruments- expression for the deflecting torque and control torque- Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters- electrometer type and attracted disc type, Extension of range of Electrostatic Voltmeters.

UNIT-II
Potentiometers & Instrument Transformers
Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types, standardization- applications. CT and PT- Ratio and Phase angle errors.

UNIT-III
Measurement of Power & Energy:
Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of reactive power.

Single phase Induction type energy meter–driving and braking torques-errors and compensations – testing by phantom loading using RSS meter. Three phase energy meter- Maximum demand meters.
UNIT – IV
D.C & A.C Bridges:
Method of measuring low, medium, high resistances – sensitivity of wheat- stone Bridge – carey foster's Bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistacne – loss of charge method. Measurement of Inductance – Factor – Maxwell's Bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle – Desauty Bridge. Wien's Bridge – Schering Bridge.

UNIT – V
Transducers & oscilloscopes:
Definition of transducers, classification of transducers, Advantages of Electrical transducers, characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers, LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.
CRO: Cathode ray oscilloscope – cathode ray tube – time base generator- horizontal and vertical amplifiers, CRO Probes, Applications of CRO, Measurement of Phase and Frequency-Lissajous patterns.

TEXT BOOKS:

1. Electrical & electronic measurement & Instruments, A.K.Swehney, Dhanpat Rai & Co . Publications.
2. Electrical measuring instruments and measurements, S.C. Bhargava, BS Publications.

REFERENCE BOOKS:

1. Electrical and electronic measurements and instrumentation, R.K.Rajput, S.Chand & company Ltd.
2. Electrical and electronic measurements, G.K.Banerjee, PHI Learning Pvt.Ltd.

Outcome:
Understanding - basic construction of all the Analog measuring instruments, Extension of range of all measuring instruments. Application of these concepts in measuring electrical quantities like voltage, current, power and energy.Analysis & Design of instrument transformers. Explain the principles - D.C and A.C potentiometer, methods of standardization & solution to problems. Explain DC and AC Bridges & apply basic bridge principles to measure the electrical parameters R,L,C,f. Basic principle, classification, advantages & applications of transducers, applications of CRO.

III Year B.Tech. EEE II-Sem

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POWER SEMICONDUCTOR DRIVES

Objective:

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase Converters and choppers are given in detail. The control of AC motor drives with variable frequency conveners and variable voltage are presented.

UNIT –I

Control of DC Motors through Phase Controlled Rectifiers:

Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to DC separately excited and DC series motors -continuous current operation - output voltage and current waveforms-Speed and Torque expressions - Speed - Torque Characteristics- Problems on Converter fed DC motors. Three phase semi and fully controlled converters Connected to DC separately excited and DC series motors - output voltage and current waveforms - Speed and Torque expressions - Speed - Torque characteristics - Problems.

UNIT – II

Four Quadrant Operations of DC Drives through Dual Converters:

Introduction to Four quadrant operation - Motoring operations, Electric Braking - Plugging, Dynamic and Regenerative Braking operations, Four quadrant operation of D C motors by dual converters -Closed loop operation of DC motor (Block Diagram Only).

UNIT III

Control of DC Motors by Choppers (1-. 2-, 4- Quadrant Operations):

Single quadrant, Two -quadrant and four quadrant chopper fed separately excited and series exacted motors - Continuous current operation - Output voltage and current wave forms - Speed torque expressions - speed torque characteristics - Problems on Chopper fed DC Motors - Closed Loop operation (Block Diagram Only).

UNIT –IV

Control of Induction Motors:

Variable voltage characteristics: Control of Induction Motor by AC Voltage Controllers - Waveforms - speed torque characteristics.

Variable frequency characteristics:

Variable frequency control of induction motor by Voltage source and current source Inverter and cyclo-converters-PWM control - Comparison of VSI and CSI operations - Speed torque Characteristics - numerical problems on induction motor drives - Closed loop operation of induction motor delves (Block Diagram Only).

Static rotor resistance control:

Slip power recovery - Static Scherbius drive – Static Kramer Drive - their performance and speed torque characteristics - advantages applications - problems.

UNIT – V

Control of Synchronous Motors: Separate control & self control of synchronous motors - Operation of self controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor - Operation - Waveforms - speed torque characteristics - Applications -Advantages and Numerical Problems Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI.

TEXT BOOKS:

1. Power Semiconductor Drives, PV Rao, BS Publications.
2. Fundamentals of Electric Drives, G K Dubey Narosa Publications

REFERENCE BOOKS:

1. Power Semiconductor Drives, S. B. Dewan, G R. Slemon , A. Straughen. Wiley Pvt Ltd.
2. Electric Drives N K. De, P. K. Sen, PHI Learning Private Ltd.
3. Thyristor Control of Electric drives, Vedam Subramanyam Tata McGraw Hill Pubications
4. Electrical machines and Drive Systems, John Hindmarsh, Alasdair Renfrew, Newnes.
5. Electric Motors and Drives, Fundamentals, Types and Applications Austin Hughes, Newnes.
6. Power Electronics and Variable Frequency Drives Technology and Applications, Bimal K. Bose, Wiley India Pvt, Ltd.
7. A First course on Electrical Drives, S K Pillai, New Age International (P) Ltd.
8. Modern Power Electronics and AC Drives, B.K.Bose, PHI.
9. Power Electronic Circuits, Devices and applications, M,H.Rashid, PHI

Outcome:

After going through this course the student gets a Thorough knowledge on, steady-state analysis control speed-torque characteristics and closed-loop operation of DC motors (separately excited shunt motor and series motor) through phase controlled rectifiers and choppers, single-quadrant two-quadrant and four-quadrant operations forward-motoring forward-braking reverse-motoring reverse-regenerative braking operations of DC motors.

III Year B.Tech. EEE II-Sem L T P C
3 1 0 3

SWITCH GEAR AND PROTECTION

Objective:
This course introduces all varieties of circuit breakers and relays for protection of generators, transformers feeders and bus bars from different faults with emphasis on neutral grounding.

UNIT–I
Circuit Breakers:
Circuit Breaker (CB) – Elementary principles of arc interruption, Recovery– Restriking Voltage and Recovery voltages–Restriking phenomenon–Average and Max. RRRV–Numerical problems-Current chopping and Resistance switching–CB ratings and specifications: Auto reclosing. Description and operation of following types Circuit Breaker: Minimum Oil Circuit Breaker, Air Blast Circuit Breaker–Vacuum and SF6 circuit breakers and their applications.

UNIT–II
Electromagnetic, Static Relays & Numerical Relays:
Principle of operation and construction of attracted armature– Balanced beam– induction disc and induction cup relays– Relays classification– Instantaneous– DMT and IDMT types– Applications of relays: Over current/under voltage relays– Directional relays– Differential relays and percentage differential relays
Distance relays:
Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays, Static Relays and Numerical Relays, Comparison of numerical relays & static relays with electromagnetic relays.

UNIT–III
Generator & Transformer Protection:
Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples on percentage windings unprotected.Protection of transformers: Percentage differential protection– Numerical problems on Design of CT's ratio– Buchholz relay protection.

UNIT–IV
Feeder and Bus bar Protection& Grounding Protection of Lines:
Over current– earth fault, Carrier current and three zone distance relay using impedance relays Protection of bus bars– Differential protection.

Neutral grounding:
Grounded & ungrounded neutral systems.-Effects of ungrounded neutral on system performance. Methods of neutral grounding: Solid resistance, reactance-Arcing grounds. Earthing practices in Substations.

UNIT–V:
Protection against over voltage and grounding:
Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc–Oxide lighting arresters– Insulation coordination– BIL– impulse ratio–. Earthing Practices in Substations.

TEXT BOOKS:

1. Power system protection and switch gear by BadriRam, Viswakarma TMH publications
2. Switchgear & protection, Sunil Rao, Khanna publishers.
3. Protection & switchgear, Bhavesh Bhalja, R.P Mahesheari, Nilesh G.Chothani, and Oxford University press.

REFERENCE BOOKS:

1. Electrical power systems, C.L Wadhwa, New age international (P) limited, Publishers.
2. Electrical Power System Protection by C. CHRISTOPOULOS and A. Wright, Springer publications.
3. Electrical power systems, P.S.R Murthy, BS Publications.
4. Power System Protection& switchgear by Bhuvanesh Oza, TMH.
5. A textbook on power system engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanapat Rai & Co pvt.ltd.
6. A textbook on power system engineering, R.K Rajput, Laxmi Publications (P) ltd.
7. Principle of power system, V.K Mehta& Rohit Mehta, S.Chand company pvt ltd.
8. Digital and numerical relays by T.S Madhavarao Tata Magra hills
9. Technical Reference Book, Vol. 1, APTRANSCO

Outcomes:

After going through this course the students gets a thorough knowledge on various types of circuit breakers and relays used for protection of generators, transformers, feeders, bus-bars etc., they understand the applications of relays, neutral grounding, lightening arrestors, and numerical relays in the power systems.

III Year B.Tech. EEE II-Sem

L	T	P	C
3	1	0	3

RENEWABLE ENERGY SOURCES
(Professional Elective-II)

Objectives:
It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, geothermal energy and ocean energy as alternative energy sources.

UNIT-I
Principles of solar radiation:
Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II
Solar Energy Collection, Storage & Applications:
Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Storage & Applications:
Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III
Wind Energy:
Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria. Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bl0-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV
Geothermal Energy:
Resources, types of wells, methods of harnessing the energy, potential in India.
Ocean Energy:
OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and Conversion techniques, mini-hydel power plants, and their economics.

UNIT-V
Miscellaneous energy conversion systems:
Coal gasification and liquefaction, thermo electric energy conversion-Thomson effect, peltier effect and see beck effect.Types of fuel cells, H2-O2 Fuel cells, Application of fuel cells,Environmental effects of energy conversion systems, pollution from coal and preventive measures, steam stations and pollution

TEXT BOOKS
1. Non-Conventional Energy Sources, G.D. Rai, Khanna Publishers.
2. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
3. Introduction to renewable energy, Vaughn Nelson, CRC Press (Taylor & Francis).

REFERENCE BOOKS
1. Renewable Energy Resources, Twidell & Wier, CRC Press (Taylor & Francis).
2. Renewable Energy Sources and Emerging Technologies, D. P. Kothari, K. C. Singal, Rakesh Ranjan, PHI Learning Private Limited.
3. Fundamentals of Renewable Energy Systems, D. Mukherjee, S. Chakrabarti, New Age International.
4. Renewable Energy Power for a sustainable Future, Godfrey Boyle, Oxford University Press.
5. Renewable energy resources, Tiwari and Ghosal, Narosa publications.
6. Renewable Energy Technologies, Ramesh & Kumar, Narosa publications.
7. Non-Conventional Energy Systems, K Mittal, Wheeler publications.

Outcomes:
After going through this course the student gets a thorough knowledge on,various types of renewable energy sources i.e. solar, wind, bio-mass, geothermal, ocean, hybrid energy systems and principles of direct energy conversion, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE II-Sem **L T P C**
3 1 0 3

RELIABILITY ENGINEERING AND APPLICATIONS TO POWER SYSTEMS
(Professional Elective-II)

Objective:
This subject introduces the concept of probability, reliability, distribution functions and various methods and techniques to calculate and estimate the reliability of different engineering problems and models.

UNIT - I
Basics of Probability theory & Distribution & Network Modeling and Reliability Analysis:
Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probabilities density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution.
Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

UNIT – II
Reliability functions & Markov Modeling:
Reliability functions f(t), F(t), R(t), h(t) and their relationships – exponential distribution – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.
Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities. – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

UNIT – III
Frequency & Duration Techniques & Generation System Reliability Analysis:
Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle time, for one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.
Reliability model of a generation system– recursive relation for unit addition and removal – load modeling - Merging of generation load model – evaluation of transition rates for merged state model – cumulative Probability, cumulative frequency of failure evaluation – LOLP, LOLE.

UNIT - IV
Composite Systems Reliability Analysis:
Decompositions method – Reliability Indices – Weather Effects on Transmission Lines.

UNIT – V
Distribution System and Reliability Analysis:
Basic Concepts – Evaluation of Basic and performance reliability indices of radial networks.

TEXT BOOKS:
1. Reliability Evaluation of Engg. System – R. Billinton, R.N.Allan, Plenum Press, New York, reprinted in India by B.S.Publications, 2007.
2. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

Outcome:
After going through this course the student gets a thorough knowledge on, basic probability theory, distribution functions, reliability analysis of various models through different methods, reliability functions, repairable inseparable systems reliability through markov modeling frequency and duration techniques, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE II-Sem **L T P C**
3 1 0 3

DIGITAL CONTROL SYSTEMS
(Professional Elective-II)

Objective:
This course gives fundamentals digital control systems, Z- transforms, state space representation of the control systems, concepts of controllability and obervability, estimation of stability in different domains, designof discrete time control systems, compensators, state feedback controllers, state observers through various transformations.

UNIT – I
Introduction:
Block Diagram of typical control system- advantages of sampling in control systems – examples of discrete data and digital systems – data conversion and quantization – sample and hold devices – D/A and A/D conversion – sampling theorem – reconstruction of sampled signals –ZOH. Z-transform: Definition and evaluation of Z-transforms – mapping between s-plane and z-plane – inverse z-plane transform – theorems of the Z-transforms –limitations of z-transforms –pulse transfer function –pulse transfer function of ZOH –relation between G(s) and G(z) – signal flow graph method applied to digital systems.

UNIT- II
State Space Analysis:
State space modeling of digital systems with sample and hold – state transition equation of digital time in variant systems – solution of time in variant discrete state equations by the Z-Transformation – transfer function from the state model – Eigen values – Eigen vector and diagonalisation of the A-matrix – Jordan canonical form. Computation of state transition matrix-Transformation to phase to variable canonical form-The state diagram – decomposition of digital system – Response of sample data system between sampling instants using state approach. Stability: Definition of stability – stability tests – The second method of Liapunov.

UNIT- III
Time Domain Analysis:
Comparison of time response of continuous data and digital control systems-correlation between time response and root locus j the s-plane and z-plane – effect of pole-zero configuration in the z-plane upon the maximum overshoot and peak time of transient response – Root loci for digital control systems – steady state error analysis of digital control systems – Nyquits plot – Bode plot-G.M and P.M.
UNIT- IV
Controller Design:
The digital control design with digital controller with bilinear transformation – Digital PID controller-Design with deadbeat response-Pole placement through state feedback-Design of full order state observer-Discrete Euler Lagrance Equation – Discrete maximum principle.

UNIT-V
Digital State Observer:
Design of - Full order and reduced order observers. Design by max. Principle: Discrete Euler language equation-discrete maximum principle.

TEXT BOOKS:
1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition.
2. Digital Control Systems, V. I. George, C. P. Kurian, Cengage Learning.
3. Digital Control and State Variable Methods by M.Gopal, TMH. 4. Digital Control Engineering, M.Gopal

REFERENCE BOOKS:
1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering Analysis and Design M. Sami Fadali Antonio Visioli, AP Acad

Outcome:
After going through this course the student gets a thorough knowledge on, basics of digital control systems, Z-transforms, mapping between S-plane and Z- plane, state- space analysis, concept of controllability and obervability, derivation of pulse-transfer function, stability analysis in S-domain and Z-domains, stability through jury-stability test, stability through bilinear transformation and R-H criteria, design of discrete-time control systems, design of lag, lead, lead-lag compensators, design of PID controllers and design of state feedback controllers and observers, with which he./she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

III Year B.Tech. EEE II-Sem

POWER ELECTRONICS AND SIMULATION LAB

Any ten of the following experiments are required to be conducted.

1. Study of the characteristics of SCR, MOSFET &IGBT.
2. Gate Firing Circuits for SCRs (R- Triggering, RC Triggering & UJT Triggering).
3. Single Phase AC voltage Controller with R & RL Loads.
4. Single Phase fully Controlled Bridge Converter with R& RL Loads.
5. DC Jones Chopper with R& RL Loads.
6. Single Phase Parallel Inverter with R& RL Loads.
7. Single Phase Cyclo-Converter with R& RL Loads.
8. Single Phase Series Inverter with R& RL Loads.
9. Single Phase Half controlled converter with R Load.
10. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
11. PSPICE simulation of resonant pulse commutation circuit and Buck Chopper.
12. PSPICE simulation of single phase Inverter with PWM control.

REFERENCE BOOKS:

1. Simulation of Electrical and Electronics Circuits Using PSPICE- by M.H. Rashid, M/s PHI publications.
2. PSPICE A/D Users Manual-Microsim, USA
3. PSPICE reference Guide –Mircosim, USA
4. MATLAB and Tool books user's manual and- MATH Works, USA

Part – D

OPEN ELECTIVES

&

GENERAL SUBJECTS

OPEN ELECTIVES

Introduction

The B.Tech course structure under CBCS consists of 4 Professional Electives and 3 open electives. Each professional elective offered by the students own department gives a choice of three to four courses out of which the student is to select one course. Similarly under open elective system, the student is offered one course each in 3 semesters viz., 3/1, 3/2 & 4/1 with 3 credits.

The six engg. and along with MBA depts. of the college have been divided into four groups
Group- I - ECE & EEE
Group –II - CSE & IT
Group –III - Mechanical & Civil
Group –IV- MBA
Under CBCS, a student from a particular group cannot opt the courses offered by that particular group.

Details of the Courses offered by different Groups -1
Courses offered by Group -1 Departments

ECE
III Year – I Semester
1. Introduction to Microcontrollers & Applications
2. Basic Electronics & Instrumentation

III Year – II Semester
1. Fundamentals of Embedded Systems
2. Principles of Communications

EEE
III Year – I Semester
1. Non Conventional Energy Sources
2. Energy Management

III Year – II Semester
1. Principles of Electrical Power Utilization
2. Energy Auditing &Conservation

Courses offered by Group-2 Departments
CSE/IT
III Year – I Semester
1. Java Programming
2. Operating Systems

III Year – II Semester
1. Database Management Systems
2. Software Engineering

Courses offered by Group-3 Departments
MECH
I Semester
1. Elements of Mechanical Engineering
2. Industrial Engineering

II Semester
1. Basic Automobile Engineering
2. Material Science and Engineering

CIVIL
I Semester
1. Remote Sensing and GIS

2. Smart City

<u>II Semester</u>

1. Green Building
2. Environmental Pollution and Control Methods

Courses offered by Group-4 Department

MBA

<u>I Semester</u>

Total engineering Quality Management

<u>II Semester</u>

Basics of Banking and Capital Market

L T P C
4 0 0 3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

PRE REQUISITES:

- Probability and statistics
- Operation research
- Mathematics-I
- Environmental studies

Course Objectives: To enable the student to understand, with a practical insight,

- The importance of certain basic issues governing the business operations namely demand and supply, production function, cost analysis,
- analysis of markets, forms of business organizations,
- Significance of capital budgeting and financial accounting and financial analysis.

UNIT –I:
Introduction to Managerial Economics& Demand Analysis:
Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT –II:
Production & Cost Analysis:
Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts (Opportunity cost vs outlay costs, Fixed, variable and semi variable costs, marginal cost vs average cost, out of pocket vs book cost, imputed cost, implicit & explicit cost, incremental and decremental cost, sunk vs future cost, separable and joint costs) Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT –III:
Markets & New Economic Environment:
Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organization: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.
UNIT-IV: Introduction to Financial Accounting & Financial Analysis:
Accounting concepts and Conventions Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).Financial Analysis: Analysis and Interpretation of Liquidity Ratios (current ratio, quick ratio), Activity Ratios(inventory turnover ratio, debtors turnover ratio), and Capital structure Ratios(debt equity ratio, interest coverage ratio) and Profitability ratios(gross profit ratio, net profit ratio, operating profit ratio, P/E ratio, EPS). Du Pont Chart.

UNIT –V: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital, Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), Net Present Value Method (simple problems), IRR and PI method.

Outcomes: At the end of the course the students is expected

- To understand and enhance the knowledge regarding managerial economics concepts and obtaining optimal solutions.
- To get an idea of analysis of firm's financial position with the techniques of financial analysis and ratio analysis.

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
2. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
3. J.V.Prabhakar Rao & P.V.Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

REFERENCE BOOKS:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2012.

2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012
4. Domnick Salvatore: Managerial Economics in a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting—A Managerial Perspective, Pearson, 2012.
6. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Kasi Reddy, Saraswathi, MEFA, PHI Learning, 2012.
10. Shailaja & Usha : MEFA, University Press, 2012.

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ADVANCED COMMUNICATION SKILLS (ACS) LAB
(Common to all branches)

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educational English speakers and respond appropriately in different socio-cultural and professional contexts.

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) lab:

1. **Activities on Fundamentals of inter-personal Communication and Building Vocabulary –** Starting a conversation – responding appropriately and relevantly – using the right body language - Role Play in different situations & Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** – General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills –** Structure and presentation of different types of writing – letter writing/ Resume writing/ e-correspondence/ Technical report writing / Portfolio writing – planning for writing – improving one's writing.
4. **Activities on Presentation Skills –** Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.
5. **Activities on Group Discussion and interview Skills –** Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation. Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video – conference and Mock Interviews.

Books Recommended:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D. Pearson Education 2011.
3. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5. The Basics of Communication: A Relational Perspective. Steve Duck & David T. Mc Mahan. Sage South Asia Edition. Sage Publications. 2012.
6. English Vocabulary in Use series, Cambridge University Press. 2009
7. Management Shapers Series by Universities Press (India) Pvt. Ltd. Himayatnagar, Hyderabad. 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanna Buckley. 2012. Cengage Learning.
9. Communication Skills by Leena Sen.PHI Learning Pvt. Ltd. New Delhi. 2009.
10. Handbook for Technical Writing by David A McMurrey & Joanna Buckley Cengage Learning. 2008.
11. Job Hunting by Colm Downess, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill. 2009.
14. Books on TOEFL/GRE/GMAT/ICAT/IELTS by Barron's/DELTA/Cambridge University Press.
15. International English for Call Centres by Barry Tomalin and Suhashini Thomas Macmillan Publishers. 2009.

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PERSONALITY DEVELOPMENT AND BEHAVIOURAL SKILLS

Course Objectives

- To enable students to communicate with outside and peer group members in an effective manner.
- To enable the students to give better presentation and explanation on their projects, posters and assignments - this makes them industry ready.
- To perform better during Campus Recruitment and various interviews they face in their career.

Course Outcomes

At the end of the course a student is expected:

- To communicate with more confidence using better spoken and written English
- To give better presentation and explanation with the use of digital inventions
- To perform well during Campus Drives and different Interviews

Course Outcomes

Unit – I

Personality Development: Definition - Various Aspects of Personality Development - Behavioural Traits. Importance of Soft skills-Soft skills for a future Entrepreneur - Qualities of a good leader - Stress Management - Success stories.

Unit – II

Non Verbal Communication: Kinesics Haptics Proxemics Vocalics Oculesics Body Language in Interviews.

Unit - III

Team Dynamics: Different Types of Teams-role of an individual - Communicating as a group or team leader - Individual Presentations/Team Presentation. Case Studies: Project Presentations.

UNIT-IV

Technical Report Writing: Formats - Effective Resume Preparation - Covering Letter - Statement of Purpose (SoP).

UNIT-V

Role of Multimedia in Communication: Communication in a Digital Edge (Video Conference Etc.)
E-Correspondence: Recent Trends in Professional Communication - Social Networking: Importance, Effects.

Blogging: Creating of Blogs - Technical and Non – technical blogs – Success Stories and Case Studies.

Reference Books

1. Barun, K Mitra, Personality Development and Soft Skills, Oxford University Press, 2nd Edition, 2016.
2. Gopalaswamy Ramesh, the Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education, 2013.
3. Krishna Mohan & Meera Banerji, Developing Communication Skills, Macmillan India Ltd, 2008.
4. Krishna Mohan & Meenakshi Raman, Effective English Communication, Tata McGraw-Hill Publishing Company Ltd, 2008.
5. Arati Gurav, 50 Mantra's of Personality Development, Buzzingstock Publishing House, 2013.
6. P. Kiranmai Dutt & Geetha Rajeevan, Basic Communication Skills, Cambridge University Pvt. Ltd2007.
7. S.C. Sood, Mita Bose, Naresh Jain, Developing Language Skills, Manohar Publications, 2007, T.M. Farhathullah, Communication Skills for Technical Students, Orient Longman Pvt Ltd, 2002.

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QUANTITATIVE METHODS & LOGICAL REASONING

Course Objectives:

1. The objective of this course is to enhance the problem solving skills in the areas of **'Quantitative Aptitude'** and **'Reasoning'** which will enable the students to better preparation for **Campus Placements** and competitive examinations.
2. To improve the logical thinking and mathematical ability of the students.

Course Outcomes:

At the end of the completion of the course a student is expected

1. To solve basic and complex mathematical problems in short time.
2. To perform well in various competitive exams and placement drives.

Quantitative Aptitude and Reasoning:

Unit – I

1. Number System:
Speed math's, Numbers, Factors, prime & Co primes, LCM & HCF, Divisibility rules, finding unit place digit and last two digits of an expression

2. Simple Equations:
Definition of Linear equation, word problems

3. Ratio, Proportion and Variations:
Definition of ratio, ratio of Proportion, Comparison of ratios, Compound ratio, Direct and indirect proportion

4. Percentages:
Converting fractions and decimal into percentages, successive percentage, populations, expenditure and savings

5. Profit and loss:
Relation between Cost price and selling price, Discount and Marked price, Gain or Loss percentages on selling price

6. Simple and Compound Interest:
Problems on interest (**I**), amount (**A**), Principal (**P**) and rate of interest(**R**)
Difference between the simple interest and compound interest for 2 and 3 years.

Unit-II

1.Partnership:
Relation between partners, period of investment and shares

2. Averages and Ages:
Average of different groups, change in averages by Adding, deleting and Replacement of objects, problems on ages.

3. Allegation and mixtures:
Allegation rule, Mean value of the mixture, Replacement of equal amount of quantity.

Time and Work:
Men and Days, Work and Wages, pipes and cisterns, hours and work, Alternate day's concept,

Time and Distance:
Difference between the average and Relative speeds, reaching the destination late and early, Stoppage time per hour, time and distance between two moving bodies

Trains, Boats and Streams:
Train crossing man, same and opposite directions, Speed of boat and stream,

Unit-III

1. Progressions:
Arithmetic, Geometric and Harmonic Progressions, Arithmetic Mean, Geometric Mean and Harmonic Mean and their relations.

2. Quadratic Equations:
General form of Quadratic equation, finding the roots of Quadratic equation, Nature of the Roots.

3. Mensurations:
2D geometry- perimeter, areas, 3D geometry - surface areas, volumes

4. Permutation and Combination:
Fundamental rules, problems on permutations & combinations.

5. Probability
Definition of probability, notations and formulae, problems on probability.

6. Data Interpretation and Data Sufficiency:
Tabular and Pie-charts, Bar and Line graphs, Introduction to data sufficiency, problems on data sufficiency.

Unit-IV

1. Deductions:
Statements and conclusions using Venn diagram and Syllogism method

2. Connectives:
Definition of simple and compound statements, Implications and negations for compound statements.

3. Series completion:
Number series, Alphabet series, letter series.

4. Coding and Decoding:
Letter coding, Number coding, Number to letter coding, Matrix coding, Substitution, Mixed letter coding, Mixed number coding, Deciphering individual letter codes by analysis.

5. Analytical Reasoning Puzzles:
Problems on Linear, Double line-up and Circular arrangements, Selections and Comparisons.

6. Blood Relations:
Defining the various relations among the members of a family, Solving Blood Relation Puzzles by using symbols and notations. Problems on Coded relations.

Unit-V

1. Direction sense test:
Sort of directions in puzzles distance between two points, problems on shadows, Application of triangular triplets.

2. Clocks:
Relation between minute-hour hands, angle vs time, exceptional cases in clocks

3. Calendars:
Definition of a Leap Year, Finding the Odd days, Finding the day of any random calendar date, repetition of calendar years.

4. Cubes and Dices:
Finding the minimum and maximum number of identical pieces and cuts, painting of cubes and cuts, problems on dice.

5. Venn diagrams:
Circular representation of given words, Geometrical representation of certain class, set theory based problems.

6. Number, Ranking and Time sequence test:
Number test, Ranking test, Time sequence test.

Text Books:
1. GL Barrons, Mc Graw Hills, Thorpe’s verbal reasoning, LSAT Material
2. R S Agarwal, S.chand, ‘A modern approach to logical reasoning’
3. R S Agarwal, S.Chand, ‘Quantitative Aptitude’

Reference Books:
1. Quantitative Aptitude-G.L BARRONS
2. Quantitative Aptitude-Abhijit Guha Mc Graw Hills.
3. Quantitative Aptitude-U.Mohan Rao SCITECH.

COURSE STRUCTURE

B.Tech EEE IV Year I Semester

Course Code	Subject	Lectures	T/P	Credits
A17441	Microprocessors and Interfacing Devices	3	1	3
A17230	Power Systems Operation & Control	3	1	3
A17231	Computer Methods In Power Systems	3	1	3
A17232 A17233 A17234	1.Optimization Methods 2.Electrical Distribution Systems 3.Special Machines	3	1	3
A17235 A17236 A17237	1.Electrical Estimation and Costing 2.Electrical Machine Design 3.Power System Planning	3	1	3
A17238 A17239	1.Electric Vehicles and Hybrid Vehicles 2.Energy Storage Systems Photo	3	1	3
A17288	Electrical Measurements Lab	--	3	2
A17493	Microprocessors and Interfacing Devices Lab	--	3	2
MP - I	Industry Oriented Mini Project	--	--	2
	Total	18	12	24

B.Tech EEE IV Year II Semester

Course Code	Subject	Lectures	T/P	Credits
A18240	Utilization Of Electrical Energy	3	1	3
A18241	Fundamentals of HVDC and FACTS Devices	3	1	3
A18244	EHVAC Transmission	3	1	3
MP-II, TS, CVV	Major Project, Seminar & Comprehensive Viva-Voce	---	--	(11+2+2)=15 16
	Total	9	3	24

B.Tech EEE IV Year I Semester

L	T	P	C
3	0	0	3

MICROPROCESSORS AND INTERFACING DEVICES

Course Objectives

1. To develop an in-depth understanding of the operation of microprocessors and microcontrollers
2. To interpret the 8086 architecture with its internal features.
3. To analyze the techniques involved in assembly language programming of 8086.
4. To understand the interfacing techniques and their applications.

Course Outcomes

At the end of the course the student should be able to

CO 1: Illustrate the internal architecture of 8086 and 8051

CO2: Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.

CO 3: Explain the use of interrupts with suitable examples.

CO4: Demonstrate the interfacing of various peripheral devices with the microprocessor 8086

UNIT-I

8086 Microprocessor: Introduction to 8085 microprocessor- 8086 architecture- Functional Diagram- Register Organization- Memory segmentation- Memory addresses- physical memory organization- Signal descriptions of 8086- common function signals- Minimum and Maximum mode operation- Timing diagrams- Interrupt structure.

UNIT-II

Assembly Language Programming using 8086: Instruction formats- addressing modes- instruction set- assembler directives-procedures-macros- Simple programs.

UNIT-III

Interfacing with 8086 Microprocessor:8255 Programmable Peripheral Interface-Various Modes of Operation-Interfacing Keyboard- Display-Stepper motor- ADC-DAC-8259 Programmable Interrupt Controller -8257DMA controller.

UNIT-IV

Communication Interface: Serial communication standards- serial data transfer schemes- 8251 USART architecture and Interfacing- RS-232-TTL to RS 232C and RS232C to TTL conversion. Simple programs on serial data transfer-IEEE-488

UNIT-V

Introduction to Microcontrollers: Overview of 8051 microcontroller- Architecture- I/O ports and Memory organization- addressing modes and instruction set of 8051- Simple programs

TEXT BOOKS

1. Advanced Microprocessors and Peripherals — A. K. Ray and K.M. Bhurchandani- TMH- 2nd Edition 2006.
2. D. V. Hall- Microprocessors and Interfacing- TMGH- 2nd Edition 2006.
3. Kenneth. J. Ayala- The 8051 Micro controller 3rd Ed.- Cengage Learning.

REFERENCES

1. The 8051Microcontrollers- Architecture and Programming and Applications -K.Uma Rao- Andhe Pallavi- Pearson-2009.
2. Micro Computer System 8086/8088 Family Architecture- Programming and Design – Liu and GA Gibson- PHI-2nd Ed.
3. Microcontrollers and Application – Ajay. V. Deshmukh- TMGH- 2005
4. The 8085 Microprocessor: Architecture- programming and Interfacing K.Uday Kumar- B.S.Umashankar- 2008-Pearson

B.Tech EEE IV Year I- Semester

L	T	P	C
3	1	0	3

POWER SYSTEM OPERATION AND CONTROL

Pre-requisite: Power Systems-I

OBJECTIVES: Objectives of this course are

- To understand importance of economic load dispatch
- To understand real time power control and operation
- To know the importance of frequency control
- To analyze different methods to control reactive power

UNIT - I Economic Operation of Power Systems

Optimal operation of Generators in Thermal Power Stations, - heat rate Curve - Cost Curve - Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses - Loss Coefficients, General transmission line loss formula.

UNIT - II Hydrothermal Scheduling

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, Scheduling problems- Short term Hydrothermal scheduling problem.

UNIT -III Modeling

Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

Modeling of Governor: Mathematical Modeling of Speed Governing System - Derivation of small signal transfer function.

Modeling of Excitation System: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model

UNIT - IV Load Frequency Control

Single Area Load Frequency Control: Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

Load frequency control of 2-area system – uncontrolled case and controlled case, tie-line bias control Load Frequency Controllers: Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT – V Reactive Power Control:

Overview of Reactive Power control – Reactive Power compensation in transmission systems– advantages and disadvantages of different types of compensating equipment for transmission systems. load compensation – Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation.

TEXT BOOKS:

1. Power system operation and control, Dr.K. Uma Rao, wiley india Pvt.Ltd
2. Power systems Analysis, Operation and control, Abjith Chakrabarti, Sunitha Halder, PHI Publications

REFERENCE BOOKS:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., THOMPSON, 3rd Edition.
2. Power system operation and control in power systems, GR.Chadrasekar Reddy, A.srinivasulu
3. Operation and control in power systems, PSR Murthy, BS publications
4. Power systems stability and control, Prabha Kundur, the McGraw-hill companies.
5. Power system analysis, C.L. Wadhwa, Newage International.
6. Modern Power system Analysis, I.J.Nagarath & D.P. Kothari Tata McGraw-hill Publishing Company Ltd.
7. Power system Analysis, Grainger and Stevenson, Tata McGraw Hill.

B.Tech EEE IV Year I- Semester

L	T	P	C
3	1	0	3

COMPUTER METHODS IN POWER SYSTEMS

Pre-requisites: Power Systems-I, Power Systems –II, Electrical Circuit Theory and Mathematics
OBJECTIVES: Objectives of this course, are

- to understand and develop Y-bus and Z-bus matrices
- to know the importance of load flow studies and its importance
- to understand the applications of short circuit studies
- to explain rotor angle stability of power systems

UNIT I:

Power System Network Matrices: Graph Theory: Definitions, Bus Incidence Matrix, Y-bus formation by Singular Transformation Methods and Direct Inspection methods, Numerical Problems.

Formation of Z-bus: Partial network, Algorithm for the Modification of Z-bus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Numerical Problems). Modification of Z-bus for the changes in network (Problems).

UNIT II:

Power flow Studies: Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations,Classification of Buses and their relevance to Power Flow.

Load flow solution using Gauss Seidel Method: Acceleration Factor, Load flow solution without and with P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Newton Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution without and with PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.

Decoupled and Fast Decoupled Methods: Comparison of Different Methods – DC load Flow

UNIT III:

Short Circuit Analysis:

Per-Unit System of Representation: Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.

Needs and assumptions for short circuit analysis.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults without and with fault impedance, Numerical Problems.

UNIT IV:

Steady State Stability Analysis: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State stability and methods to improve steady state stability.

UNIT V:

Transient Stability Analysis: Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Case study – sudden loss of parallel lines, Critical Clearing Angle Calculation- Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

OUTCOMES:
After this course, the student will be able to

- develop the Y-bus and Z-bus matrices
- develop load flow programs
- understand the importance of short circuit studies
- understand stability and instability power systems

TEXT BOOKS:

1. Power System Analysis, Dr.N.V.Ramana, Pearson Education India, 2011.
2. Computer methods in power system analysis, Stagg and EL-Abiad, Mc-Graw hill, 1987
3. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari, Tata McGraw-Hill Publishing Company, 4th edition.

REFERENCE BOOKS:

1. Power System Analysis, A.Nagoorkani, RBA Publications, 3rd edition
2. Power System Analysis and Stability, S.S. Vadhera, Khanna Publications
3. Power Sytem Analysis, Hadi Saadat, Tata McGraw Hill,2002.
4. Power System Analysis by J.J. Grainger and W.D. Stevenson, McGraw Hill,2016
5. Computer techniques and models in power systems, By K.Uma Rao, I.K.International, 2010
6. Computer Techniques in Power System Analysis by M.A.Pai, TMH Publications,1979
7. Power System Analysis, Grainger and Stevenson, Tata McGraw Hill.

B.Tech EEE IV Year I- Semester

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3	1	0	3

OPTIMIZATION METHODS
(Professional Elective-3)

Pre-requisites: Electrical Circuit Theory, Electronic Devices and Circuits, Engineering Mathematics

OBJECTIVES: Objectives of this course are

- To introduce various optimization techniques i.e classical, linear programming, transportation problem, simplex algorithm, dynamic programming
- Constrained and unconstrained optimization techniques for solving and optimizing an electrical and electronic engineering circuits design problems in real world situations.
- To explain the concept of Dynamic programming and its applications to project implementation.

UNIT-I

Introduction & Classical Optimization Techniques: Statement of an Optimization problem - design vector - design constraints - constraint surface - objective function - objective function surfaces - classification of Optimization problems Single variable Optimization - multi variable Optimization without constraints - necessary and sufficient conditions for minimum/maximum multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers - multivariable Optimization with inequality constraints - Kuhn-Tucker conditions.

UNIT — II

Linear Programming: Standard form of a linear programming problem - geometry of linear programming problems - definitions and theorems - solution of a system of linear simultaneous equations - pivotal reduction of a general system of equations - motivation to the simplex method - simplex algorithm.

UNIT – III

Transportation Problem & Unconstrained Optimization: Finding initial basic feasible solution by north - west corner rule, least cost method and Vogel's approximation method testing for optimality of balanced transportation problems, one dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Univariate method, Powell's method and steepest descent method.

UNIT-IV

Constrained Nonlinear Programming: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of interior and exterior penalty function methods,

UNIT—V

Dynamic Programming: Dynamic programming multistage decision processes - types - concept of sub optimization and the principle of optimality - computational procedure in dynamic programming - examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

OUTCOMES: After this course, the student will be able to

- explain the need of optimization of engineering systems
- understand optimization of electrical and electronics engineering problems
- apply classical optimization techniques, linear programming, simplex algorithm, transportation problem
- apply unconstrained optimization and constrained non-linear programming and dynamic programming
- formulate optimization problems.

TEXT BOOKS:

1. Engineering optimization. Theory and practice". S. S.Rao, New Age International (P) Limited, 4th edition, 2009
2. Optimization Methods in Operations Research and systems Analysis, K.V. Mittal and C. Mohan, New Age International (P) Limited,3rd edition

REFERENCE BOOKS:

1. Operations Research, Dr.S.D.Sharma, KedarNath Ram Nath, 1972
2. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt Ltd, 6th edition
3. Operations Research: An Introduction, H.A.Taha, Pearson Pvt. Ltd, 8th Edition, Pearson/Prentice Hall, 2007.
4. Operations Research, Richard Bronson, Govindasami Naadimuthu, Tata Mc GrawHill Company Limited,2nd edition 2003
5. Linear programming, Springer series in operations research, George Bernard Dantzig, Mukund Narain Thapa, 3rd edition, 2003.

B.Tech EEE IV Year I- Semester **L T P C**
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ELECTRICAL DISTRIBUTION SYSTEMS
(Professional Elective-3)

Pre-requisites: Power Systems – I and Power Systems - II

OBJECTIVES: Objectives of this course are

- to distinguish between transmission and distribution systems
- to understand design considerations of feeders
- to compute voltage drop and power loss in feeders
- to understand protection of distribution systems
- to examine the power factor improvement and voltage control

UNIT - I

Introduction & General Concepts: Introduction to distribution systems: Load modelling and characteristics. Coincidence factor, contribution factor loss factor – Relationship between the load factor and loss factor.

Classification of loads: Residential, commercial, Agricultural and Industrial loads and their characteristics.

UNIT - II

Distribution Feeders & Substations: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. Substations: Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT - III

Distribution System Analysis: Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT - IV

Protective Devices & Co Ordination: Objectives of distribution system protection, types of common faults and procedure for fault calculations.

Protective Devices: Principle of operation of Fuses, Circuit Reclosure, and line sectionalizes, and circuit breakers. Coordination of Protective Devices: General coordination procedure.

UNIT - V

Voltage Control & PF Improvement: Equipment for voltage control, effect of series capacitors, line drop Compensation, effect of AVB/AVR. Power-factor control using different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and Switched), capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

OUTCOMES:

After this course, the student will be able to

- distinguish between transmission, and distribution line and design the feeders
- compute power loss and voltage drop of the feeders
- design protection of distribution systems
- understand the importance of voltage control and power factor improvement

TEXT BOOKS:

1. Electrical Power Distribution Systems, V.Kamaraju, Tata Mc Graw Hill Publishing company, 2nd edition, 2010.
2. Electric Power Distribution System Engineering, Turan Gonen, CRC Press, 3rd edition
3. Electrical Distribution Systems, Dr. S. Siva Naga Raju, Dr.K.Shankar, Danapathi Rai Publications

REFERENCE BOOKS:

1. Electric Power Generation, Transmission and Distribution, S.N. Singh, PHI Publishers, 2nd edition
2. Electrical Power Distribution hand book, G. Ram Murthy, University Press, 2nd edition.
3. Electric Power Distribution, Tata McGraw Hill Publishing Company, A.S. Pabla, 5th edition, 1997.

B.Tech EEE IV Year I- Semester `

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SPECIAL MACHINES
(Professional Elective- 3)

Pre-requisites: Electrical Machines-I and Electrical Machines-II

OBJECTIVES: Objectives of this course is to make the student to

- comprehend the necessity and significance of special machines
- understand the features of stepper motor
- get awareness of switched reluctance motors
- gain knowledge of Brushless DC motors
- become familiar about linear induction motor.

UNIT-1

SPECIAL TYPES OF D.C MACHINES-I

Series booster-Shunt booster-Non-reversible boost-Reversible booster

SPECIAL TYPES OF DC MACHINES –II

Armature excited machines - Rosenberg generator- The Amplidyne and Metadyne -Rototrol and Regulex-third brush generator-three wire generator-dynamometer.

UNIT -II

STEPPER MOTORS

Introduction-synchronous inductor (or hybrid stepper motor), Hybrid stepping motor, construction, principles of operation, Energization with two phase at a time- essential conditions for the satisfactory operation of a 2-phase hybrid step motor- very slow- speed synchronous motor for servo control-different configurations for switching the phase windings-control circuits for stepping motors-an open-loop controller for a 2-phase stepping motor.

UNIT-III

SWITCHED RELUCTANCE MOTOR

Introduction – improvements in the design of conventional reluctance motors- Some distinctive differences between SR and conventional reluctance motors - principle of operation of SRM - power converter for SR motor - Rotor sensing mechanism and logic control, drive and power circuits, position sensing of rotor with Hall probes - derivation of torque expression,- control of SR Motor for traction -type load

UNIT –IV

PERMANENT MAGNET MATERIALS AND MOTORS

Introduction, Hysteresis loops and recoil line- stator frames (pole and yoke - part) of conventional PM dc Motors, Equivalent circuit of a PM-Development of Electronically commutated dc motor from conventional dc motor.

BRUSHLESS DC MOTOR

Types of construction - principle of operation of BLDM- sensing and switching logic scheme, sensing- logic controller, lockout pulses - drive and power circuits,- Base drive circuits, power converter circuit- Theoretical analysis and performance prediction, modelling and magnet circuit d-q analysis of BLDM -transient analysis

UNIT-V

LINEAR INDUCTION MOTOR

Development of a double sided LIM from rotary type IM- A schematic of LIM drive for electric traction development of one sided LIM with back iron-field analysis of a DSLIM fundamental assumptions.-

Course Outcomes: After completion of the course, the student will be able to

- distinguish the various special machines based on the application.
- apply knowledge on control aspect of stepper motors and variable reluctance motors.
- identify the magnetic materials for the given application
- choose a proper sensor for the operation of machines
- model a given machine for a given application and its relevant assumptions
- derive torque expression for a given machine and its significance

TEXT BOOKS

1. K.Venkataratnam :Special electrical machines, university press, , 2009
2. R.K. Rajput : Electrical machines - 5th edition, Lakshmi Publications
3.V.V.Athani - Stepper motor: Fundamentals, Applications and Design, New age International publishers.

B.Tech EEE IV Year I- Semester

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ELECTRICAL ESTIMATION AND COSTING

(Professional Elective-4)

Pre requisites: Electric Circuit Theory, Network Theory, Power Systems –II, Switch Gear and Protection

OBJECTIVES: The objectives of this course are

- To emphasize the estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability.
- Exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations design.
- To successfully estimate costing of the products / projects that are part of our everyday usage.

UNIT-I

Design of Simple electric circuits: Electrical diagrams- classification of diagrams according to purpose - methods of representation for wiring diagram. System of connection of appliances and accessories - schematic wiring and single line diagram. Design and drawing of panel boards. Design conditions – standard sizes of boards – materials used.

UNIT-II

Design Considerations of Electrical Installations: Electric Supply System - Three phase four wire distribution system - Protection of Electric Installation against over load - short circuit and Earth fault – Earthing - General requirements of electrical installations - testing of installations - Indian Electricity rules - Neutral and Earth wire.

UNIT- III

Types of loads - Systems of wiring - Service connections - Service Mains- Sub-Circuits -Location of Outlets - Location of Control Switches - Location of Main Board and Distribution board - Guide lines for Installation of Fittings - Load Assessment - Permissible voltage drops and sizes of wires - Estimation and Costing of Electric installations.

UNIT - IV

Electrical Installation for Different Types of Buildings and Small Industries: Electrical installations for residential buildings - estimating and costing of material - Electrical installations for commercial buildings - high rise buildings. Electrical installations for small industries.

UNIT - V

Overhead and Underground Transmission and Distribution Lines: Introduction - Supports for transmission lines - Distribution lines - Materials used - Underground cables - Mechanical Design of overhead lines - Design of underground cables.

OUTCOMES: After the course, the student

- acquires knowledge in estimation and costing aspects of all electrical equipment,
- obtains knowledge on installation and designs to analyze the cost viability
- will be exposed to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations

TEXT BOOKS:

1. Electrical Design Estimating and Costing, K. B. Raina, S. K. Bhattacharya, New Age International Publisher,5th edition
2. Design of Electrical Installations, Er. V. K. Jain, Er. Amitabh Bajaj, University Science Press.
3. Electricity Pricing Engineering Principles and Methodologies, Lawrence J. Vogt, P. E., CRC Press.
4. Electrical Installation Estimating and Costing by J.B.Gupta, 8th edition, S.K.Katria and Sons, New Delhi.

REFERENCE BOOKS:

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650 volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage not exceeding 650V), Indian Standard Institution, IS: 3106- 1966.
5. Code of Practice for earthling, Indian Standard Institution, IS:3043- 1966.
6. Code of Practice for Installation and Maintenance of induction motors, Indian Standard Institution, IS: 900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650 Volts), Indian Standard Institution, IS: 2274-1963.
8. Electrical Installation, estimating and costing, Gupta J. B., Katson, Ludhiana.

B.Tech EEE IV Year I- Semester

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ELECTRICAL MACHINE DESIGN
(Professional Elective-4)

Course Objectives:

- To understand the nature of various Electrical Engineering Materials.
- To understand the Specifications of various A.C. and D.C. machines.
- To know the importance of magnetic and thermal circuit calculations in the design aspect.
- To know the various design features of Electrical machines.

UNIT -I: Basic Considerations in Machine Design Principles of Design: Introduction-Types of Electrical Machines, Specifications, Limitations in Design-O/P Co-efficient, Importance of specific loadings-effects of materials on design, General design procedure. Electrical Materials: Conducting Materials and their properties, Classification, Applications Insulating Materials and their properties, Classification, Applications, Magnetic Materials and their properties, Classification, Applications.

UNIT-II: Design of Magnetic circuit and Thermal circuit Magnetic circuit Design: Magnetic circuits of Electrical machines-Laws of magnetic circuits, Ampere turns for magnetic circuit-Calculation of Magnetic circuit of D.C.Machine and Induction Motor. Thermal circuit Design : Temperature rise in Electrical machines-Standard ratings of electrical machines-Modes of heat dissipated-Quantity of Cooling Medium required.

UNIT-III: Design of DC Machines: Important features of DC Machines, O/P equation-Selection of Specific magnetic and electrical loadings-factors effecting selection of no. of poles-Selection of core length and Diameter, Calculation of length of air gap, Design of shunt field system-Design of armature winding only.

UNIT-IV: Design of Transformers: Introduction, O/P Equation (both 1ϕ& 3ϕ), E.M.F./turn, Different dimensions of Transformer, Steps to design a Transformer, Design of Main dimensions of Transformer Tank.

UNIT-V: Design of A.C. Rotating machines: Design of 3ϕ Induction Motor: Introduction-O/P Equation-Estimation of main Dimensions, air gap length of Induction Motor. Design of 3ϕ Alternators: Introduction-O/P Equation, Estimation of main dimensions, length of air gap, Estimation of turns /phase, Design of tooth and slot.

Course Outcomes: After the completion of this course the student will be able to

- Select a suitable material for a given application.
- Identify the need and required pre-requisites for machine design.
- Distinguish the appropriate design procedure for a given DC/AC machine.
- Determine the main dimensions of a given DC/AC machine.
- Design a proper cooling system for a given machine.

Text Books:

1. K.G.Upadhyay, "Design of Electrical Machines", New Age International Publishers, NewDelhi,2013.
2. Dr. V.N.Mittle & A.Mittal, "Design of Electrical Machines", 5 th reprint Edition, Standard Publishers Distributors, New Delhi, 2013.

Reference Books:

1. A.K.Sawhney,"A Course in Electrical Machine Design", 6 th Edition, Dhanpat Rai & Co.(P) Ltd.,Delhi,2014.
2. R.K.Agarwal, "Principles of Electrical Machine Design", 5 th Edition, S.K.Kataria & Sons, Delhi, 2014.
3. M.G.Say, "The Performance and Design of Alternating Current Machines", 3 rd Edition, CBS Publishers & Distributors, Delhi,2002

B.Tech EEE IV Year I- Semester

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POWER SYSTEM PLANNING
(Professional Elective-4)

Prerequisite: Power Systems I, Power Systems II

OBJECTIVES:

- To understand power planning and tools used for planning.
- To understand integrated power generation, cogeneration, transmission and distribution planning and power sector finances
- To study power system reliability planning, load management, reactive power management and online power flow.
- To study the environmental effects of power plant pollution, overhead transmission lines and technical impacts.

UNIT I

Introduction of power planning: National and Regional Planning- integrated resources planning- least cost utility planning- structure of Power System- planning tools- Electrical Regulation – Electricity acts- Indian electricity Act 1910 - Electricity (Supply) Act - Indian electricity rules 1956 - Electricity act 2003 - Electricity Act 2010 - Electrical forecasting, - Forecasting techniques- Mathematical modelling and simulation.

UNIT II

Integrated Power Generation: Generation planning - cogeneration/captive power - renovation and modernization of power plants - power pooling and power trading,

Transmission and distribution planning: Planning Criteria - HVDC Transmission - Flexible AC Transmission System - Reactive Power Planning - Rural electrification.

Power system economics: Power sector finance - Financial planning - private participation - Rural electrical investment - Concept of rational tariffs.

UNIT III

Power System Reliability Operation and Maintenance Planning: System reliability- Reliability planning - System operation planning - Load management - Load prediction - Reactive power balance. Online power flow studies - State estimation - Computerized management - Power system simulator.

UNIT IV

Energy Efficiency: Sustainable growth - Energy efficient technologies - Demand side management - Efficient energy use - Supply side management - Energy audit measuring instruments.

UNIT V

Environmental Effects: Environmental impacts of Power generation-Power plants pollution: The green house effect- Hydro plants - Nuclear Plants - Wind mills - Geothermal generation, Fuel cell and their effects. High Voltage overhead transmission lines - Technological impacts.

OUTCOMES:

After the course, the student

- acquires knowledge on, power planning and tools used for planning
- acquires knowledge on integrated power generation, cogeneration, transmission & distribution planning and power sector finances, power system reliability planning, load management, reactive power compensation and online power flow studies.
- Will be able to prepare optimal power system expansion planning, operation and maintenance costs of various power plants.

TEXT BOOKS:

1. Electrical Power System Planning, A.S.Pabla, Machmillan India Ltd.
2. Modern Power System Planning, X.Wang, J.R.Mc Donald, MGH publishers.
3. Electric Power System Planning: Issues, Algorithms and solutions, Hossein Seifi, Mohammad Sadegh Sepasian, Springer

REFERENCE BOOKS:

1. Power System restructuring engineering and economics, M.Tllick, F.Falina and L.Fink, Kulwar Academic Publisher.

B.Tech EEE IV Year I- Semester

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ELECTRICAL MEASUREMENTS LAB

Course Objectives:

1. To know the procedures for measuring Resistance, Inductance and Capacitance of different ranges using bridges
2. To perform experiments to measure three phase power, frequency, core losses.
3. To design experiments for calibration of energy meter, power factor meter
4. To know the industrial practices of measuring dielectric strength of transformer oil & Testing.

Any ten of the following experiments are required to be conducted

1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer type power factor meter.
3. Crompton D.C. Potentiometer - Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge - Measurement of resistance - Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit.
6. Schering Bridge & Anderson Bridge.
7. Measurement of 3 Phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
9. LVDT and capacitance pickup - characteristics and Calibration.
10. Resistance strain gauge - strain measurements and Calibration.
11. Transformer turns ratio measurement using A.C. Bridge.
12. Measurement of ratio error and phase angle of given C.T. by comparison.

Course Outcomes: Upon completion of this Laboratory course student should be able

1. to calibrate and test single phase energy meter, calibrate PMMC voltmeter and calibrate LPF wattmeter
2. to measure resistance, inductance and capacitance
3. to measure 3-Φ reactive power,
4. to test dielectric strength of oil of transformers.
5. to calibrate LVDT and resistance strain gauge.

REFERENCE BOOKS:

1. A Course in Electrical and Electronics Measuremnts and Instrumentation, A.K.Sawhney, Dhanpat Rai & Co.
2. Electrical and electronics measurements and instrumentation, R.K.Rajput, S.Chand & Company Ltd.

B.Tech EEE IV Year I Semester

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MICROPROCESSORS AND INTERFACING LABORATORY

Course objective:

- The aim of the course is to simulate the art of writing the ALP for 8086 and 8051 microcontroller to interface peripheral devices for simple applications

Course Outcomes

At the end of the course the student should be able to

CO1. Apply the fundamentals of assembly level programming of microprocessors and microcontrollers.

CO2. Build a program on a microprocessor using instruction set of 8086 and 8051.

CO3. Evaluate Assembly language program for 8086 and 8051 microcontroller to interface peripheral devices for simple applications

Note: Minimum of 12 experiments to be conducted.

8086 MICROPROCESSOR:

1. Arithmetic Operations (addition, subtraction, multiplication and division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest numbers in an array of numbers.
5. Generation of Fibonacci series.
6. Hexadecimal to Decimal conversions
7. ASCII to Decimal conversion
8. Program for sorting an array for 8086.
9. Program for searching for a number or character in a string for 8086.
10. Program for string manipulations for 8086.

MASM PROGRAMMING:

1. Arithmetic Operations (addition, subtraction, multiplication and division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest numbers in an array of numbers.
5. Generation of Fibonacci series.
6. Hexadecimal to Decimal conversions

8051 MICROCONTROLLER:

1. Arithmetic Operations (addition, subtraction, multiplication and division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest numbers in an array of numbers.
5. Generation of Fibonacci series.
6. Masking of Bits.
7. Hexadecimal to Decimal conversion.

INTERFACING WITH 8086 MICROPROCESSOR:

1. Stepper motor interfacing to 8086.
2. Elevator simulator interfacing to 8086.
3. seven- segment display interfacing to 8086.
4. Interfacing ADC and DAC to 8086.
5. Digit Key – interfacing to 8086.

B.Tech EEE IV Year II- Semester

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UTILIZATION OF ELECTRICAL ENERGY

Pre-requisites: Electrical Machines-I and Electrical Machines-II

OBJECTIVES: The objectives of this course are

- To understand the fundamentals of illumination and good lighting .practices
- To understand the methods of electric heating and welding.
- To understand the concepts of electric drives and their application to electrical traction systems.

UNIT I:

ILLUMINATION: Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

VARIOUS ILLUMINATION METHODS: Discharge lamps, MV and SV lamps - comparison between tungsten filament lamps and fluorescent tubes, Energy Efficient Lamps -principle of operation, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT-II:

ELECTRIC HEATING &WELDING:

ELECTRIC HEATING: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.

ELECTRIC WELDING: resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding

UNIT III:

ELECTRIC DRIVES: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT IV:

ELECTRIC TRACTION-I:System of electric traction and track electrification. Review of existing electric traction systems in India, Magnetic Levitation - Bullet Trains. Special features of traction motor, advantages of electric braking. Mechanics of train movement, Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT V:

ELECTRIC TRACTION-II: Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation, adhesive weight and coefficient of adhesion.

OUTCOMES: After this course, the student

- gets a thorough knowledge on, electric drives characteristics and their applicability in industry based on the nature of different types of loads and their characteristics
- understands the concepts and methods of electric heating, welding, illumination and electric traction.
- can apply the above concepts to real-world electrical and electronics problems and applications.

TEXT BOOKS:

1. Utilisation of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Sons.

REFERENCE BOOKS:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Revised edition, 1997.
3. Utilization of Electric Energy, VVL Rao, University Press.
4. Utilisation of Electric Power, Er. R.K. Rajput, Laxmi Publications

B.Tech EEE IV Year II- Semester

L	T	P	C
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Fundamentals of HVDC and FACTS Devices

Prerequisites: Electrical Circuit, Control System, Power Electronics, Power Systems-I and Power Systems –II

OBJECTIVES: The objectives of this course are

- To facilitate the students to understand the basic concepts and recent trends in HVDC transmission.
- To introduce the application of a variety of high power- electronic controllers for active and reactive power in AC transmission lines.
- To enable the students to work with the concepts of HVDC transmission and are exposed to the basics and control of FACTS controllers.

UNIT-I

Introduction: Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station. HVDC converters, pulse number, analysis of 3 phase bridge (Graetz) circuit with and without overlap, converter bridge characteristics, equivalent circuits or rectifier and inverter configurations of twelve pulse converters.

UNIT-II

Converter & HVDC System Control: Principles of DC Links Control, converters control characteristics, system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of DC link.

Harmonics, Filters and Reactive Power Control: Introduction, generation of harmonics, AC and DC filters. Reactive Power Requirements in steady state, sources of reactive power, static VAR systems.

UNIT-III

FACTS Concepts: Flow of power in AC parallel paths and meshed systems,Basic typesof FACTS controllers, brief description and definitions of FACTS controllers.VSC for FACTS applications.

UNIT-IV

Static Shunt Compensators: Objectives of shunt compensation, principles of shunt compensation- variable impedance type & switching converter type-static synchronous compensator (STATCOM) configuration-characteristics and control,SVC and STATCOM - comparision.

UNIT-V

Static Series Compensators: Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), and switching converter type series compensators, static series synchronous compensator (SSSC)-power angle characteristics-basic operating control schemes, UPFC introduction(Block diagram)

OUTCOMES: After this course, the student

- will be skilled enough to work with the HVDC systems, being capable of analyzing the HVDC circuits and develop exquisite interest to work in the area of HVDC transmission.
- shall be able to explain the basic principles of different types of facts controllers and their characteristics.
- shall be able to model different FACTS controllers, form a basis for selecting a particular controller for a given application and analyze and compare the performance of various facts controllers.

TEXT BOOKS:

1. 'HVDC transmission systems', Padiyar, K.R., Wiley Eastern Ltd., 2010.
2. 'Concepts and Technology of Flexible A.C.Transmission System', Hingorani, L.Gyugyi, IEEE Press New York, 2000 ISBN –0780334588

REFERENCE BOOKS:

1.Direct Current Transmission-Vol.1,Kimbark, E.W Wiley Interscience,1971.
2. 'FACTS controllers for Transmission andDistribution systems' Padiyar K.R., New Age International Publishers, 1 st Edition,2007
3. 'HVDC Transmission', S.Kamakshaiah and V.Kamaraju1 st Edition,Tata McGraw Hill, 2011.
3.'FACTS – Modeling and simulation in PowerNetworks'Enrique Acha, Claudio R.Fuerte-Esqivel, Hugo Ambriz-Perez, Cesar Angeles-Camacho, John Wiley & Sons, 2002.

B.Tech EEE IV Year II- Semester

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EHV AC TRANSMISSION

Pre requisites: Electromagnetic Fields, Power Systems I, Power Systems II, Switch Gear and Protection

OBJECTIVES: The objectives of this course are

- To understand the concepts of extra high voltage AC transmission.
- To understand the behaviour of the line parameters for extra high voltages, voltage gradients of the transmission line conductors.
- To study the effect of corona, electrostatic field calculations, travelling wave theory concept,
- To study the effect of lightning, protection against lightning and voltage control

UNIT - I

Introduction: Necessity of EHV AC transmission - advantages and problems, power handling capacity and line losses-mechanical considerations - Resistance of conductors - Properties of bundled conductors - Line and ground reactive parameters: Line inductance and capacitance - sequence inductances and capacitances - modes of propagation - ground return.

UNIT - II

Voltage Gradients of Conductors: Electrostatics - field of sphere gap - field of line changes and properties – charge - potential relations for multi- conductors - surface voltage gradient on conductors - distribution of voltage gradient on sub-conductors of bundle.

Corona Effects: Power loss and Audible Noise (AN) - Corona loss formulae - Charge voltage diagram - Generation, characteristics, limits and measurements of Audible Noise - Radio Interference (RI) – corona pulses generation-Properties and limits for Radio Interference.

UNIT - III

Electro Static Field and Magnetic Fields: Electrostatic field: calculation of electrostatic field of EHV/AC lines - Effect on humans, animals and plants - Electrostatic induction on un-energized circuit of double-circuit line - Electromagnetic Interference - Meters and measurement of electrostatic fields.

Travelling wave theory: Travelling wave expression and solution- source of excitation - lumped parameters of distributed lines - generalized constants - no load voltage conditions and charging current.

UNIT –IV

Lightning and lightning protection: Lightning strokes on lines – lightning stroke mechanism - general principles of the lightning - protection problem - tower-footing resistance - insulator flashover and withstand voltages - probability of occurrence of lightning - stroke currents- lightning arresters and protective characteristics - dynamic voltage rise and arrester rating - operating characteristics of lightning arresters - insulation coordination based on lightning.

UNIT -V

Voltage Control: Power circle diagram and its use - voltage control using synchronous condensers - cascade connection - shunt and series compensation - sub synchronous resonance in series capacitor - compensated lines - static VAR compensating system.

OUTCOMES: After this course, the student

- gets a thorough knowledge on, general aspects and necessity of extra high voltage (EHVAC) transmission, advantages and disadvantages of EHVAC,
- understands concepts of voltage gradient, effects of corona, electro static field calculations.
- understands the theory of travelling waves, lightning strokes and protection, voltage control of EHVAC transmission.

TEXT BOOKS

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd, revised edition, 2007
2. HVAC and DC Transmission by S. Rao.

REFERENCE BOOKS

1. EHV Transmission line- Edison Electric Institute, Edison Electric Inst., 1968.

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B. TECH. ELECTRICAL AND ELECTRONICS ENGINEERING

I YEAR

Code	Subject	L	T/P/D	C
A10001	English	2	-	4
A10002	Mathematics – I	3	1	6
A10003	Mathematical Methods	3	-	6
A10004	Engineering Physics	3	-	6
A10005	Engineering Chemistry	3	-	6
A10501	Computer Programming	3	-	6
A10301	Engineering Drawing	2	3	6
A10581	Computer Programming Lab.	-	3	4
A10081	Engineering Physics / Engineering Chemistry Lab.	-	3	4
A10083	English Language Communication Skills Lab.	-	3	4
A10082	IT Workshop / Engineering Workshop	-	3	4
	Total	**19**	**16**	**56**

II YEAR I SEMESTER

Code	Subject	L	T/P/D	C
A30007	Mathematics – III	4	-	4
A30102	Fluid Mechanics and Hydraulic Machinery	4	-	4
A30404	Electronic Devices & Circuits	4	-	4
A30204	Electrical Circuits	4	-	4
A30403	Electromagnetic fields	4	-	4
A30206	Electrical Machines-I	4	-	4
A30181	Fluid Mechanics and Hydraulic Machinery Lab	-	3	2
A30482	Electronic devices & Circuit labs	-	3	2
	Total	**24**	**6**	**28**

II YEAR II SEMESTER

Code	Subject	L	T/P/D	C
A40010	Managerial Economics & Financial Analysis	4	-	4
A40214	Power Systems-I	4	-	4
A40413	Electronic Circuits	4	-	4
A40407	Switching Theory and Logic Design	4	-	4
A40213	Network Theory	4	-	4
A40212	Electrical Machines-II	4	-	4
A40287	Electrical Machines lab -I	-	3	2
A40286	Electrical Circuits and Simulation Lab	-	3	2
	Total	**24**	**6**	**28**

III YEAR I SEMESTER

Code	Subject	L	T/P/D	C
A50423	IC Applications	4	-	4
A50014	Management Science	4	-	4
A50221	Power Systems-II	4	-	4
A50211	Control Systems	4	-	4
A50220	Power Electronics	4	-	4
A50218	Electrical Machines-III	4	-	4
A50289	Electrical Machines lab –II	-	3	2
A50086	Advanced Communication Skills Lab	-	3	2
	Total	**24**	**6**	**28**

III YEAR II SEMESTER

Code	Subject	L	T/P/D	C
A60223	Electrical and Electronics Instrumentation	4	-	4
A60225	Static Drives	4	-	4
A60222	Computer Methods in Power Systems	4	-	4
A60430	Microprocessors and Interfacing Devices	4	-	4
A60009	Environmental Studies	4	-	4
 A60117 A60017 A60018	**Open Elective** Disaster Management Intellectual Property Rights Human Values and Professional Ethics	4	-	4
A60290	Control Systems and Simulation Lab	-	3	2
A60291	Power Electronics and Simulation Lab	-	3	2
	Total	**24**	**6**	**28**

IV YEAR I SEMESTER

Code	Subject	L	T/P/D	C
A70231	Switch Gear and Protection	4	-	4
A70232	Utilization of Electrical Energy	4	-	4
A70421	Digital Signal Processing	4	-	4
A70230	Power System Operation and Control	4	-	4
	Elective-I	4	-	4
A70228	High Voltage Engineering			
A70432	VLSI Design			
A70435	Digital Control Systems			
	Elective-II	4	-	4
A70229	Optimization Techniques			
A70226	Electrical Distribution Systems			
A70227	Electrical Estimation and Costing			
A70498	Microprocessors and Interfacing Devices Lab	-	3	2
A70293	Electrical Measurements Lab	-	3	2
	Total	**24**	**6**	**28**

IV YEAR II SEMESTER

Code	Subject	L	T/P/D	C
A80237	Fundamentals of HVDC and FACTS Devices	4	-	4
	Elective-III	4	-	4
A80238	Neural Networks and Fuzzy Logic			
A80324	Renewable Energy Sources			
A80244	Principles of Reliability Engineering			
	Elective-IV	4	-	4
A80234	Advanced Control Systems			
A80235	EHV AC Transmission			
A82909	Nanotechnology			
A80087	Industry Oriented Mini Project	-	-	2
A80089	Seminar	-	6	2
A80088	Project Work	-	15	10
A80090	Comprehensive Viva-Voce	-	-	2
	Total	**12**	**21**	**28**

Note: All End Examinations (Theory and Practical) are of three hours duration.

T-Tutorial L – Theory P – Practical D-Drawing C – Credits

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(A10001) ENGLISH

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

Objectives:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they

can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: **Skills Annexe -Functional English for Success)**
- Just A Minute(JAM) Sessions.

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Scanning
- Recognizing coherence/sequencing of sentences

NOTE : The students will be trained in reading skills using the prescribed text for detailed study.

They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/ newspaper articles.

Writing Skills :

Objectives

To develop an awareness in the students about writing as an exact and formal skill.

To equip them with the components of different forms of writing, beginning with the lower order ones.

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Five Units, are prescribed:

For Detailed study: First Textbook: "Skills Annexe -Functional English for Success", Published by Orient Black Swan, Hyderabad

For Non-detailed study

1. **Second text book "Epitome of Wisdom",** Published by Maruthi Publications, Guntur
   - The course content and study material is divided into Five Units.

Unit –I:

1. Chapter entitled **'Wit and Humour**' from **'Skills Annexe'** -Functional English for Success, Published by Orient Black Swan, Hyderabad
2. Chapter entitled **'Mokshagundam Visvesvaraya'** from **"Epitome of Wisdom**", Published by Maruthi Publications, Hyderabad.

L- Listening For Sounds, Stress and Intonation

S- Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)

R- Reading for Subject/ Theme

W- Writing Paragraphs

G- Types of Nouns and Pronouns

V- Homonyms, homophones synonyms, antonyms

Unit –II

1. Chapter entitled **“Cyber Age”** from **“Skills Annexe -Functional English for Success”** Published by Orient Black Swan, Hyderabad.
2. Chapter entitled **'Three Days To See'** from **“Epitome of Wisdom”**, Published by Maruthi Publications, Hyderabad.

L – Listening for themes and facts

S – Apologizing, interrupting, requesting and making polite conversation

R- for theme and gist

W- Describing people, places, objects, events

G- Verb forms

V- noun, verb, adjective and adverb

Unit –III

1. Chapter entitled **'Risk Management'** from **“Skills Annexe -Functional English for Success”** Published by Orient Black Swan, Hyderabad
2. Chapter entitled **'Leela's Friend'** by R.K. Narayan from **“Epitome of Wisdom”**, Published by Maruthi Publications, Hyderabad

L – for main points and sub-points for note taking

S – giving instructions and directions; Speaking of hypothetical situations

R – reading for details

W – note-making, information transfer, punctuation

G – present tense

V – synonyms and antonyms

Unit –IV

1. Chapter entitled **'Human Values and Professional Ethics'** from **“Skills Annexe -Functional English for Success”** Published by Orient Black Swan, Hyderabad
2. Chapter entitled **'The Last Leaf'** from **“Epitome of Wisdom”**, Published by Maruthi Publications, Hyderabad

L - Listening for specific details and information

S- narrating, expressing opinions and telephone interactions

R - Reading for specific details and information

W- Writing formal letters and CVs

G- Past and future tenses

V- Vocabulary - idioms and Phrasal verbs

Unit –V

1. Chapter entitled **'Sports and Health'** from **"Skills Annexe - Functional English for Success"** Published by Orient Black Swan, Hyderabad
2. Chapter entitled **'The Convocation Speech'** by N.R. Narayanmurthy' from **"Epitome of Wisdom"**, Published by Maruthi Publications, Hyderabad

L- Critical Listening and Listening for speaker's tone/ attitude

S- Group discussion and Making presentations

R- Critical reading, reading for reference

W- Project proposals; Technical reports, Project Reports and Research Papers

G- Adjectives, prepositions and concord

V- Collocations and Technical vocabulary

Using words appropriately

* Exercises from the texts not prescribed shall also be used for classroom tasks.

REFERENCES :

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.

11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw – Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publishers

Outcomes:

- Usage of English Language, written and spoken.
- Enrichment of comprehension and fluency
- Gaining confidence in using language in verbal situations.

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(A10002) MATHEMATICS -I

Objectives: To learn

- The types of Matrices and their properties.
- Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if exist.
- The concept of eigenvalues and eigenvectors of a matrix is to reduce a quadratic form into a canonical form through a linear transformation.
- The mean value theorems and to understand the concepts geometrically.
- The functions of several variables and optimization of these functions.
- The evaluation of improper integrals, Beta and Gamma functions.
- Multiple integration and its applications.
- Methods of Solving the differential equations of 1^{st} and higher order
- The applications of the differential equations to Newton's law of cooling, Natural growth and decay, Bending of beams etc.
- The definition of integral transforms and Laplace Transform.
- Properties of Laplace transform.
- Inverse Laplace Transform.
- Convolution theorem.
- Solution of Differential equations using Laplace transform.

UNIT-I

Theory of Matrices: Real matrices – Symmetric, skew – symmetric, orthogonal. Complex matrices: Hermitian, Skew-Hermitian and Unitary Matrices. Idempotent matrix.

Elementary row and column transformations- Elementary matrix, Finding rank of a matrix by reducing to Echelon and normal forms. Finding the inverse of a non-singular square matrix using row/ column transformations (Gauss-Jordan method). Consistency of system of linear equations (homogeneous and non- homogeneous) using the rank of a matrix. Solving m x n and n x n linear system of equations by Gauss elimination.

Cayley-Hamilton Theorem (without proof) – Verification. Finding inverse of a matrix and powers of a matrix by Cayley-Hamilton theorem, Linear dependence and Independence of Vectors. Linear Transformation –

Orthogonal Transformation. Eigen values and eigen vectors of a matrix. Properties of eigen values and eigen vectors of real and complex matrices. Finding linearly independent eigen vectors of a matrix when the eigen values of the matrix are repeated.

Diagonalization of matrix – Quadratic forms up to three variables. Rank – Positive definite, negative definite, semi definite, index, signature of quadratic forms. Reduction of a quadratic form to canonical form.

UNIT – II

Differential calculus methods: Rolle's Mean value Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – (all theorems without proof but with geometrical interpretations), verification of the Theorems and testing the applicability of these theorem to the given function.

Functions of several variables: Functional dependence- Jacobian- Maxima and Minima of functions of two variables without constraints and with constraints-Method of Lagrange multipliers.

UNIT – III

Improper integration, Multiple integration & applications: Gamma and Beta Functions –Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions

Multiple integrals – double and triple integrals – change of order of integration-change of variables (polar, cylindrical and spherical) Finding the area of a region using double integration and volume of a region using triple integration.

UNIT – IV

Differential equations and applications : Overview of differential equations-exact, linear and Bernoulli (NOT TO BE EXAMINED). Applications of first order differential equations – Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories.

Linear differential equations of second and higher order with constant coefficients, Non-homogeneous term of the type type $f(X) = e^{ax}$, Sin ax, Cos ax, and x^n, $e^{ax} V(x)$, $x^n V(x)$, method of variation of parameters. Applications to bending of beams, Electrical circuits and simple harmonic motion.

UNIT – V

Laplace transform and its applications to Ordinary differential equations
Definition of Integral transform, Domain of the function and Kernel for the Laplace transforms. Existence of Laplace transform. Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied or divided by “t”. Laplace transforms of derivatives and integrals of functions. – Unit step function – second shifting theorem –

Dirac's delta function, Periodic function – Inverse Laplace transform by Partial fractions(Heaviside method) Inverse Laplace transforms of functions when they are multiplied or divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem –- Solving ordinary differential equations by Laplace transforms.

TEXT BOOKS:

1. Advanced engineering Mathematics by Kreyszig, John Wiley & Sons Publishers.

2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.

REFERENCES:

1. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar, 3rd edition, Narosa Publishing House, Delhi.

2. Engineering Mathematics – I by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.

3. Engineering Mathematics – I by D. S. Chandrasekhar, Prison Books Pvt. Ltd.

4. Engineering Mathematics – I by G. Shanker Rao & Others I.K. International Publications.

5. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, CRC Press Taylor & Francis Group.

6. Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Edi, 2013, Chapman & Hall/ CRC.

7. Advanced Engineering Mathematics, Michael Greenberg, Second Edition, Pearson Education.

Outcome:

- After learning the contents of this Unit the student is able to write the matrix representation of a set of linear equations and to analyze solutions of system of equations.
- The student will be able to understand the methods of differential calculus to optimize single and multivariable functions.
- The student is able to evaluate the multiple integrals and can apply the concepts to find the Areas, Volumes, Moment of Inertia etc., of regions on a plane or in space.
- The student is able to identify the type of differential equation and uses the right method to solve the differential equation. Also able to apply the theory of differential equations to the real world problems.
- The student is able to solve certain differential equations using Laplace Transform. Also able to transform functions on time domain to frequency domain using Laplace transforms.

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(A10003) MATHEMATICAL METHODS

Objectives:

- The objective is to find the relation between the variables x and y out of the given data (x,y).
- This unit also aims to find such relationships which exactly pass through data or approximately satisfy the data under the condition of least sum of squares of errors.
- The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data.
- This topic deals with methods to find roots of an equation and solving a differential equation.
- The numerical methods are important because finding an analytical procedure to solve an equation may not be always available.
- In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very much required.
- Indeed, any periodic and non-periodic function can be best analyzed in one way by Fourier series and transforms methods.
- The unit aims at forming a partial differential equation (PDE) for a function with many variables and their solution methods. Two important methods for first order PDE's are learnt. While separation of variables technique is learnt for typical second order PDE's such as Wave, Heat and Laplace equations.
- In many Engineering fields the physical quantities involved are vector-valued functions.
- Hence the unit aims at the basic properties of vector-valued functions and their applications to line integrals, surface integrals and volume integrals.

UNIT – I:

Interpolation and Curve fitting:

Interpolation: Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols- Difference Equations – Differences of a polynomial-Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae –

Interpolation with unevenly spaced points-Lagrange's Interpolation formula. B. Spline interpolation – Cubic spline.

Curve fitting: Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

UNIT – II :

Numerical techniques:

Solution of Algebraic and Transcendental Equations and Linear system of equations: Introduction – Graphical interpretation of solution of equations .The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method .

Solving system of non-homogeneous equations by L-U Decomposition method(Crout's Method)Jacobi's and Gauss-Seidel Iteration method.

Numerical Differentiation, Integration, and Numerical solutions of First order differential equations: Numerical differentiation, Numerical integration - Trapezoidal rule, Simpson's 1/3rd and 3/8 Rule , Generalized Quadrature.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series method –Picard's Method of successive Approximation- single step methods-Euler's Method-Euler's modified method, Runge-Kutta Methods, Predictor –corrector methods(Milne's Method and Adams-Bashforth methods only).

UNIT – III:

Fourier series and Fourier Transforms: Definition of periodic function. Fourier expansion of periodic functions in a given interval of length 2π Determination of Fourier coefficients – Fourier series of even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT-IV:

Partial differential equations : Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method), Method of separation of variables for second order equations –Applications of Partial differential equations-Two dimensional wave equations, Heat equation.

UNIT – V

Vector Calculus: Vector Calculus: Scalar point function and vector point function, Gradient- Divergence- Curl and their related properties. - Laplacian operator, Line integral – work done – Surface integrals -Volume integral. Green's Theorem, Stoke's theorem and Gauss's Divergence Theorems (Statement & their Verification). Solenoidal and irrotational vectors, Finding Potential function.

TEXT BOOKS:

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

REFERENCES:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi & Others, S. Chand.
2. Introductory Methods by Numerical Analysis by S.S. Sastry, PHI Learning Pvt. Ltd.
3. Mathematical Methods by G.Shankar Rao, I.K. International Publications, N.Delhi.
4. Mathematical Methods by V. Ravindranath, Etl, Himalaya Publications.
5. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3rd Edi, 2013, CRC Press Taylor & Francis Group.
6. Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Edi, 2013, Chapman & Hall/ CRC.
7. Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Pearson Education.

Outcomes:

From a given discrete data, one will be able to predict the value of the data at an intermediate point and by curve fitting, can find the most appropriate formula for a guessed relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making.

- After studying this unit one will be able to find a root of a given equation and will be able to find a numerical solution for a given differential equation.
- Helps in describing the system by an ODE, if possible. Also, suggests to find the solution as a first approximation.
- One will be able to find the expansion of a given function by Fourier series and Fourier Transform of the function.
- Helps in phase transformation, Phase change and attenuation of coefficients in acoustics.

- After studying this unit, one will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
- Most of the problems in physical and engineering applications, problems are highly non-linear and hence expressing them as PDEs'. Hence understanding the nature of the equation and finding a suitable solution is very much essential.
- After studying this unit, one will be able to evaluate multiple integrals (line, surface, volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.
- It is an essential requirement for an engineer to understand the behavior of the physical system.

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(A10004) ENGINEERING PHYSICS

Objectives:

It gives

- to the students basic understanding of bonding in solids, crystal structures and techniques to characterize crystals.
- to understand the behavior of electron in a solid and thereby one can determine the conductivity and specific heat values of the solids.
- to study applications in Engineering like memory devices, transformer core and Electromagnetic machinery.
- to help the student to design powerful light sources for various Engineering Applications and also enable them to develop communication systems using Fiber Technology.
- to understand the working of Electronic devices, how to design acoustic proof halls and understand the behavior of the materials at Nano scale.

UNIT-I

Crystallography: Ionic Bond, Covalent Bond, Metallic Bond, Hydrogen Bond, Vander-Waal's Bond, Calculation of Cohesive Energy of diatomic molecule-Space Lattice**,** Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems, Structure of Diamond and NaCl.

X-ray Diffraction & Defects in Crystals: Bragg's Law, X-Ray diffraction methods: Laue Methods, Powder Method**:** Point Defects: Vacancies, Substitutional, Interstitial, Frenkel and Schottky Defects, line defects (Qualitative) & Burger's Vector.

UNIT-II

Principles of Quantum Mechanics: Waves and Particles, de Broglie Hypothesis , Matter Waves, Davisson and Germer' Experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time Independent Wave Equation - Physical Significance of the Wave Function – Infinite square well potential, extension to three dimensions

Elements of Statistical Mechanics & Electron theory of Solids: Phase space, Ensembles, Micro Canonical, Canonical and Grand Canonical Ensembles **-** Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics (Qualitative Treatment), Concept of Electron Gas, , Density of States, Fermi Energy- Electron in a periodic Potential, Bloch Theorem, Kronig-Penny Model (Qualitative Treatment), E-K curve, Origin of Energy Band Formation in Solids, Concept of Effective Mass of an Electron, Classification of Materials into Conductors, Semi Conductors & Insulators.

UNIT-III

Dielectric Properties: Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities: Ionic and Electronic - Internal Fields in Solids, Clausius - Mossotti Equation, Piezo - electricity and Ferro- electricity.

Magnetic Properties & Superconducting Properties: Permeability, Field Intensity, Magnetic Field Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magneton, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Domain Theory of Ferro Magnetism on the basis of Hysteresis Curve, Soft and Hard Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials and their Applications, Superconductivity, Meissner Effect, Effect of Magnetic field, Type-I & Type-II Superconductors, Applications of Superconductors

UNIT-IV

Optics: Interference-Interference in thin films (Reflected light), Newton rings experiment- Fraunhofer diffraction due to single slit, N-slits, Diffraction grating experiment , Double refraction-construction and working of Nicol's Prism

Lasers & Fiber Optics: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and Relation between them, Population Inversion, Lasing Action, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers- Principle of Optical Fiber, Construction of fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers: Step Index and Graded Index Fibers, Attenuation in Optical Fibers, Application of Optical Fiber in communication systems.

UNIT-V:

Semiconductor Physics: Fermi Level in Intrinsic and Extrinsic Semiconductors, Calculation of carrier concentration in Intrinsic &, Extrinsic Semiconductors, Direct and Indirect Band gap semiconductors, Hall Effect-Formation of PN Junction, Open Circuit PN Junction, Energy Diagram of PN Diode, Diode Equation, I-V Characteristics of PN Junction diode, Solar cell, LED & Photo Diodes. Acoustics of Buildings & Acoustic Quieting: Reverberation and Time of Reverberation, Sabine's Formula for Reverberation Time, Measurement of Absorption Coefficient of a Material, factors affecting the Architectural Acoustics and their Remedies.

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Top-down Fabrication: Chemical Vapour Deposition, Characterization by TEM.

TEXT BOOKS:

1. Engineering Physics,K. Malik, A. K. Singh, Tata Mc Graw Hill Book Publishers.
2. Engineering Physics, V. Rajendran, Tata Mc Graw Hill Book Publishers.

REFERENCES:

1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons.
2. Sears and Zemansky's University Physics (10^{th} Edition) by Hugh D. Young Roger A. Freedman, T. R. Sandin, A. Lewis FordAddison-Wesley Publishers.
3. Applied Physics for Engineers – P. Madhusudana Rao (Academic Publishing company, 2013).
4. Solid State Physics – M. Armugam (Anuradha Publications).
5. Modern Physics – R. Murugeshan & K. Siva Prasath – S. Chand & Co. (for Statistical Mechanics).
6. A Text Book of Engg Physics – M. N. Avadhanulu & P. G. Khsirsagar– S. Chand & Co. (for acoustics).
7. Modern Physics by K. Vijaya Kumar, S. Chandralingam: S. Chand & Co.Ltd.
8. Nanotechnology – M.Ratner & D. Ratner (Pearson Ed.).

9. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).

10. Solid State Physics – A.J. Dekker (Macmillan).

11. Applied Physics – Mani Naidu Pearson Education.

Outcomes:

- The student would be able to learn the fundamental concepts on behavior of crystalline solids.
- The knowledge on Fundamentals of Quantum Mechanics, Statistical Mechanics enables the student to apply to various systems like Communications Solar Cells, Photo Cells and so on.
- Design, Characterization and study of properties of materials help the student to prepare new materials for various Engineering applications.
- This course also helps the student exposed to non-destructive testing methods.
- Finally, Engineering Physics Course helps the student to develop problem solving skills and analytical skills.

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(A10005) ENGINEERING CHEMISTRY

Objective:

An engineer is as someone who uses scientific, natural and physical principles to design something of use for people or other living creatures. Much of what any engineer does involves chemistry because everything in our environment has a molecular make up. Engineering requires the concepts of applied chemistry and the more chemistry an engineer understands, the more beneficial it is. In the future, global problems and issues will require an in-depth understanding of chemistry to have a global solution. This syllabus aims at bridging the concepts and theory of chemistry with examples from fields of practical application, thus reinforcing the connection between science and engineering. It deals with the basic principles of various branches of chemistry which are fundamental tools necessary for an accomplished engineer.

UNIT I:

Electrochemistry & Corrosion: Electro Chemistry – Conductance - Specific, Equivalent and Molar conductance and their Units; Applications of Conductance (Conductometric titrations). **EMF:** Galvanic Cells, types of Electrodes – (Calomel, Quinhydrone and glass electrodes); Nernst equation and its applications ; concept of concentration cells, electro chemical series, Potentiometric titrations, determination of P^H using glass electrode-Numerical problems.

Batteries: Primary cells (dry cells) and secondary cells (lead-Acid cell, Ni-Cd cell, Lithium cells). Applications of batteries. **Fuel cells** – Hydrogen – Oxygen fuel cell; methanol – oxygen fuel cell ; Advantages and Applications.

Corrosion and its control: Causes and effects of corrosion; Theories of corrosion – Chemical & Electrochemical corrosion; Types of corrosion (Galvanic, Water line, Pitting and Intergranular); Factors affecting rate of corrosion – Nature of metal and Nature of Environment – Corrosion control methods – Cathodic protection (sacrificial anodic and impressed current). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (galvanization & tinning), Cementation, cladding, electroplating (copper plating) Electroless plating (Ni plating) - Organic coatings – Paints - constituents and their functions.

UNIT II:

Engineering Materials: Polymers: Types of Polymerization (Chain & Step growth).**Plastics:** Thermoplastic & Thermo setting resins; Compounding & fabrication of plastics (Compression and injection moulding).Preparation, properties, engineering applications of PVC, Teflon and Bakelite.

Fibers- Charcterstics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fiber Reinforced Plastics (FRP) – applications. **Rubbers** – Natural rubber and its vulcanization. Elastomers – Buna-s, Butyl rubber and Thiokol rubber.

Conducting polymers: Polyacetylene, Polyaniline, Mechanism of Conduction, doping; applications of Conducting polymers. **Bio-degradable Polymers**- preparation and Applications of Poly vinyl acetate and Poly lactic acid - **Cement:** composition of Portland cement, setting & hardening of cement (reactions), **Lubricants:** Classification with examples- Characterstics of a good lubricant & mechanism of lubrication (thick film, thin film and extreme pressure) – properties of lubricants: viscosity, Cloud point, flash and fire points. **Refractories:** Classification, characteristics of a good refractory and applications.

Nanomaterials: Introduction, preparation by sol-gel & chemical vapour deposition methods. Applications of nanomaterials.

UNIT III:

Water and its Treatment: Hardness of Water: Causes of hardness, expression of hardness – units – types of hardness, estimation of temporary & permanent hardness of water by EDTA method - numerical problems. Boiler troubles – Scale & sludges, Priming and foaming, caustic enbrittlement and boiler corrosion; Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and calgon conditioning) – External treatment – Lime Soda process, Zeolite process and ion exchange process. Numerical Problems. **Potable Water**- Its Specifications – Steps involved in trtament of potable water – Disinfection of water by chlorination and ozonisation. Reverse osmosis & its significance.

Unit – IV :

Fuels & Combustion: Fuels – Classification – soild fuels : coal – analysis of coal - proximate and ultimate analysis and their significance. Liquid fuels

– petroleum and its refining – cracking – types – fixed bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol, Bergius and Fischer-Tropsch's process: Gaseous fuels - constituents, characteristics and applications of natural gas, LPG and CNG. Analysis of flue gas by Orsat's apparatus – Numerical Problems.

Combustion – Definition, Calorific value of fuel – HCV , LCV; Determination of calorific value by Junker's gas calorimeter – theoretical calculation of Calorific value by Dulong's formula – Numerical problems on combustion.

UNIT V:

Phase Rule & Surface Chemistry : **Phase Rule:** Definition of terms: Phase, component, degree of freedom, phase rule equation. Phase diagrams – one component system- water system. Two component system Lead- Silver, cooling curves, heat treatment based on iron-carbon phase diagram - hardening, annealing and normalization.

Surface Chemistry: **Adsorption –** Types of Adsorption, Isotherms – Freundlich and Langmuir adsorption isotherm, applications of adsorption; **Colloids**: Classification of Colloids; Electrical & optical properties, micelles, applications of colloids in industry.

TEXT BOOKS:

1. Engineering Chemistry by R.P. Mani,K.N. Mishra, B. Rama Devi / CENGAGE learning.
2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008).

REFERENCE BOOKS

1. Engineering Chemistry by B. Siva Shankar Mc.Graw Hill Publishing Company Limited, New Delhi (2006).
2. Engineering Chemistry J.C. Kuriacase & J. Rajaram, Tata McGraw Hills Publishing Company Limited, New Delhi (2004).
3. Text Book of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co Publishers, New Delhi (2006).
4. Chemistry of Engineering Materials by CV Agarwal,C.P Murthy, A.Naidu, BS Publications.

Outcome:

- Students will demonstrate a depth of knowledge and apply the methods of inquiry in a discipline of their choosing, and they will demonstrate a breadth of knowledge across their choice of varied disciplines.

- Students will demonstrate the ability to access and interpret information, respond and adapt to changing situations, make complex decisions, solve problems, and evaluate actions.
- Students will demonstrate awareness and understanding of the skills necessary to live and work in a diverse engineering world.

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(A10501) COMPUTER PROGRAMMING

Objectives:

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs.
- To learn to write programs (using structured programming approach) in C to solve problems.
- To introduce the students to basic data structures such as lists, stacks and queues.
- To make the student understand simple sorting and searching methods.

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development.

Introduction to the C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators (Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements (making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

UNIT - II

Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Limitations of recursion, example C programs, Preprocessor commands.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

UNIT - III

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT - IV

Enumerated, Structure, and Union Types– The Type Definition (typedef), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command –line arguments.

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling),Positioning functions, C program examples.

UNIT – V

Searching and Sorting – Sorting- selection sort, bubble sort, Searching-linear and binary search methods.

Lists- Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Push and Pop Operations, Queues- Enqueue and Dequeue operations.

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Oxford University Press.

REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. C for All, S. Thamarai Selvi, R.Murugesan, Anuradha Publications.
3. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.
4. Programming in C, Ajay Mittal, Pearson.
5. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
6. Problem solving with C, M.T.Somasekhara, PHI.
7. Programming with C, R.S.Bickar, Universities Press.
8. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.
9. Programming in C – Stephen G. Kochan, III Edition, Pearson

Education.

10. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
11. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press.

Outcomes:

Demonstrate the basic knowledge of computer hardware and software.

Ability to apply solving and logical skills to programming in C language and also in other languages.

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(A10301) ENGINEERING DRAWING

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Drawing/ Graphics – Various Drawing Instruments – Conventions in Drawing – **Lettering practice** – BIS Conventions.

Curves: Constructions of Curves used in Engineering Practice:

a) Conic Sections including the Rectangular Hyperbola – General method only.

b) Cycloid, Epicycloid and Hypocycloid

c) Involute.

Scales: Construction of different types of Scales, Plain, Diagonal, Vernier scale.

UNIT – II

Orthographic Projections in First Angle

Projection: Principles of Orthographic Projections – Conventions – First and Third Angle projections.

Projections of Points : including Points in all four quadrants.

Projections of Lines : Parallel, perpendicular, inclined to one plane and inclined to both planes. True length and true angle of a line. Traces of a line.

Projections of Planes: Plane parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference planes.

UNIT – III

Projections of Solids: Projections of regular solids, cube, prisms, pyramids, tetrahedran, cylinder and cone, axis inclined to both planes.

Sections and Sectional Views: Right Regular Solids – Prism, Cylinder, Pyramid, Cone – use of Auxiliary views.

UNIT – IV

Development of Surfaces: Development of Surfaces of Right, Regular Solids – Prisms, Cylinder, Pyramids, Cone and their parts. frustum of solids.

Intersection of Solids: Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT – V

Isometric Projections : Principles of Isometric Projection – Isometric Scale

– Isometric Views– Conventions – Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of parts with Spherical surface.

Transformation of Projections : Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects.

Perspective Projections : Perspective View : Points, Lines and Plane Figures, Vanishing Point Methods (General Method only).

TEXT BOOKS

1. Engineering Drawing – Basant, Agrawal, TMH.
2. Engineering Drawing, N.D. Bhatt.

REFERENCES :

1. Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd.
2. Engineering drawing – P.J. Shah .S.Chand Publishers.
3. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.
4. Engineering Drawing – M.B. Shah and B.C. Rana, Pearson.
5. Engineering Drawing by K.Venu Gopal & V.Prabu Raja New Age Publications.
6. Engineering Drawing by John. PHI Learning Publisher.

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(A10581) COMPUTER PROGRAMMING LAB

Objectives:

- To write programs in C to solve the problems.
- To implement linear data structures such as lists, stacks, queues.
- To implement simple searching and sorting methods.

Recommended Systems/Software Requirements:

- Intel based desktop PC
- ANSI C Compiler with Supporting Editors

Week I

a) Write a C program to find the sum of individual digits of a positive integer.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Week 2

a) Write a C program to calculate the following Sum:

$Sum=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$

b) Write a C program to find the roots of a quadratic equation.

Week 3

a) The total distance travelled by vehicle in 't' seconds is given by distance s = $ut+1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Week 4

a) Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.

ii) To find the GCD (greatest common divisor) of two given integers.

Week 5

a) Write a C program to find the largest integer in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices

ii) Multiplication of Two Matrices

Week 6

a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to a given main string from a given position.

ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not

Week 7

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.

b) Write a C program to count the lines, words and characters in a given text.

Week 8

a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

Week 9

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

$1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

Week 10

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to convert a Roman numeral to its decimal equivalent.

Week 11

Write a C program that uses functions to perform the following operations:

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 12

a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

Week 13

a) Write a C program to display the contents of a file.

b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Week 14

a) Write a C program that uses non recursive function to search for a Key value in a given list of integers using Linear search.

b) Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using Binary search.

Week 15

a) Write a C program that implements the Selection sort method to sort a given array of integers in ascending order.

b) Write a C program that implements the Bubble sort method to sort a given list of names in ascending order.

Week 16

Write a C program that uses functions to perform the following operations:

i) Create a singly linked list of integer elements.

ii) Traverse the above list and display the elements.

Week 17

Write a C program that implements stack (its operations) using a singly linked list to display a given list of integers in reverse order. Ex. input: 10 23 4 6 output: 6 4 23 10

Week 18

Write a C program that implements Queue (its operations) using a singly linked list to display a given list of integers in the same order. Ex. input: 10

23 4 6 output: 10 23 4 6

Week 19

Write a C program to implement the linear regression algorithm.

Week 20

Write a C program to implement the polynomial regression algorithm.

Week 21

Write a C program to implement the Lagrange interpolation.

Week 22

Write C program to implement the Newton- Gregory forward interpolation.

Week 23

Write a C program to implement Trapezoidal method.

Week 24

Write a C program to implement Simpson method.

TEXT BOOKS:

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications.
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers.
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.

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(A10081) ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB

(Any TEN experiments compulsory)

Objectives

This course on Physics lab is designed with 13 experiments in an academic year. It is common to all branches of Engineering in B.Tech I^{st} year.

The objective of the course is that the student will have exposure to various experimental skills which is very essential for an Engineering student.

The experiments are selected from various areas of Physics like Physical Optics, Lasers, Fiber Optics, Sound, Mechanics, Electricity & Magnetism and Basic Electronics.

Also the student is exposed to various tools like Screw gauge, Vernier Callipers, Physics Balance , Spectrometer and Microscope.

1. Dispersive power of the material of a prism – Spectrometer.
2. Determination of wavelength of a source – Diffraction Grating.
3. Newton's Rings - Radius of curvature of plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Time constant of an R-C circuit.
6. L-C-R circuit.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
8. Study the characteristics of LED and LASER sources.
9. Bending losses of fibres & Evaluation of numerical aperture of a given fibre.
10. Energy gap of a material of p-n junction.
11. Torsional pendulum.
12. Wavelength of light –diffraction grating - using laser.
13. Characteristics of a solar cell.

LABORATORY MANUAL:

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers).

Outcomes

The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering.

With the exposure to these experiments the student can compare the theory and correlate with experiment.

ENGINEERING CHEMISTRY LAB

List of Experiments (Any 12 of the following)

Titrimetry:

1. Estimation of ferrous iron by dichrometry.
2. Estimation of hardness of water by EDTA method.

Mineral analysis:

3. Determination of percentage of copper in brass.
4. Estimation of manganese dioxide in pyrolusite.

Instrumental Methods:

Colorimetry:

5. Determination of ferrous iron in cement by colorimetric method
6. Estimation of copper by colorimetric method.

Conductometry:

7. Conductometric titration of strong acid vs strong base.
8. Conductometric titration of mixture of acids vs strong base.

Potentiometry:

9. Titration of strong acid vs strong base by potentiometry.
10. Titration of weak acid vs strong base by potentiometry.

Physical properties:

11. Determination of viscosity of sample oil by redwood / oswald's viscometer.
12. Determination of Surface tension of lubricants.

Preparations:

13. Preparation of Aspirin
14. Preparation of Thiokol rubber

Adsorption:

15. Adsorption of acetic acid on charcoal.

TEXT BOOKS:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Inorganic quantitative analysis, Vogel.

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel, Ane Books Private Ltd.,
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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(A10083) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives

- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
- To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

Syllabus: English Language Communication Skills Lab shall have two parts:

a. **Computer Assisted Language Learning (CALL) Lab**

b. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the **English Language Communication Skills Lab**

Exercise – I

CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants

ICS Lab: Ice-Breaking activity and JAM session

Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise – II

CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies –

Requests – Social and Professional Etiquette - Telephone Etiquette.

Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise - III

CALL Lab: Minimal Pairs- Word accent and Stress Shifts- Listening Comprehension.

ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.

Sequence of Tenses, Question Tags and One word substitutes.

Exercise – IV

CALL Lab: Intonation and Common errors in Pronunciation.

ICS Lab: Extempore- Public Speaking

Active and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise – V

CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice

ICS Lab: Information Transfer- Oral Presentation Skills

Reading Comprehension and Job Application with Resume preparation.

Minimum Requirement of infra structural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

   The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor

   a) Speed – 2.8 GHZ

   b) RAM – 512 MB Minimum

   c) Hard Disk – 80 GB

ii) Headphones of High quality

2. **Interactive Communication Skills (ICS) Lab :**

   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories.* New Delhi: Foundation.
2. *Speaking English Effectively* 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. *How to Prepare for Group Discussion and Interviews.* Tata McGraw Hill
4. Hancock, M. 2009. *English Pronunciation in Use. Intermediate.* Cambridge: CUP.
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
6. Hewings, M. 2009. *English Pronunciation in Use. Advanced.* Cambridge: CUP.
7. Marks, J. 2009. *English Pronunciation in Use. Elementary.* Cambridge: CUP.
8. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication.* New Delhi : Foundation.
9. Soundararaj, Francis. 2012. *Basics of Communication in English. New Delhi: Macmillan.*
10. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
11. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
12. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan).
13. **Prescribed Lab Manual:** A Manual entitled "***English Language Communication Skills (ELCS) Lab Manual- cum- Work Book***" published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination

marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

Outcomes:

- Better Understanding of nuances of language through audio- visual experience and group activities.
- Neutralization of accent for intelligibility.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.

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(A10082) IT WORKSHOP / ENGINEERING WORKSHOP

Objectives:

The IT Workshop for engineers is a training lab course spread over 54 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools and LaTeX. (**Recommended to use Microsoft office 2007 in place of MS Office 2003).**

PC Hardware

Week 1 – Task 1 : Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Week 2 – Task 2 : Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Week 3 – Task 3 : Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Week 4 – Task 4 : Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Week 5 – Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Week 6 – Task 6 : Software Troubleshooting : Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Week 7 - Task 1 : **Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Week 8 - Task 2 : Web Browsers, Surfing the Web : Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Week 9 - Task 3 : **Search Engines & Netiquette :** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Week 10 - Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Week 11- Task 5: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Productivity tools

LaTeX and Word

Week 12 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that would be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

Task 1 : Using LaTeX and Word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Week 13 - Task 2: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Week 14 - Task 3 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Week 15 - Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the two tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Week 16 - Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting

LaTeX and MS/equivalent (FOSS) tool Power Point

Week 17 - Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Power point. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Week 18- Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting – Images, Clip Art, Audio, Video, Objects, Tables and Charts

Week 19 - Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion – Leslie Lamport, PHI/Pearson.
3. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill Publishers.
4. Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

Outcomes:

- Apply knowledge for computer assembling and software installation.
- Ability how to solve the trouble shooting problems.
- Apply the tools for preparation of PPT, Documentation and budget sheet etc.

ENGINEERING WORKSHOP

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Fitting
3. Tin-Smithy and Development of jobs carried out and soldering.
4. Black Smithy
5. House-wiring
6. Foundry
7. Welding
8. Power tools in construction, wood working, electrical engineering and mechanical Engineering.

2. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Plumbing

2. Machine Shop
3. Metal Cutting (Water Plasma)

TEXT BOOK:

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition

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(A30007) MATHEMATICS – III

Objectives: To learn

- Transforming the given variable coefficient equation (Cauchy's and Lagrange's) into the one with constant coefficients.
- Identifying ordinary points, singular points and regular singular points for the given ODE.
- Finding the series solution around a regular singular point.
- Solve the given ODE with variable coefficients by Frobenius method and test the convergence of its series solution.
- Series solutions for Legendre and Bessel differential equations, analyzing the properties of Legendre and Bessel polynomials.
- Differentiation and Integration of complex valued functions.
- Evaluation of integrals using Cahchy's integral formula.
- Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions.
- Evaluation of integrals using residue theorem.
- Transform a given function from z - plane to w – plane.
- Identify the transformations like translation, magnification, rotation and reflection and inversion.
- Properties of bilinear transformations.

UNIT – I:

Linear ODE with variable coefficients and series solutions(second order only): Equations reducible to constant coefficients-Cauchy's and Lagrange's differential equations. Motivation for series solutions, Ordinary point and Regular singular point of a differential equation , Transformation of non-zero singular point to zero singular point. Series solutions to differential equations around zero, Frobenius Method about zero.

Unit-II

Special Functions : Legendre's Differential equation, General solution of Legendre's equation, Legendre polynomials Properties: Rodrigue's formula – Recurrence relations, Generating function of Legendre's polynomials – Orthogonality. Bessel's Differential equation, Bessel functions properties: – Recurrence relations, Orthogonality, Generating function , Trigonometric expansions involving Bessel functions.

UNIT-III:

Complex Functions –Differentiation and Integration : Complex functions and its representation on Argand plane, Concepts of limit Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions – Milne – Thompson method. Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

UNIT-IV:

Power series expansions of complex functions and contour Integration: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity. Residue – Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$

(b) $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$

UNIT-V:

Conformal mapping: Transformation of z-plane to w-plane by a function, Conformal transformation. Standard transformations- Translation; Magnification and rotation; inversion and reflection,Transformations like e^z, log z, z^2, and Bilinear transformation. Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given .

TEXT BOOKS:

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

REFERENCES:

1) Complex Variables Principles And Problem Sessions By A.K.Kapoor, World Scientific Publishers.
2) Engineering Mathematics-3 By T.K.V.Iyengar andB.Krishna Gandhi Etc.
3) A Text Book Of Engineering Mathematics By N P Bali, Manesh Goyal.
4) Mathematics for Engineers and Scientists, Alan Jeffrey, 6th Edit. 2013, Chapman & Hall/CRC.

5) Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Person Education.

6) Mathematics For Engineers By K.B.Datta And M.A S.Srinivas, Cengage Publications.

Outcome: After going through this course the student will be able to:

- Apply the Frobenius method to obtain a series solution for the given linear 2nd ODE.
- Identify Bessel equation and Legendre equation and solve them under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Bessel and Legendre polynomials.

After going to through this course the student will be able to

a. analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem.

b. Find the Taylor's and Laurent series expansion of complex functions.

c. The conformal transformations of complex functions can be dealt with ease.

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(A30102) FLUID MECHANICS AND HYDRAULIC MACHINERY

UNIT I

Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure –measurement of pressure- Piezometer, U-tube and differential manometers.

Fluid kinematics: stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

UNIT-II

Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line - hydraulic gradient line.

Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle.

UNIT III

Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work don and efficiency, flow over radial vanes.

Hydroelectric power stations: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

UNIT IV

Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube- theory- functions and efficiency.

Performance of hydraulic turbines: Unit and specific quantities, Model Analysis, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank.

UNITV

Centrifugal pumps: classification, working, work done – manomertic head, static head- losses and efficiencies- specific speed- Model analysis, pumps in series and parallel-performance characteristic curves, NPSH, water hammer.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCE BOOKS:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley, John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements).

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(A30404) ELECTRONIC DEVICES AND CIRCUITS

Objectives:

This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers. This course focuses:

- To familiarize the student with the principle of operation, analysis and design of Junction diode, BJT and FET transistors and amplifier circuits.
- To understand diode as rectifier.
- To study basic principle of filter circuits and various types.

UNIT -I:

P-N Junction Diode: Qualitative Theory of P-N Junction, P-N Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of VI characteristic, Ideal versus Practical – Resistance levels (Static and Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics.

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode, SCR and Semiconductor Photo Diode.

UNIT-II:

Rectifiers and Filters : The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, p- Section Filters, Comparision of Filters, Voltage Regulation using Zener Diode.

UNIT-III:

Bipolar Junction Transistor and UJT: The Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, BJT Operation, BJT Symbol, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation , BJT Specifications, BJT Hybrid Model, Determination of h-parameters from Transistor Characteristics, Comparison of CB, CE, and CC Amplifier Configurations, UJT and Characteristics.

UNIT-IV:

Transistor Biasing and Stabilization: Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector - Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in VBE and ß, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, Analysis of a Transistor Amplifier Circuit using h-Parameters.

UNIT-V:

Field Effect Transistor and FET Amplifiers

Field Effect Transistor: The Junction Field Effect Transistor (Construction, principle of operation, symbol) – Pinch-off Voltage - Volt-Ampere characteristics, The JFET Small Signal Model, MOSFET (Construction, principle of operation, symbol), MOSFET Characteristics in Enhancement and Depletion modes.

FET Amplifiers: FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing FET, FET as Voltage Variable Resistor, Comparison of BJT and FET.

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit, 2 Ed.,1998, TMH.
2. Electronic Devices and Circuits – Mohammad Rashid, Cengage Learing, 2013.
3. Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford.

REFERENCE BOOKS:

1. Integrated Electronics – J. Millman and Christos C. Halkias, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI.
3. Electronic Devices and Circuits – B. P. Singh, Rekha Singh, Pearson, 2Ed, 2013.
4. Electronic Devices and Circuits --K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt. Ltd.
6. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 Ed., 2008, TMH.

Course Outcomes:

At the end of the course, the student will be able to:

- Understand and Analyse the different types of diodes, operation and its characteristics.
- Design and analyse the DC bias circuitry of BJT and FET.
- Design biasing circuits using diodes and transistors.
- To analyze and design diode application circuits, amplifier circuits and oscillatorsemploying BJT, FET devices.

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	4	**-/-/-**	**4**

(A30204) ELECTRICAL CIRCUITS

Objective:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course if laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, theorems and network topology.

UNIT –I:

Introduction to Electrical Circuits: Circuit Concept, R-L-C Parameters, Voltage and Current Sources, Independent and Dependent Sources, Source Transformation, Voltage – Current relationship for Passive Elements (for different input signals –Square, Ramp, Saw tooth and Triangular). Kirchhoff's Laws, Network Reduction Techniques – Series, Parallel, Series Parallel, Star –to-Delta or Delta-to-Star Transformations, Nodal Analysis, Mesh Analysis, Super node and Super mesh for DC Excitations.

UNIT –II:

Single Phase A.C. Circuits: R.M.S. and Average values and form factor for different periodic wave forms, Steady State Analysis of R, L and C (in Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Phase and Phase difference, Concept of Power Factor, Real and Reactive powers, J-notation, Complex and Polar forms of representation, Complex power.

UNIT –III:

Locus diagrams, Resonance and Magnetic circuits: Locus diagrams - series R-L, R-C, R-L-C and parallel combination with variation of various parameters - Resonance-series, parallel circuits, concept of band width and Q factor. Magnetic circuits-Faraday's laws of electromagnetic induction-concept of self and mutual inductance-dot convention-coefficient of coupling-composite magnetic circuit-analysis of series and parallel magnetic circuits.

UNIT –IV:

Network Topology: Definitions, Graph, Tree, Basic cutset and Basic Tie set Matrices for Planar Networks, Loop and Nodal methods for analysis of Networks with Dependent & Independent Voltage and Current Sources, Duality & Dual Networks.

UNIT –V:

Network Theorems (With A.C. & D.C): Tellegen's, Superposition, Reciprocity, Thevinin's, Norton's, Maximum Power Transfer, Milliman's and

Compensation theorems for D.C excitations.

TEXT BOOKS:

1. Electric Circuits - A.Chakrabarhty, Dhanipat Rai & Sons.
2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.

REFERENCE BOOKS:

1. Engineering Circuit Analysis - William Hayt ,Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.
2. Electric Circuit Analysis - K.S.Suresh Kumar, Pearson Education.
3. Electrical Circuits - David A.Bell, Oxford University Press.
4. Network Analysis and Circuits - M.Arshad, Infinity Science Press.
5. Circuits - A.Bruce Carlson, Cengage Learning.
6. Electrical Circuits: An Introduction - KCA Smith & RE Alley, Cambridge University Press.

Outcome:

After going through this course the student gets a thorough knowledge on basics of circuit concepts, electrical parameters, single phase AC circuits, magnetic circuits , resonance, network topology and network theorems with which he/she can able to apply the above conceptual things to real-world problems and applications.

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	L	T/P/D	C
II Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A30403) ELECTROMAGNETIC FIELDS

Objective:

The objective of this course is to introduce the concepts of electric field and magnetic fields and their applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

UNIT – I:

Electrostatics: Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law, div (D)=ρv Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

UNIT – II:

Conductors, Dielectrics and Capacitance: Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behavior of conductors in an electric field – Conductors and Insulators. Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT – III:

Magneto Statics: Static magnetic fields – Biot-Savart's law –- Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0.

Ampere's circuital law and its applications: viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Curl (H)=Jc, Field due to a circular loop, rectangular and square loops.

UNIT-IV:

Force in Magnetic Fields And Magnetic Potential : Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field. Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations. Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

UNIT – V:

Time Varying Fields : Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple problems - Modification of Maxwell's equations for time varying fields – Displacement current .

TEXT BOOKS:

1. "Engineering Electromagnetics" William H. Hayt & John. A. Buck McGraw-Hill Companies.
2. "Electro magnetic Fields", Sadiku, Oxford Publications.

REFERENCES:

1. "Introduction to Electro Dynamics",D J Griffiths, Prentice-Hall of India Pvt. Ltd.
2. "Electromagnetic Fields", Y Mallikarjuna Reddy, Universities Press.
3. "Electromagnetics",J. D Kraus Mc Graw-Hill companies.
4. "Electromagnetism-Problems with solutions", Ashutosh Pramanik, PHI Learning.
5. "Electromagnetics-Problems and solutions", William H. Hayt & John. A. Buck McGraw-Hill Companies.

Outcome:

After going through this course the student gets a thorough knowledge on vector algebra, 3-dimensional co-ordinate systems, electrostatics, behavior of conductors insulators semiconductors dielectrics and capacitance, magneto statics, time-varying fields, interaction between electricity and magnetism, different laws, Maxwell's equations, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	**-/-/-**	**4**

(A30206) ELECTRICAL MACHINES - I

Objective:

Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

UNIT – I:

Electromechanical Energy Conversion: Electromechanical Energy conversion – forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems.

UNIT – II:

D.C. Generators & Armature Reaction : D.C. Generators – Principle of operation – Action of commutator – constructional features – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Problems.

Armature reaction – Cross magnetizing and de-magnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

UNIT – III:

Types of D.C Generators & Load Characteristics : Methods of Excitation – separately excited and self excited generators – build-up of E.M.F - critical field resistance and critical speed - causes for failure to self excite and remedial measures. Load characteristics of shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing.

UNIT – IV:

D.C. Motors & Speed Control Methods: D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation.

Speed control of DC Motors: Armature voltage and field flux control methods. Ward-Leonard system. Principle of 3 point and 4 point starters – protective devices.

UNIT – V:

Testing of D.C. Machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency. Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a DC motor test**.**

TEXT BOOKS:

1. Electrical Machines, P.S. Bimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.

REFERENCE BOOKS:

1. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
2. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.
3. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
4. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
5. Electrical Machines, R. K. Srivastava, Cengage Learning.

Outcome:

After going through this course the student gets a thorough knowledge on electromechanical energy conversion, construction operation characteristics speed control methods and testing of different types of DC Generators and DC motors, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(A30181) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

1. Calibration of Venturimeter.
2. Calibration of Orifice meter.
3. Determination of friction factor for a given pipe line.
4. Determination of loss of head due to sudden contraction in a pipeline.
5. Verification of Bernoulli's theorem.
6. Impact of jets on Vanes.
7. Performance Test on Pelton Wheel.
8. Performance Test on Francis Turbine.
9. Performance Test on Kaplan Turbine.
10. Performance Test on Centrifugal Pump.
11. Performance Test on Multi Stage Centrifugal Pump.
12. Performance Test on Reciprocating Pump.

Note: Any 10 of the above 12 experiments are to be conducted.

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(A30482) ELECTRONIC DEVICES AND CIRCUITS LAB

PART A: (Only for Viva-voce Examination)

Electronic Workshop Practice (In 3 Lab Sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
   i. Multimeters (Analog and Digital)
   ii. Function Generator
   iii. Regulated Power Supplies
   iv. CRO.

PART B: (For Laboratory Examination – Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
4. Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
5. Half Wave Rectifier with & without filters.
6. Full Wave Rectifier with & without filters.
7. FET characteristics.
8. Design of Self-bias circuit.
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier .
12. SCR characteristics.
13. UJT Characteristics

PART C: Equipment required for Laboratories:

1. Regulated Power supplies (RPS) -0-30 V

2.	CRO's	-0-20 MHz.
3.	Function Generators	-0-1 MHz.
4.	Multimeters	
5.	Decade Resistance Boxes/Rheostats	
6.	Decade Capacitance Boxes	
7.	Ammeters (Analog or Digital)	-0-20 μA, 0-50μA, 0-100μA, 0-200μA, 0-10 mA.
8.	Voltmeters (Analog or Digital)	-0-50V, 0-100V, 0-250V
9.	Electronic Components	-Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes – Ge & Si type, Transistors – NPN, PNP type)

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II Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A40010) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Objectives:

To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations namely: demand and supply, production function, cost analysis, markets, forms of business organisations, capital budgeting and financial accounting and financial analysis.

Unit I

Introduction & Demand Analysis*:* Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. *Elasticity of Demand*: Definition, Types, Measurement and Significance of Elasticity of Demand. *Demand Forecasting,* Factors governing demand forecasting, methods of demand forecasting.

Unit II

Production & Cost Analysis: *Production Function* – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. *Cost Analysis***:** Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. *Pricing*: Objectives and Policies of Pricing. Methods of Pricing. *Business:* Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, *New Economic Environment*: Changing Business Environment in Post-liberalization scenario.

Unit IV

Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

Unit V

Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions - Introduction IFRS - Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). *Financial Analysis***:** Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi. 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting—A Managerial Perspective, Pearson, 2012.
6. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha : MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J. V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

Outcomes:

At the end of the course, the student will

- Understand the market dynamics namely, demand and supply, demand forecasting , elasticity of demand and supply, pricing methods and pricing in different market structures.

- Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
- Develop an understanding of
- Analyse how capital budgeting decisions are carried out.
- Understand the framework for both manual and computerised accounting process
- Know how to analyse and interpret the financial statements through ratio analysis.

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(A40214) POWER SYSTEMS-I

Objective:

Electrical Power plays significant role in day to day life of entire mankind. This course concerns the generation and distribution of power along with the economic aspects.

UNIT-I:

Power Stations:

Thermal Power Station: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses. Brief description of TPS components-Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and cooling towers.

Nuclear Power Stations: Nuclear Fission and Chain reaction, Nuclear fuels, Principle of operation of Nuclear reactor, Reactor Components- Moderators, Control rods, Reflectors and Coolants, Radiation hazards- Shielding and Safety precautions, Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only).

UNIT-II:

General Aspects of D.C & A.C Distribution Systems: Classification of Distribution Systems - Comparison of DC vs. AC and Under-Ground vs. Over - Head Distribution Systems- Requirements and Design features of Distribution Systems- Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT-III:

Air Insulated & Gas Insulated (GIS) Substations: Classification of substations: - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams. Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, bus bar, construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV:

Power Factor & Voltage Control: Causes of low power factor -Methods of Improving power factor -Phase advancing and generation of reactive KVAR using static Capacitors-Most economical power factor for constant KW load and constant KVA type loads, Numerical Problems.

Dependency of Voltage on Reactive Power flow- Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

UNIT-V:

Economic Aspects of Power Generation & Tariff: Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs.

Desirable Characteristics of a Tariff Method-Tariff Methods: Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods and Numerical Problems.

TEXT BOOKS:

1. Principles of Power Systems by V.K Mehta and Rohit Mehta S.Chand Company Pvt. Ltd, New Delhi 2004.
2. Electrical Power Systems, PSR. Murty, BS Publications.

REFERENCE BOOKS:

1. A Text book of Power system Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
2. Electrical Power Generation, Transmission and Distribution, S.N.Singh., PHI.
3. Electrical Power Systems by C.L.Wadhawa New Age International (P) Limited, Publishers.
4. Generation of Electrical Energy, Dr. B. R. Gupta, S. Chand.

Outcome:

After going through this course the student gets a thorough knowledge on thermal gas and nuclear power plants operation, AC and DC distribution systems operation, AIR insulated and GAS insulated indoor/outdoor substations operation, voltage control and power factor improvement techniques, economic aspects of power generation and different types of TARIFF methods with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
II Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A40413) ELECTRONIC CIRCUITS

Objective:

Electrical circuits plays significant role in day to day life of entire mankind. This course deals with the concept of different types of amplifiers, oscillators, vibrators, clippers, clampers, switching characteristics of various semiconductor devices, linear wave shaping and frequency response of bipolar junction transistor and field effect transistor.

UNIT-I:

Single Stage Amplifiers Design And Analysis: Review of CE, CB, CC& CS amplifiers-Classification of Amplifiers, Distortion in amplifiers-Approximate analysis, CE, CB, CC amplifiers comparison.

FEEDBACK AMPLIFIERS: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics-Voltage series-Voltage shunt, Current series and Current shunt Feedback configurations-Simple problems.

UNIT-II:

BJT & FET Frequency Response: Logarithms-Decibels-General frequency consideration-Low frequency analysis-Low frequency response of BJT amplifiers-Low frequency response of FET amplifier-Miller effect capacitance-High frequency response of BJT amplifier-Square wave testing.

UNIT-III:

Multivibrators: Analysis and Design of Bi-stable, Mono-stable, Astable-Multivibrators and Schmitt trigger using transistors.

Clippers and Clampers: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT –IV:

Large Signal Amplifiers: Class –A Power Amplifier, Maximum Value of Efficiency of Class-A Amplifier, Transformer coupled amplifier- Push Pull Amplifier-Complimentary Symmetry Circuits (Transformer Less Class B Power Amplifier)-Phase Inverters, Transistor Power Dissipation, Thermal Runway, Heat sinks.

LINEAR WAVESHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs.

UNIT-V:

Switching Characteristics of Devices: Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

TEXT BOOKS:

1. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nasheisky, 9th Edition 2007, Pearson Education.
2. Electronic Devices and Circuits by S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, 2nd edition 2008, Tata McGraw Hill Companies.
3. Solid State Pulse Circuits by David A. Bell, 4th Edition, Prentice Hall of India.

REFERENCES:

1. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
2. Electronic Devices and Circuits, Anil K. Maini, Varsha Agrawal, 1st Edition, WILEY.
3. Pulse, Digital & Switching Waveforms by Jacob Milliman, Harbert Taub and Mothiki S Prakash rao, 2nd edition 2008, Tata McGraw Hill Companies.

Outcome:

After going through this course the student gets a thorough knowledge on various electronic circuits like oscillators, multi-vibrators, frequency response analysis, clippers and clampers, switching characteristics of semiconductor devices, concept of wave-shaping, with this knowledge they can apply sufficient knowledge for solving real world problems.

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(A40407) SWITCHING THEORY AND LOGIC DESIGN

Course Objectives:

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic tools for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

UNIT -I:

Number System and Boolean Algebra And Switching Functions: Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.

Boolean Algebra: Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT -II:

Minimization and Design of Combinational Circuits: Introduction, The Minimization with theorem, The Karnaugh Map Method, Five and Six Variable Maps, Prime and Essential Implications, Don’t Care Map Entries, Using the Maps for Simplifying, Tabular Method, Partially Specified Expressions, Multi-output Minimization, Minimization and Combinational Design, Arithmetic Circuits, Comparator, Multiplexers, Code Converters, Wired Logic, Tristate Bus System, Practical Aspects related to Combinational Logic Design, Hazards and Hazard Free Relations.

UNIT -III:

Sequential Machines Fundamentals: Introduction, Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, The Flip-Flop, The D-Latch Flip-Flop, The "Clocked T" Flip-Flop, The " Clocked J-K" Flip-Flop, Design of a Clocked Flip-Flop, Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration, Clock Skew.

UNIT -IV:

Sequential Circuit Design and Analysis: Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Design Aspects, State Reduction, Design Steps, Realization using Flip-Flops Counters - Design of Single mode Counter, Ripple Counter, Ring Counter, Shift Register, Shift Register Sequences, Ring Counter Using Shift Register.

UNIT -V:

Sequential Circuits: Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

Algorithmic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

1. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3rd Edition.

REFERENCE BOOKS:

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.
2. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
3. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier.
4. Fundamentals of Logic Design- Charles H. Roth, Cengage LEanring, 5th, Edition, 2004.
5. Digital Logic Applications and Design- John M. Yarbrough, Thomson Publications, 2006.
6. Digital Logic and State Machine Design – Comer, 3rd, Oxford, 2013.

Course Outcomes:

Upon completion of the course, students should possess the following skills:

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD.
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyse small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Be able to design and analyse small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

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(A40213) NETWORK THEORY

Objective:

This course introduces the basic concepts of network theory which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course if laid on the basic analysis of circuits which includes three phase circuits, transient analysis of DC and AC circuits , network functions, two-port network parameters, Fourier analysis of AC circuits, design and analysis of filters.

UNIT-I:

Three-Phase AC Circuits: Phase sequence- Star and delta connection-Relation between line and phase voltages and currents in balanced systems-Analysis of balanced and unbalanced 3 phase circuits-Measurement of active and reactive power.

UNIT-II:

D.C & A.C Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combination) for D.C and A.C excitation-Initial conditions-solution method using differential equation and Laplace transforms.

UNIT-III:

Network Functions: The concept of Complex Frequency, Physical Interpretation of Complex Frequency, Transform Impedance and Transform Circuits, Series and parallel Combination of Elements, Terminal Pairs or Ports, Networks Functions for the One-port and Two-port, Poles and Zeros of Network Functions, Significance of poles and Zeros, Properties of Driving Point Functions, Properties of Transfer Functions, Necessary Conditions for Driving Point Functions, Necessary Conditions for Transfer Functions, Time Domain Response from Pole Zero Plot.

UNIT-IV:

Network Parameters: Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations. Cascaded networks, concept of transformed network – two-port network parameters using transformed variables.

UNIT-V:

Filters and Fourier analysis of A.C Circuits: Low pass, High pass, Band pass, Band elimination, Prototype filter design. The Fourier theorem, consideration of symmetry, exponential form of Fourier series, line spectra and phase angle spectra, Fourier integrals and Fourier transforms, properties of Fourier transforms.

TEXT BOOKS:

1. Electric Circuits, A.Chakrabarhty, Dhanipat Rai & Sons.
2. Network analysis, N.C Jagan and C. Lakhminarayana, BS publications.

REFERENCE BOOKS:

1. Engineering circuit analysis, William Hayt, Jack E. Kemmerly, S M Durbin, McGraw Hill Companies.
2. Electrical Circuits, David A.Bell, Oxford University Press.
3. Electric Circuit Analysis, K.S.Suresh Kumar, Pearson Education.
4. Circuits, A.Bruce Carlson, Cengage Learning.
5. Network Analysis and Circuits, M.Arshad, Infinity Science Press.
6. Electrical Circuits an Introduction, KCA Smith & RE Alley, Cambridge University Press.

Outcome:

After going through this course the student gets a thorough knowledge on three-phase systems of electrical circuits, transient analysis of AC and DC networks, Laplace transforms, different types of network functions, two-port network parameters, operation and design of various filter circuits, Fourier transforms and analysis of AC circuits through Fourier transforms , with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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II Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A40212) ELECTRICAL MACHINES – II

Objective:

As an extension of Electrical machines I course this subject facilitates to study of the performance of Transformers and Induction motors which are the major part of industrial drives and agricultural pump sets.

UNIT-I:

Single Phase Transformers: Single phase transformers-types - constructional details-minimization of hysteresis and eddy current losses-EMF equation - operation on no load and on load - phasor diagrams. Equivalent circuit - losses and efficiency-regulation. All-day efficiency - effect of variations of frequency & supply voltage on iron losses.

UNIT-II:

Testing of Transformers: Testing of 1-phase transformers: OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios.

UNIT-II:

Auto & Poly-Phase Transformers: Auto transformers: Equivalent circuit - comparison with two winding transformers.

Poly-phase transformers : Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ, Third harmonics in phase voltages-three winding transformers-tertiary windings-determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.

UNIT-IV:

Poly-Phase Induction Motors: Poly-phase induction motors-construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and pf at standstill and during operation. Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging.

UNIT-V:

Circle Diagram & Speed Control of Induction Motors: Circle diagram-no load and blocked rotor tests-predetermination of performance-methods of starting and starting current and torque calculations.

Speed control: change of frequency; change of poles and methods of consequent poles; cascade connection. Injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

TEXT BOOKS:

1. Electrical machines-PS Bhimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.

REFERENCE BOOKS:

1. Electric Machines, I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.
2. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
3. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
4. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
5. Electrical Machines, R. K. Srivastava, Cengage Learning.
6. Performance and Design of AC Machines, MG.Say, BPB Publishers.
7. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw-Hill Companies.
8. Electric machinery, A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies.

Outcome:

After going through this course the student gets a thorough knowledge on construction operation characteristics and testing of different types of Transformers and construction operation characteristics testing (concept of circle diagram) and speed control methods of poly-phase induction motors, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
II Year B.Tech. EEE-II Sem	**-**	**-/3/-**	**2**

(A40287) ELECTRICAL MACHINES LAB – I

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator.
2. Load test on DC shunt generator.
3. Load test on DC series generator.
4. Load test on DC compound generator.
5. Hopkinson's test on DC shunt machines.
6. Fields test on DC series machines.
7. Swinburne's test and speed control of DC shunt motor.
8. Brake test on DC compound motor.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

9. Brake test on DC shunt motor.
10. Retardation test on DC shunt motor.
11. Separation of losses in DC shunt motor.

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	-	**-/3/-**	**2**

(A40286) ELECTRICAL CIRCUITS AND SIMULATION LAB

PART-A: ELECTRICAL CIRCUITS

1. Verification of Thevenin's and Norton's theorems.
2. Verification of Superposition and Maximum Power Transfer Theorems.
3. Verification of RMS value of complex wave.
4. Verification of Compensation Theorem.
5. Verification of Reciprocity, Millmann's Theorems.
6. Locus Diagrams of RL and RC Series Circuits.
7. Series and Parallel Resonance.
8. Determination of Self, Mutual Inductances and Coefficient of coupling.
9. Determination of Z and Y Parameters.
10. Determination of Transmission line and hybrid parameters.
11. Measurement of Active Power for Star and Delta connected balanced loads.
12. Measurement of Reactive Power for Star and Delta connected balanced loads.
13. Measurement of 3-phase Power by two- Wattmeter Method for unbalanced loads.

PART-B: PSPICE SIMULATION

1. Simulation of DC Circuits
2. DC Transient response
3. Mesh Analysis
4. Nodal Analysis

NOTE:

- PSPICE Software Package is necessary.
- Eight experiments are to be conducted from PART-A and any two experiments from PART-B

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III Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A50423) IC APPLICATIONS

UNIT-I:

Integrated Circuits : Classification, chip size and circuit complexity, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis& characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL .

UNIT-II:

OP-AMP and Applications: Basic information of OP-AMP, ideal and practical OP-AMP, internal circuits, OP-AMP characteristics, DC and AC characteristics, 741 OP-AMP and its features, modes of operation-inverting, non-inverting, differential.

Basic application of OP-AMP, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, introduction to voltage regulators.

UNIT-III:

Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT-IV:

Timers & Phase Locked Loops : Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT-V:

D-A and A- D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

TEXT BOOKS:

1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International (p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI.

REFERENCE BOOKS:

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
3. Design with Operational Amplifiers &Analog Integrated Circuits, Sergio Franco, McGraw Hill.
4. Digital Fundamentals – Floyd and Jain, Pearson Education.

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	4	**-/-/-**	**4**

(A50014) MANAGEMENT SCIENCE

Objectives:

This course is intended to familiarise the students with the framework for the managers and leaders available for understanding and making decisions relating to issues related organisational structure, production operations, marketing, Human resource Management, product management and strategy.

UNIT -I:

Introduction to Management and Organisation: Concepts of Management and organization- nature, importance and Functions of Management, Systems Approach to Management - Taylor's Scientific Management Theory – Fayal's Principles of Management – Maslow's theory of Hierarchy of Human Needs – Douglas McGregor's Theory X and Theory Y – Hertzberg Two Factor Theory of Motivation - Leadership Styles, Social responsibilities of Management. Designing Organisational Structures: Basic concepts related to Organisation - Departmentation and Decentralisation, Types and Evaluation of mechanistic and organic structures of organisation and suitability.

UNIT -II:

Operations and Marketing Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement – Business Process Reengineering (BPR) - Statistical Quality Control: control charts for Variables and Attributes (simple Problems) and Acceptance Sampling, TQM, Six Sigma, Deming's contribution to quality. Objectives of Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records – JIT System, Supply Chain Management, Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

UNIT -III:

Human Resources Management (HRM): Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating – Capability Maturity Model (CMM) Levels – Performance Management System.

UNIT -IV:

Project Management (PERT/CPM): Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

UNIT -V:

Strategic Management and Contemporary Strategic Issues: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balanced Score Card as Contemporary Business Strategies.

TEXT BOOKS:

1. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2004
2. P Vijaya Kumar, N. Appa Rao and Ashima B. Chhalill, Cengage Learning India, 2012.

REFERENCE BOOKS:

1. Kotler Philip and Keller Kevin Lane: Marketing Management, Pearson, 2012.
2. Koontz and Weihrich: Essentials of Management, McGraw Hill, 2012.
3. Thomas N.Duening and John M.Ivancevich Management—Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012.
5. Samuel C.Certo: Modern Management, 2012.
6. Schermerhorn, Capling, Poole and Wiesner: Management, Wiley, 2012.
7. Parnell: Strategic Management, Cengage,2012.
8. Lawrence R Jauch, R.Gupta andWilliam F.Glueck: Business Policy and Strategic Management, Frank Bros.2012.
9. Aryasri: Management Science, McGraw Hill, 2012

Outcomes:

By the end of the course, the student will be in a position to

- Plan an organisational structure for a given context in the organisation.
- carry out production operations through Work study.
- understand the markets, customers and competition better and price the given products appropriately.
- ensure quality for a given product or service.
- plan and control the HR function better.
- plan, schedule and control projects through PERT and CPM.
- evolve a strategy for a business or service organisation.

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III Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A50221) POWER SYSTEMS-II

Objective:

This course is an extension of Power systems-I course. It deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

UNIT-I:

Transmission Line Parameters: Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT-II:

Performance of Short, Medium And Long Length Transmission Lines: Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems .Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT – III:

Power System Transients & Factors Governing The Performance of Transmission Lines : Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the

Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT-IV:

Overhead Line Insulators & Sag, Tension Calculations: Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT-V:

Underground Cables: Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading, HV cables.

TEXT BOOKS:

1. Electrical power systems, C.L.Wadhwa, New Age International (P) Limited, Publishers.
2. Electrical Power Systems, PSR. Murty, BS Publications.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. A Textbook of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
3. Electrical Power Generation, Transmission and Distribution, S.N.Singh, PHI.
4. Principles of Power Systems, V.K Mehta and Rohit Mehta S.Chand Company Pvt. Ltd.
5. Power System Engineering, I.J.Nagarath & D.P Kothari , TMH.
6. Power System Analysis and Design, Dr. B. R. Gupta, S. Chand & Company Limited.
7. Power System Analysis, Operation and control, Abhijit Chakrpabarti, Sunitha Halder , PHI, 3/e, 2010
8. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC Press (Taylor & Francis Group) Special Indian Edition,2/e.

Outcome:

After going through this course the student gets a thorough knowledge on calculation of transmission line parameters, performance analysis of short medium long length transmission lines and factors affecting the performance analysis of transmission lines, transients in power systems, operation of different types of overhead line insulators, sag and tension calculation of transmission lines and detailed analysis of underground cables for power transmission and distribution , with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	**-/-/-**	**4**

(A50211) CONTROL SYSTEMS

Objective:

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT – I:

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems.

UNIT II:

Transfer Function Representation: Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction is using Mason's gain formula.

UNIT-III:

Time Response Analysis Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT – IV:

Stability Analysis in S-Domain: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci. Basics of PID controllers.

UNIT – V:

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

TEXT BOOKS:

1. Control Systems theory and applications, S.K Bhattacharya, Pearson.
2. Control Systems, N.C.Jagan, BS Publications.

REFERENCE BOOKS:

1. Control systems, A.Ananad Kumar, PHI.
2. Control Systems Engineering, S.Palani, Tata-McGraw-Hill.
3. Control systems, Dhanesh N.Manik, Cengage Learning.
4. Control Systems Engineering,I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
5. Control Systems,N.K.Sinha, New Age International (P) Limited Publishers.

Outcome:

After going through this course the student gets a thorough knowledge on open loop and closed loop control systems , concept of feedback in control systems, mathematical modeling and transfer function derivations of translational and rotational systems, Transfer functions of Synchros, AC and DC servo motors, Transfer function representation through block diagram algebra and signal flow graphs, time response analysis of different ordered systems through their characteristic equation and time-domain specifications , stability analysis of control systems in S-domain through R-H criteria and root-locus techniques, frequency response analysis through bode diagrams, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	**-/-/-**	**4**

(A50220) POWER ELECTRONICS

Objective:

With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

UNIT – I:

Power Semi Conductor Devices & Commutation Circuits: Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points. Two transistor analogy – SCR - UJT firing circuit ––– Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT – II:

AC-DC Converters (1-Phase & 3-Phase Controlled Rectifiers): Phase control technique – Single phase Line commutated converters – Mid point and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode –Numerical problems. Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Free wheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems. Three phase converters – Three pulse and six pulse converters – Mid point and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) - Waveforms –Numerical Problems.

UNIT – III:

DC-DC Converters (Choppers): Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression, Jones chopper, AC Chopper, Problems.

UNIT–IV:

AC-AC Converters (AC Voltage Controllers) & Frequency Changers (Cyclo-Converters) : AC voltage controllers – Single phase two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms – Firing circuits -Numerical problems –Cyclo-converters – Single phase mid - point cyclo-converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo-converter (Principle of operation only) – Waveforms.

UNIT – V:

DC-AC Converters (Inverters): Inverters – Single phase inverter – Basic series, parallel inverter –operation and Waveforms – Three phase inverters (180, 120 degrees conduction modes of operation)-Voltage control techniques for inverters, Pulse width modulation techniques – Numerical problems.

TEXT BOOKS:

1. Power Electronics, Dr. P. S. Bimbhra, Khanna Pubishers.
2. Power Electronics Devices, Circuits and Industrial applications, V. R. Moorthi, Oxford University Press.

REFERENCE BOOKS:

1. Power Electronics: Circuits, Devices and Applications, M. H. Rashid, Prentice Hall of India.
2. Power Electronics, M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing Company.
3. Power Electronics, Vedam Subramanyam, New Age International (P) Limited, Publishers.
4. Elements of Power Electronics, Philip T. Krein, Oxford University Press.
5. Power Electronics, M. S. Jamil Asghar, PHI Private Limited.
6. Power Electronics, P.C.Sen,Tata Mc Graw-Hill Publishing.
7. Power Electronics, K. Hari Babu, Scitech Publications India Pvt. Ltd.
8. Principles of Power Electronics, John G. Kassakian, Martin F. Schlect, Geroge C. Verghese, Pearson Education.
9. Thyristorised Power Controllers, G. K. Dubey, S. R. Doradra, A. Joshi and R. M. K. Sinha, New Age International (P) Limited Publishers.

Outcome:

After going through this course the student gets a thorough knowledge on construction operation V-I characteristics commutation firing and protection of various power semiconductor devices, focused analysis of thyristor device, nature of the R, RL and RLE loads for different power inputs, AC-to-DC power conversion through 1-phase & 3-phase controlled rectifiers, DC-to-DC power conversion through step-up and step-down choppers, AC-to-AC power conversion through AC voltage controllers, Frequency conversion through cyclo-converters, DC-to-AC power conversion through 1-phase & 3-phase inverters, different types of PWM (pulse-width modulation) techniques, steady-state and transient state analysis of all the power converters , with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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III Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A50218) ELECTRICAL MACHINES – III

Objective:

This subject is an extension of previous machines courses. It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in house hold appliances and control systems.

UNIT – I:

Synchronous Machines & Characteristics: Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation. Harmonics in generated EMF – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT – II:

Regulation of Synchronous Generator: Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT – III:

Parallel Operation of Synchronous Generator: Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

UNIT – IV:

Synchronous Motors : Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed.

Power Circles: Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT – V:

Single Phase Motors & Special Machines: Single phase Motors: Single phase induction motor – Constructional features-Double revolving field theory

Equivalent circuit – split-phase motors – Capacitor start Capacitor run motors.

Principles of A.C. Series motor-Universal motor, Stepper motor shaded pole motor, (Qualitative Treatment only).

TEXT BOOKS:

1. Electrical machines-PS Bhimbra, Khanna Publishers.
2. Principles of Electrical Machines, V. K. Mehta, Rohit Mehta, S. Chand Publishing.

REFERENCE BOOKS:

1. Electromachanics-III (Synchronous and single phase machines), S.Kamakashiah, Right Publishers
2. Electric Machines, I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers.
3. Performance and Design of AC Machines, MG.Say, BPB Publishers.
4. Theory of Alternating Current Machinery, Langsdorf, Tata McGraw-Hill Companies.
5. Electric machinery, A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw Hill Companies.
6. Electric Machines, Mulukutla S. Sarma, Mukesh K. Pathak, Cengage Learning.
7. Fundamentals of Electric Machines, B. R. Gupta, Vandana Singhal, New Age International Publishers.
8. Electrical Machines, M. V. Deshpande, PHI Learning Private Limited.
9. Electrical Machines, R. K. Srivastava, Cengage Learning.

Outcome:

After going through this course the student gets a thorough knowledge on, construction operation characteristics regulation parallel-operation power circles starting & speed control methods of synchronous machines and construction operation characteristics of single-phase motors and special machines, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
III Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	-	**-/3/-**	**2**

(A50289) ELECTRICAL MACHINES LAB – II

The following experiments are required to be conducted as compulsory experiments:

1. O.C. & S.C. Tests on Single-phase Transformer.
2. Sumpner's test on a pair of single-phase transformers.
3. Brake test on three-phase Induction Motor.
4. No-load and Blocked rotor tests on three-phase Induction motor.
5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods.
6. **'V'** and '**Inverted V'** curves of a three—phase synchronous motor.
7. Equivalent Circuit of a single-phase induction motor.
8. Determination of **Xd** and **Xq** of a salient pole synchronous machine.

In addition to the above eight experiments, atleast any two of the following experiments are required to be conducted from the following list:

1. Parallel operation of Single-phase Transformers.
2. Separation of core losses of a single-phase transformer.
3. Scott connection of transformers.
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods.
5. Efficiency of a three-phase alternator.
6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.
7. Measurement of sequence impedance of a three-phase alternator.

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	-	**-/3/-**	**2**

(A50086) ADVANCED COMMUNICATION SKILLS (ACS) LAB

Introduction

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

Minimum Requirement:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- **Spacious room with appropriate acoustics.**
- **Round Tables with movable chairs**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ**
- **T. V, a digital stereo & Camcorder**
- **Headphones of High quality**

Prescribed Lab Manual: A book titled ***A Course Book of Advanced***

Communication Skills (ACS) Lab published by Universities Press, Hyderabad.

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner's Compass**, 7th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Preparing for being Interviewed**
  - **Positive Thinking**
  - **Interviewing Skills**
  - **Telephone Skills**
  - **Time Management**

Books Recommended

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5. The Basics of Communication: A Relational Perspective. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
6. English Vocabulary in Use series, Cambridge University Press 2008.
7. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
9. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.

10. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
11. Job Hunting by Colm Downes, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.
14. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/ Cambridge University Press.
15. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

***Advanced Communication Skills Lab Practicals**:*

1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation

1. **Seminar/ Professional Presentation**
2. **A Report on the same has to be prepared and presented.**

* ***Teachers may use their discretion to choose topics relevant and suitable to the needs of students.***
* ***Not more than two students to work on each mini project.***
* ***Students may be assessed by their performance both in oral presentation and written report.***

Outcomes

- Accomplishment of sound vocabulary and its proper use contextually.
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

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III Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A60223) ELECTRICAL AND ELECTRONICS INSTRUMENTATION

Objective:

Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current Power factor, power, energy and magnetic measurements.

UNIT-I:

Introduction to Measuring Instruments : Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – Extension of range of E.S. Voltmeters.

UNIT – II:

Potentiometers & Instrument Transformers: Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate types standardization – applications. CT and PT – Ratio and phase angle errors.

UNIT –III:

Measurement of Power & Energy: Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems.

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximum demand meters.

UNIT – IV:

D.C & A.C Bridges: Method of measuring low, medium and high resistance – sensitivity of wheat-stone's bridge – carey foster's bridge, kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

Measurement of inductance- Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle - Desauty Bridge. Wien's bridge – Schering Bridge.

UNIT-V:

Transducers & Oscilloscopes: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, photo diodes.

CRO: Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers-CRO probes-applications of CRO-Measurement of phase and frequency-lissajous patterns.

TEXT BOOKS:

1. Electrical and Electronic Measurements and Instrumentation, R. K. Rajput, S. Chand & Company Ltd.
2. Electrical Measuring Instruments and Measurements, S. C. Bhargava, BS Publications.

REFRENCE BOOKS:

1. Electrical & Electronic Measurement & Instruments, A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical and Electronic Measurements, G. K. Banerjee, PHI Learning Pvt. Ltd.
3. Electrical Measurements and Measuring Instruments, Golding and Widdis, Reem Publications.
4. Electrical Measurements, Buckingham and Price, Prentice – Hall
5. Electrical Measurements: Fundamentals, Concepts, Applications, Reissland, M.U, New Age International (P) Limited, Publishers.
6. Electrical Measurements and measuring Instruments, E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.

Outcome:

After going through this course the student gets a thorough knowledge on, different types of measuring instruments their construction operation and characteristics, resistance voltage current measurements through potentiometers, voltage current measurements through instrument transformers, power and energy measurements through watt and energy meters, resistance measurements through DC bridges, capacitance and inductance measurements through AC bridges, operation of different types of transducers, measurement of phase and frequency through CRO, range extension of measuring instruments and different types of errors & their reduction methods in measuring instruments, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	-/-/-	4

(A60225) STATIC DRIVES

Objective:

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are presented.

UNIT – I:

Control of DC Motors through Phase Controlled Rectifiers: Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to DC separately excited and DC series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed DC motors. Three phase semi and fully controlled converters connected to DC separately excited and DC series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT – II:

Four Quadrant Operation of DC Drives through Dual Converters: Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor (Block Diagram Only).

UNIT-III:

Control of DC Motors By Choppers (1-, 2-, 4- Quadrant Operations): Single quadrant, Two –quadrant and four quadrant chopper fed dc separately excited and series excited motors – Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed DC Motors – Closed Loop operation (Block Diagram Only).

UNIT –IV:

Control of Induction Motors: Variable voltage characteristics: Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

Variable frequency characteristics: Variable frequency control of induction motor by Voltage source and current source inverter and cyclo-converters- PWM control – Comparison of VSI and CSI operations – Speed torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only).

Static rotor resistance control: Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications – problems.

UNIT – V:

Control of Synchronous Motors: Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only), variable frequency control, Cyclo converter, PWM, VFI, CSI.

TEXT BOOKS:

1. Power Semiconductor Drives, PV Rao, BS Publications.
2. Fundamentals of Electric Drives, G K Dubey Narosa Publications

REFERENCE BOOKS:

1. Power Semiconductor Drives, S. B. Dewan, G. R. Slemon , A. Straughen, Wiley Pvt Ltd.
2. Electric Drives N. K. De, P. K. Sen, PHI Learning Private Ltd.
3. Thyristor Control of Electric drives, Vedam Subramanyam Tata McGraw Hill Publications.
4. Electrical machines and Drive Systems, John Hindmarsh, Alasdair Renfrew, Newnes.
5. Electric Motors and Drives, Fundamentals, Types and Applications Austin Hughes, Newnes.
6. Power Electronics and Variable Frequency Drives Technology and Applications, Bimal K. Bose, Wiley India Pvt. Ltd.
7. A First course on Electrical Drives, S K Pillai, New Age International (P) Ltd.
8. Modern Power Electronics and AC Drives, B.K.Bose, PHI.
9. Power Electronic Circuits, Devices and applications, M.H.Rashid, PHI.

Outcome:

After going through this course the student gets a thorough knowledge on, steady-state analysis control speed-torque characteristics and closed-loop operation of DC motors (separately excited shunt motor and series motor) through phase controlled rectifiers and choppers, single-quadrant two-quadrant and four-quadrant operations forward-motoring forward-braking reverse-motoring reverse-regenerative braking operations of DC motors through four-quadrant choppers and dual converters, steady-state analysis control speed-torque characteristics and closed-loop operation of induction motors i.e. variable voltage characteristics through AC voltage controllers, variable frequency characteristics through cyclo-converters and Voltage Source and Current source Inverters (VSI & CSI), static rotor resistance control slip-power recovery through static scherbius and Kramer drives , steady-state analysis control speed-torque characteristics and closed-loop operation of synchronous motors through VSI, CSI and Cyclo-converters, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	**-/-/-**	**4**

(A60222) COMPUTER METHODS IN POWER SYSTEMS

Objective:

This course introduces formation of Z bus of a transmission line, power flow studies by various methods. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

UNIT –I:

Power System Network Matrices: Graph Theory: Definitions, Bus Incidence Matrix, Y_{bus} formation by Direct and Singular Transformation Methods, Numerical Problems.

Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems). - Modification of ZBus for the changes in network (Problems).

UNIT –II:

Power Flow Studies: Load Flows: Necessity of Power Flow Studies – Data for Power Flow Studies – Derivation of Static load flow equations.

Load flow solutions using Gauss Seidel Method: Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses): Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Newton-Raphson Method in Rectangular and Polar Co-Ordinates Form: Load Flow Solution with or without PV Busses- Derivation of Jacobian Elements, Algorithm and Flowchart.

Decoupled and Fast Decoupled Methods: Comparison of Different Methods – DC load Flow.

UNIT – III:

Short Circuit Analysis: Per-Unit System of Representation: Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems.

Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

Symmetrical Component Theory: Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances. Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

Unsymmetrical Fault Analysis: LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT –IV:

Steady State Stability Analysis: Elementary concepts of Steady State, Dynamic and Transient Stabilities. Description of: Steady State Stability Power Limit, Transfer Reactance, Synchronizing Power Coefficient, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability.

UNIT –V:

Transient Stability Analysis: Derivation of Swing Equation. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. - Solution of Swing Equation: Point-by-Point Method. Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

TEXT BOOKS:

1. Computer Techniques in Power System Analysis, M.A.Pai, TMH Publications.
2. Computer techniques and models in power systems, K.Uma rao, I.K.International.

REFERENCE BOOKS:

1. Power System Analysis, PSR Murty, BS Publications.
2. Power system Analysis Operation and control, Abhijit Chakrabarth, Sunita Haldar, PHI.
3. Power System Analysis, Hadi Saadat , TMH.
4. Modern Power System Analysis, Turan Gonen, CRC Press.
5. Modern Power Systems Analysis, Xi – Fan Wang, Yonghua Song, Malcolm Lrving, Springer International.
6. Electrical Power Systems Analysis, Security and Deregulation, P. V. Venkatesh, B. V. Manikandan, S. Charles Raja, A.Srinivasan, PHI.
7. Modern Power system Analysis, I.J.Nagrath & D.P.Kothari: Tata McGraw-Hill Publishing Company.
8. Power System Analysis, T. K. Nagasarkar, M. S. Sukhija. Oxford University Press.
9. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.

Outcome:

After going through this course the student gets a thorough knowledge on, power system network matrices through graph theory, power flow studies (load-flow) through various computer methods, short-circuit analysis, per-unit system of representation, concept of sequence impedances, symmetrical and unsymmetrical fault analysis, steady-state dynamic-state and transient-state stability analysis, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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(A60430) MICROPROCESSORS AND INTERFACING DEVICES

Objective:

The objective of this course is to introduce 8086 versions of Microprocessor and its architectural aspects and different components interfacing with it along with 8051microcontroller information.

UNIT-I:

8086 Microprocessor: 8086 architecture-Functional Diagram, Register Organization, Memory segmentation, memory addresses, physical memory organization, signal descriptions of 8086- common function signals, Minimum and maximum mode signals, Read Write cycles Timing diagrams, interrupt structure of 8086.

UNIT-II:

Assembly Language Programming: Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical branch and cell instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT-III:

Peripheral Interfacing with 8086 Microprocessor: 8255 PPI, Keyboard, display controllers, stepper motor, A/D, D/A Converter Interfacing with 8086 microprocessor. Static and Dynamic memories, Vector interrupt table, interrupt service routine, Introduction to DOS and BIOS interrupts, 8259, DMA controller 8257 Interfacing with 8086 microprocessor.

UNIT-IV:

Communication Interface: Serial Communication Standards, serial data transfer schemes, 8251 USART architecture and interfacing RS-232, IEEE -488, prototype and trouble shooting.

UNIT-V:

Introduction to Microcontrollers: Overview of 8051-Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051.

TEXT BOOKS:

1. Advanced microprocessors and peripherals, A.K. Ray and K M Bhurchandani, TMH.
2. Microprocessors and Microcontrollers, Architecture, Programming and System Design, Krishna Kant, PHI Learning PVT. Ltd.

REFERENCE BOOKS:

1. D.V.Hall, "Micro Processor and Interfacing ", Tata McGraw-Hill.
2. Microprocessors and Interfacing, N. Senthil, Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah, Oxford University press.
3. Microprocessors, PC Hardware and Interfacing, N. Mathivanan, PHI Learning PVT. Ltd.
4. Microprocessors, Nilesh B. Bahadure, PHI Learning PVT. Ltd.
5. Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design, Liu & Gibson, PHI.
6. Kenneth J Ayala, "The 8051 Micro Controller", Cengage learning.
7. The 8051 micro-controllers' architecture and programming and applications, K Uma rao, Andhe pallavi, Pearson.
8. Microcontrollers and applications, Ajay V. Deshmukh, Tata McGraw-Hill Companies.

Outcome:

After going through this course the student gets a thorough knowledge on, architecture, pin diagram, register and memory organizations, concept of memory segmentation, minimum and maximum mode of operations, timing diagrams, addressing modes, instruction set, assembler directives, macros, procedures, vector interrupts , peripheral and communication interfacing of 8086 microprocessor and 8051 microcontroller, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	**-/-/-**	**4**

(A60009) ENVIRONMENTAL STUDIES

Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations.

UNIT-I :

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II:

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III:

Biodiversity and Biotic Resources : Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary,

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems And Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

SUGGESTED TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which inturn helps in sustainable development.

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	4	**-/-/-**	**4**

(A60117) DISASTER MANAGEMENT
(Open Elective)

Unit-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

Unit –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

Unit –III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

Unit –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters

Infrequent events: Cyclones – Lightning – Hailstorms

Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation) Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards / Disasters- Physical hazards/ Disasters-Soil Erosion

Soil Erosion:— Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion

Chemical hazards/ disasters:— Release of toxic chemicals, nuclear explosion- Sedimentation processes Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation

Biological hazards/ disasters:- Population Explosion.

Unit –V

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni.
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning.

REFERENCES

1. R.B.Singh (Ed) Environmental Geography, Heritage Publishers New Delhi,1990.
2. Savinder Singh Environmental Geography, Prayag Pustak Bhawan, 1997.
3. Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978.
4. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000.
5. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003.
6. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994.
7. Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003.
8. A.S. Arya Action Plan For Earthquake,Disaster, Mitigation in V.K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994.
9. R.K. Bhandani An overview on Natural & Man made Disaster & their Reduction,CSIR, New Delhi.
10. M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001.

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(A60018) HUMAN VALUES AND PROFESSIONAL ETHICS
(Open Elective)

Objectives : This introductory course input is intended

- To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

Unit I:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

Unit III:

Understanding Harmony in the Family and Society- Harmony in Human -

Human Relationship : Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; **Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.** Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

Unit IV:

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence : Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Unit V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics : Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a) Ability to utilize the professional competence for augmenting universal human order,

b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,

c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations

TEXT BOOKS

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

2. Prof. KV Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications,3rd Edition.

REFERENCE BOOKS

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA.
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991.
5. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
6. A.N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethichs (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

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	4	**-/-/-**	**4**

(A60017) INTELLECTUAL PROPERTY RIGHTS

(Open Elective)

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks : Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets : Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition : Misappropriation right of publicity, False advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing company ltd.,

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(A60290) CONTROL SYSTEMS AND SIMULATION LAB

Any Eight of the following experiments are to be conducted:

1. Time response of Second order system.
2. Characteristics of Synchros.
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor.
5. Transfer function of DC motor.
6. Effect of P, PD, PI, PID Controller on a second order systems.
7. Lag and lead compensation – Magnitude and phase plot.
8. Transfer function of DC generator.
9. Temperature controller using PID.
10. Characteristics of magnetic amplifiers.
11. Characteristics of AC servo motor.

Any two simulation experiments are to be conducted:-

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB.
4. State space model for classical transfer function using MATLAB – Verification.

REFERENCE BOOKS:

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.

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III Year B.Tech. EEE-II Sem	L	T/P/D	C
	-	-/3/-	2

(A60291) POWER ELECTRONICS AND SIMULATION LAB

Any Eight of the Experiments in Power Electronics Lab

1. Study of Characteristics of SCR, MOSFET & IGBT.
2. Gate firing circuits for SCR's.
3. Single Phase AC Voltage Controller with R and RL Loads.
4. Single Phase fully controlled bridge converter with R and RL loads.
5. Forced Commutation circuits (Class A, Class B, Class C, Class D and Class E).
6. DC Jones chopper with R and RL Loads.
7. Single Phase Parallel, inverter with R and RL loads.
8. Single Phase Cyclo-converter with R and RL loads.
9. Single Phase half controlled converter with R load.
10. Three Phase half controlled bridge converter with R-load.
11. Single Phase series inverter with R and RL loads.
12. Single Phase Bridge converter with R and RL loads.
13. Single Phase dual converter with RL loads.
14. Operation of MOSFET based chopper.

Any two simulation experiments with PSPICE/PSIM:

1. Single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
2. Resonant pulse commutation circuit and Buck chopper.
3. Single- phase Inverter with PWM control.

REFERENCE BOOKS:

1. Simulation of Electric and Electronic circuits using PSPICE, M.H.Rashid, PHI.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.
5. Spice for power electronics and electric power, Rashid , CRC Press.

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IV Year B.Tech. EEE-I Sem	L	T/P/D	C
	4	-/-/-	4

(A70231) SWITCH GEAR AND PROTECTION

Objective:

This course introduces all varieties of Circuit Breakers and Relays for protection of Generators, Transformers and feeder bus bars from over voltages and other hazards. It emphasis on Neutral grounding for overall protection.

UNIT – I:

Circuit Breakers: Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages.- Restriking Phenomenon, Average and Max. RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto reclosures. Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers.

UNIT – II:

Electromagnetic and Static Relays: Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. **Relays Classification:** Instantaneous, DMT and IDMT types. Application of relays: Over current/ under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation. **Distance relays:** Impedance, Reactance and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison. **Static Relays:** Static Relays verses Electromagnetic Relays.

UNIT – III:

Generator & Transformer Protection : Protection of generators: against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected. **Protection of transformers:** Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

UNIT–IV:

Feeder &Bus-Bar protection & Grounding: Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay.Protection of Bus bars – Differential protection. **Neutral Grounding:** Grounded and Ungrounded Neutral Systems. - Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance - Arcing Grounds and Grounding Practices.

UNIT – V:

Protection Against Over Voltages: Generation of Over Voltages in Power Systems.-Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

TEXT BOOKS:

1. Switchgear and Protection, Sunil S Rao, Khanna Publlishers.
2. Protection and Switchgear, Bhavesh Bhalja, R. P. Mahesheari, Nilesh G. Chothani, Oxford University Press.

REFERENCE BOOKS:

1. Electrical Power Systems, C.L.Wadhwa, New Age international (P) Limited, Publishers.
2. Power System Protection and Switchgear, Badari Ram, D.N Viswakarma, TMH Publications.
3. Electrical Power System Protection, C. Christopoulos and A. Wright, Springer International.
4. Electrical Power Systems, PSR. Murty, BS Publications.
5. Power system protection and switch gear by Bhuvanesh Oza, TMH,
6. A Text Book on Power System Engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
7. A Textbook of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
8. Principles of Power Systems**,** V.K Mehta and Rohit Mehta S.Chand Company Pvt. Ltd.

Outcome:

After going through this course the student gets a thorough knowledge on, various types of protective devices (circuit breakers, relays etc..) and their co-ordination, protection of generators, transformers, feeders, bus-bars, through different types of protective devices, overvoltage protection, lightening, concept of earthing and grounding, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	-/-/-	4

(A70232) UTILIZATION OF ELECTRICAL ENERGY

Objective:

This subject deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and their application to electrical traction systems.

UNIT – I:

Electric Drives: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT – II:

Electric Heating & Welding: Electric Heating: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating.

Electric welding: resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

UNIT – III:

Illumination : Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

UNIT – IV:

Electric Traction-I : System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostatic braking and regenerative braking. Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

UNIT – VIII

Electric Traction-II: Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion.

TEXT BOOK:

1. Utilization of Electrical Power, Er. R. K. Rajput, Laxmi Publications.

2. Art & Science of Utilization of electrical Energy, Partab, Dhanpat Rai & Sons.

REFERENCE BOOKS:

1. Utilization of Electric Energy, E. Openshaw Taylor, University press.
2. Generation, Distribution and Utilization of electrical Energy, C.L. Wadhwa, New Age International (P) Limited.
3. Utilization of Electrical Power including Electric drives and Electric traction, N.V.Suryanarayana, New Age International (P) Limited.
4. Utilization of Electric Energy, VVL Rao, University Press.

Outcome:

After going through this course the student gets a thorough knowledge on, electric drives characteristics and their applicability in industry, nature of different types of loads and their characteristics, concept of electric heating welding, illumination, electric traction and utilization of electric energy by the above mentioned means, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
IV Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A70421) DIGITAL SIGNAL PROCESSING

Objectives:

This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous-time and discrete-time signals and systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real-world signal processing applications.
- To acquaint in FFT algorithms, Multi-rate signal processing techniques and finite word length effects.

UNIT -I:

Introduction: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, Linear Shift Invariant Systems, Stability, and Causality, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems

Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

UNIT -II:

Discrete Fourier series: DFS Representation of Periodic Sequences, Properties of Discrete Fourier Series, Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.

UNIT -III:

IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT -IV:

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT -V:

Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Upsampling, Interpolation, Sampling Rate Conversion.

Finite Word Length Effects: Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round-off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Dead Band Effects.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley, 2009

REFERENCE BOOKS:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj and C.Gnanapriya, TMH, 2009
4. Discrete Systems and Digital Signal Processing with MATLAB – Taan S. ElAli, CRC press, 2009.
5. *Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and* Barrie W. Jervis, 2nd Edition, Pearson Education, 2009.
6. Digital Signal Processing - Nagoor Khani, TMG, 2012

Course Outcomes:

On completion of this subject, the student should be able to:

- Perform time, frequency and Z -transform analysis on signals and systems.

- Understand the inter-relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of roundoff errors.
- Design a digital filter for a given specifications.
- Understand the fast computation of DFT and appreciate the FFT processing.
- Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.

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IV Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A70230) POWER SYSTEM OPERATION AND CONTROL

Objective:

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

UNIT – I:

Economic Operation of Power Systems: Optimal operation of Generators in Thermal Power Stations, - heat rate Curve – Cost Curve – Incremental fuel and Production costs, input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses – Loss Coefficients, General transmission line loss formula.

UNIT – II:

Hydrothermal Scheduling: Optimal scheduling of Hydrothermal System: Hydroelectric power plant models, scheduling problems-Short term hydrothermal scheduling problem.

UNIT – III:

Modeling: Modeling of Turbine: First order Turbine model, Block Diagram representation of Steam Turbines and Approximate Linear Models.

Modeling of Governor: Mathematical Modeling of Speed Governing System – Derivation of small signal transfer function.

Modeling of Excitation System: Fundamental Characteristics of an Excitation system, Transfer function, Block Diagram Representation of IEEE Type-1 Model.

UNIT – IV:

Single Area & Two-Area Load Frequency Control : Necessity of keeping frequency constant. Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case.

Load frequency control of 2-area system: Uncontrolled case and controlled case, tie-line bias control.

Load Frequency Controllers: Proportional plus Integral control of single area and its block diagram representation, steady state response – Load Frequency Control and Economic dispatch control.

UNIT – V:

Reactive Power Control: Overview of Reactive Power control – Reactive Power compensation in transmission systems – advantages and disadvantages of different types of compensating equipment for transmission systems. Load compensation: Specifications of load compensator, Uncompensated and compensated transmission lines: shunt and Series Compensation. (Qualitative treatment)

TEXT BOOKS:

1. Power System Operation and Control, Dr. K. Uma Rao, Wiley India Pvt. Ltd.
2. Power Systems Analysis, operation and control, Abhijit Chakrabarti, Sunitha Halder, PHI.

REFERENCE BOOKS:

1. Operation and Control in Power Systems, PSR Murthy, BS Publications.
2. Power systems stability and control, Prabha Kundur, The McGraw – Hill companies**.**
3. Power System Analysis, C.L.Wadhwa, Newage International.
4. Modern Power System Analysis, I.J.Nagrath & D.P.Kothari Tata McGraw – Hill Publishing Company Ltd.
5. Power System Analysis and Design, J.Duncan Glover and M.S.Sarma, Cengage Learning.
6. Power System Analysis, Grainger and Stevenson, Tata McGraw Hill.

Outcome:

After going through this course the student gets a thorough knowledge on, economic operation of power systems, scheduling of hydro-thermal power plants, modeling of the power system components like turbine, governor and excitation systems, necessity of keeping the frequency of the power system constant , load frequency control in single and two area systems, operation of load frequency controllers, reactive power control, uncompensated transmission line and compensation in transmission systems through shunt and series compensations, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
IV Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A70228) HIGH VOLTAGE ENGINEERING
(Elective-I)

Objective:

This subject deals with the detailed analysis of Breakdown occurring in gaseous, liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition High voltage testing methods are also discussed.

UNIT- I:

Introduction to High Volatge Engineering: Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT- II:

Break Down in Dielectric Materials: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT-III:

Generation & Measurement of High Voltages & Currents : Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators. Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

UNIT-IV:

Over Voltages & Insulation Co-Ordination: Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT- V:

Testing Of Materials & Electrical Apparatus: Measurement of D.C

Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements. Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters, and Radio Interference measurements.

TEXT BOOKS:

1. High Voltage Engineering, M.S.Naidu and V. Kamaraju, TMH Publications.
2. High Voltage Engineering, C.L.Wadhwa, New Age Internationals (P) Limited.

REFERENCE BOOKS:

1. High Voltage Engineering: Fundamentals, E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier.
2. High Voltage Insulation Engineering, Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited.
3. High Voltage Engineering, Theory and Practice, Mazen Abdel Salam, Hussein Anis, Ahdan El-Morshedy, Roshdy Radwan , Marcel Dekker

Outcome:

After going through this course the student gets a thorough knowledge on, basics of high voltage engineering, break-down phenomenon in different types of dielectrics, generation and measurement of high voltages and currents, the phenomenon of over-voltages, concept of insulation co-ordination, testing of various materials and electrical apparatus used in high voltage engineering, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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IV Year B.Tech. EEE-I Sem	L	T/P/D	C
	4	-/-/-	4

(A70432) VLSI DESIGN
(Elective-I)

Course Objectives:

The objectives of the course are to:

- Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.
- Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
- Give exposure to the design rules to be followed to draw the layout of any logic circuit.
- Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

UNIT –I:

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit ω_0; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT -II:

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT –III:

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT -IV:

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT -V:

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K. Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
5. Introduction to VLSI – Mead & Convey, BS Publications, 2010.

Course Outcomes:

Upon successfully completing the course, the student should be able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Choose an appropriate inverter depending on specifications required for a circuit
- Draw the layout of any logic circuit which helps to understand and estimate parasitics of any logic circuit
- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics

- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand Design of large memories.
- design simple logic circuit using PLA, PAL, FPGA and CPLD.
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

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IV Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A70435) DIGITAL CONTROL SYSTEMS

(Elective-I)

Objective:

This course gives fundamentals digital control systems, z-transforms, state space representation of the control systems, concepts of controllability and observabilty, estimation of stability in different domains, design of discrete time control systems, compensators, state feedback controllers, state observers through various transformations.

UNIT – I:

Introduction : Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

Z – TRANSFORMS: Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms. Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT – II:

State Space Analysis: State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and its Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations. Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT –III:

Stability Analysis: Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane.

Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT-IV:

Design of Discrete Time Control System : Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – V:

State Feedback Controllers & Observers: Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.

State Observers – Full order and Reduced order observers.

TEXT BOOK:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition.
2. Digital Control Systems , V. I. George, C. P. Kurian, Cengage Learning

REFERENCE BOOKS:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.Digital Control and State Variable Methods by M.Gopal, TMH .
2. Digital Control Engineering Analysis and Design M. Sami Fadali Antonio Visioli, AP Academic Press.

Outcome:

After going through this course the student gets a thorough knowledge on, basics of digital control systems, z-transforms, mapping between S-plane and Z-plane, state-space analysis, concept of controllability and observabilty, derivation of pulse-transfer function, stability analysis in S-domain and Z-domains, stability through jury-stability test, stability through bilinear transformation and R-H criteria, design of discrete-time control systems, design of lag, lead, lead-lag compensators, design of PID controllers and design of state feedback controllers and observers, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	4	-/-/-	4

(A70229) OPTIMIZATION TECHNIQUES

(Elective-II)

Objective:

This course introduces various optimization techniques i.e classical, linear programming, transportation problem, simplex algorithm, dynamic programming, constrained and unconstrained optimization techniques for solving and optimizing an electrical and electronic engineering circuits design problems in real world situations.

UNIT – I:

Introduction & Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – II:

Linear Programming: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

UNIT – III:

Transportation Problem & Unconstrained Optimization: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method. Univariate method, Powell's method and steepest descent method.

UNIT – IV:

Constrained Nonlinear Programming: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – V:

Dynamic Programming: Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

TEXT BOOKS:

1. Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited.
2. Optimization Methods in Operations Research and systems Analysis, K.V. Mittal and C. Mohan, New Age International (P) Limited.

REFERENCE BOOKS:

1. Operations Research, Dr. S.D.Sharma.
2. Introductory Operations Research, H.S. Kasene & K.D. Kumar, Springer (India), Pvt .LTd.
3. Operations Research: An Introduction, H.A.Taha, Pearson Pvt. Ltd.
4. Operations Research, Richard Bronson, Govindasami Naadimuthu, Tata Mc Graw – Hill Company Limited.

Outcome:

After going through this course the student gets a thorough knowledge on, Optimization of electrical and electronics engineering problems through classical optimization techniques, linear programming, simplex algorithm, transportation problem, unconstrained optimization, constrained non-linear programming and dynamic programming, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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IV Year B.Tech. EEE-I Sem	**4**	**-/-/-**	**4**

(A70227) ELECTRICAL DISTRIBUTION SYSTEMS
(Elective-II)

Objective:

This course gives the complete knowledge of electrical distribution systems, the design of feeders, substations. It also gives conceptual knowledge on how to determine the performance of a distribution system through its important parameters i.e. voltage drops and power losses and the very important thing that protection of the system by means of protective devices and their co-ordination during the several fault conditions. It also specifies how to improve the voltage profiles and power factor of the system to better value using various voltage control and compensation techniques.

UNIT – I:

Introduction & General Concepts: Introduction to distribution systems: Load modeling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor.

Classification of loads: Residential, commercial, Agricultural and Industrial loads and their characteristics.

UNIT – II:

Distribution Feeders & Substations: Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, voltage levels, feeder loading; basic design practice of the secondary distribution system. **Substations:** Rating of distribution substation, service area within primary feeders. Benefits derived through optimal location of substations.

UNIT – III:

Distribution System Analysis: Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, manual methods of solution for radial networks, three phase balanced primary lines.

UNIT – IV:

Protective Devices & Co-Ordination: Objectives of distribution system protection, types of common faults and procedure for fault calculations.

Protective Devices: Principle of operation of Fuses, Circuit Reclosures, and line sectionalizes, and circuit breakers.

Coordination of Protective Devices: General coordination procedure.

UNIT – V:

Voltage Control & P.F Improvement: Equipment for voltage control, effect of series capacitors, line drop Compensation, effect of AVB/AVR. Power-factor control using different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and Switched), capacitor allocation - Economic justification –Procedure to determine the best capacitor location.

TEXT BOOK:

1. Electrical Power Distribution Systems,V.Kamaraju , TMH.
2. Elecrical Distrubution Systems, Dr. S. Siva naga raju, Dr. K. Shankar. Danapathi Rai Publications.

REFERENCE BOOK:

1. Electric Power Distribution System Engineering, Turan Gonen, CRC Press.
2. Electric Power Generation, Transmission and Distribution, SN. Singh, PHI Publishers.

Outcome:

After going through this course the student gets a thorough knowledge on, general aspects of electrical distribution systems, design and analysis of distribution feeders and substations, distribution systems analysis through voltage-drop and power loss calculations, operation of protective devices used in distribution systems and their co-ordination, voltage control and power factor improvement through capacitor compensation and distribution system-faults analysis, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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IV Year B.Tech. EEE-I Sem	L	T/P/D	C
	4	-/-/-	4

(A70228) ELECTRICAL ESTIMATING AND COSTING

(Elective-II)

Objective:

Emphasize the estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability. Exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations design. These techniques should help the students to successfully estimate costing of the products / projects that are part of our every day usage.

UNIT–I:

Design Considerations of Electrical Installations: Electric Supply System, Three phase four wire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections , Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNI –II:

Electrical Installation for Different Types of Buildings and Small Industries: Electrical installations for residential buildings – estimating and costing of material, Electrical installations for commercial buildings, Electrical installations for small industries.

UNIT–III:

Overhead and Underground Transmission and Distribution Lines: Introduction, Supports for transmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.

UNIT–IV:

Substations: Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoor substations – Floor mounted type.

UNIT–V:

Design of Illumination Schemes: Introduction, Terminology in illumination, laws of illumination, various types of light sources, Practical lighting schemes.

TEXT BOOKS:

1. Electrical Design Estimating and Costing, K. B. Raina, S. K. BhattAcharya, New Age International Publisher.
2. Design of Electrical Installations, Er. V. K. Jain, Er. Amitabh Bajaj, University Science Press.
3. Electricity Pricing Engineering Principles and Methodologies, Lawrence J. Vogt, P. E., CRC Press.

REFERENCE BOOKS:

1. Code of practice for Electrical wiring installations,(System voltage not exceeding 650 volts), Indian Standard Institution, IS: 732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution, IS: 2032.
4. Code of Practice for selection, Installation of Maintenance of fuse (voltage not exceeding 650V), Indian Standard Institution, IS: 3106-1966.
5. Code of Practice for earthling, Indian Standard Institution, IS:3043-1966.
6. Code of Practice for Installation and Maintenance of induction motors, Indian Standard Institution, IS: 900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650 Volts), Indian Standard Institution, IS: 2274-1963.
8. Electrical Installation, estimating and costing, Gupta J. B., Katson, Ludhiana.

Outcome:

After going through this course the student gets a thorough knowledge on, estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability, exposure to design and estimation of wiring, design of overhead and underground distribution lines, substations and illuminations, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
IV Year B.Tech. EEE-I Sem	**L**	**T/P/D**	**C**
	-	**-/3/-**	**2**

(A70498) MICROPROCESSORS AND INTERFACING DEVICES LAB

8086 Microprocessor:

1. Arithmetic operations(Addition, Subtraction, Multiplication and Division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest number in an array of numbers.
5. Generation of Fibonacci series.
6. Hexadecimal to Decimal conversion.
7. ASCII to Decimal conversion.
8. Program for sorting an array for 8086.
9. Program for searching for a number or character in a string for 8086.
10. Program for string manipulations for 8086.

MASM Programming:

1. Arithmetic operations(Addition, Subtraction, Multiplication and Division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest number in an array of numbers.
5. Generation of Fibonacci series.
6. Hexadecimal to Decimal conversion.

8051 Microcontroller:

1. Arithmetic operations(Addition, Subtraction, Multiplication and Division)
2. Addition of two BCD numbers.
3. Ascending order/Descending order of an array of numbers.
4. Finding Largest/Smallest number in an array of numbers.
5. Generation of Fibonacci series.
6. Masking of Bits.
7. Hexadecimal to Decimal conversion.

Interfacing with 8086 Microprocessor:

1. Stepper motor interfacing to 8086.
2. Traffic Light Controller interfacing to 8086.
3. Elevator simulator interfacing to 8086.
4. Seven-segment Display interfacing to 8086.
5. Tone Generator interfacing to 8086.
6. Interfacing ADC and DAC to 8086.
7. SRAM and DRAM interfacing to 8086.
8. Digit Key - interfacing to 8086.

Note: Minimum of 12 experiments to be conducted.

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	-	**-/3/-**	**2**

(A70293) ELECTRICAL MEASUREMENTS LAB

The following experiments are required to be conducted as compulsory experiments:

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer power factor meter
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Dielectric oil testing using H.T. testing Kit
6. Schering bridge & Anderson bridge.
7. Measurement of 3-phase reactive power with single-phase wattmeter.
8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.

In addition to the above eight experiments, at-least any two of the experiments from the following list are required to be conducted:

9. Calibration LPF wattmeter – by Phantom testing
10. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
11. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given C.T. by Null method.
12. P.T. testing by comparison – V.G. as Null detector – Measurement of % ratio error and phase angle of the given P.T.
13. LVDT and capacitance pickup – characteristics and Calibration
14. Resistance strain gauge – strain measurements and Calibration
15. Transformer turns ratio measurement using a.c. bridge
16. Measurement of % ratio error and phase angle of given C.T. by comparison.

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IV Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A80237) FUNDAMENTALS OF HVDC AND FACTS DEVICES

Objective:

This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Harmonics and Filters, Reactive power control and Power factor improvements of the system. It also deals with basic FACTS concepts, static shunt and series compensation and combined compensation techniques.

UNIT – I:

Introduction: Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station. HVDC converters, pulse number, analysis of Gratez circuit with and without overlap, converter bridge characteristics, equivalent circuits or rectifier and inverter configurations of twelve pulse converters.

UNIT – II:

Converter & HVDC System Control: Principles of DC Link Control – Converters Control Characteristics – system control hierarchy, firing angle control, current and extinction angle control, starting and stopping of DC link.

UNIT-III:

Harmonics, Filters and Reactive Power Control : Introduction, generation of harmonics, AC and DC filters, Reactive Power Requirements in steady state, sources of reactive power, static VAR systems.

Power Flow Analysis in AC/DC Systems: Modeling of DC/AC converters, Controller Equations-Solutions of AC/DC load flow –Simultaneous method-Sequential method.

UNIT-IV:

Introduction to FACTS : Flow of power in AC parallel paths and meshed systems, basic types of FACTS controllers, brief description and definitions of FACTS controllers.

Static Shunt Compensators: Objectives of shunt compensation, methods of controllable VAR generation, static VAR compensators, SVC and STATCOM, comparison between SVC and STATCOM.

UNIT – V:

Static Series Compensators : Objectives of series compensation, variable impedance type-thyristor switched series capacitors (TCSC), and switching converter type series compensators, static series synchronous compensator (SSSC)-power angle characteristics-basic operating control schemes.

Combined Compensators: Introduction, unified power flow controller (UPFC), basic operating principle, independent real and reactive power flow controller, control structure.

TEXT BOOKS:

1. HVDC Transmission, S. Kamakshaiah, V. Kamaraju, The Mc – Graw Hill Companies.
2. Understanding FACTS, Concepts and Technology of Flexible AC Transmission Systems, Narain. G. Hingorani, Laszlo Gyugyi, IEEE Press, Wiley India.

REFERENCE BOOKS:

1. HVDC and Facts Controllers Applications of Static Converters in Power Systems, Vijay K. Sood, Kluwer Academic Publishers.
2. HVDC Power Transmission Systems: Technology and system Interactions, K.R.Padiyar, New Age International (P) Limited.
3. Thyristor – Based Conrollers for Electrical Transmission Systems, R. Mohan Mathur, Rajiv K. Varma.Wiley India.
4. FACTS Modeling and Simulation in Power Networks, Enrique Acha, Wiley India Distributed by BSP Books Pvt. Ltd.

Outcome:

After going through this course the student gets a thorough knowledge on, basics of HVDC system, converters control schemes harmonics filters reactive power control and power flow analysis in HVDC systems and basic concepts of FACTS, necessity of FACTS controllers and their operation, shunt and series compensation through various static compensators, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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IV Year B.Tech. EEE-II Sem	L	T/P/D	C
	4	-/-/-	4

(A80238) NEURAL NETWORKS AND FUZZY LOGIC
(Elective-III)

Objective:

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.

UNIT – I:

Introduction & Essentials to Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN. Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

UNIT–II:

Single & Multi Layer Feed Forward Neural Networks : Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications. Credit Assignment Problem, Generalized Delta Rule, and Derivation of Back-propagation (BP) Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT-III:

Associative Memories-I: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory).

UNIT-IV:

Associative Memories-II: Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem. Architecture of Hopfield

Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

UNIT – V:

Fuzzy Logic: Classical & Fuzzy Sets: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, De-fuzzification to crisp sets, De-fuzzification methods.

TEXT BOOKS:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications, Rajasekharan and Pai, PHI.
2. Neural Networks and Fuzzy Logic, C. Naga Bhaskar, G. Vijay Kumar, BS Publications.

REFERENCE BOOKS:

1. Artificial Neural Networks, B. Yegnanarayana, PHI.
2. Artificial Neural Networks, Zaruda, PHI.
3. Neural Networks and Fuzzy Logic System, Bart Kosko, PHI.
4. Fuzzy Logic and Neural Networks, M. Amirthavalli, Scitech Publications India Pvt. Ltd.
5. Neural Networks, James A Freeman and Davis Skapura, Pearson Education.
6. Neural networks by satish Kumar , TMH, 2004
7. Neural Networks, Simon Hakins , Pearson Education.
8. Neural Engineering, C.Eliasmith and CH.Anderson, PHI.

Outcome:

After going through this course the student gets a thorough knowledge on, , biological neurons and artificial neurons, comparative analysis between human and computer, artificial neural network models, characteristics of ANN's, different types of activation functions, learning strategies, learning rules, perceptron models, single and multi layer feed-forward and feed-back neural networks, back-propagation algorithm, Kolmogorov Theorem, different types of associative memories and basics of fuzzy logic, concept of classical and fuzzy sets, fuzzy logic system components fuzzification and defuzzification, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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IV Year B.Tech. EEE-II Sem	L	T/P/D	C
	4	-/-/-	4

(A80324) RENEWABLE ENERGY SOURCES

(Elective-III)

Objective:

It introduces solar energy its radiation, collection, storage and application. It also introduces the Wind energy, Biomass energy, geothermal energy and ocean energy as alternative energy sources.

UNIT – I:

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II:

Solar Energy Collection, Storage & Applications: Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Storage & Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III:

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV:

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V:

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, and principles of DEC.

TEXT BOOKS:

1. Non-Conventional Energy Sources, G.D. Rai, Khanna Publishers.
2. Introduction to renewable energy, Vaughn Nelson, CRC Press (Taylor & Francis).

REFERENCE BOOKS:

1. Renewable Energy Resources, Twidell & Wier, CRC Press (Taylor & Francis).
2. Renewable Energy Sources and Emerging Technologies, D. P. Kothari, K. C. Singal, Rakesh Ranjan, PHI Learning Private Limited.
3. Fundamentals of Renewable Energy Systems, D. Mukherjee, S. Chakrabarti, New Age International.
4. Renewable Energy Power for a sustainable Future, Godfrey Boyle, Oxford University Press.
5. Renewable energy resources, Tiwari and Ghosal, Narosa publications.
6. Renewable Energy Technologies, Ramesh & Kumar, Narosa publications.
7. Non-Conventional Energy Systems, K Mittal, Wheeler publications.

Outcome:

After going through this course the student gets a thorough knowledge on, , various types of renewable energy sources i.e. solar, wind, bio-mass, geothermal, ocean , hybrid energy systems and principles of direct energy conversion, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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IV Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A80244) PRINCIPLES OF RELIABILITY ENGINEERING
(Elective-III)

Objective:

This subject introduces the concept of probability, reliability, distribution functions, and various methods and techniques to calculate and estimate the reliability of different engineering problems and models.

UNIT – I:

Basics of Probability Theory & Distribution: Basic probability theory – rules for combining probabilities of events – Bernoulli's trials – probabilities density and distribution functions – binomial distribution – expected value and standard deviation of binomial distribution.

UNIT – II:

Network Modeling & Reliability Analysis: Analysis of Series, Parallel, Series-Parallel networks – complex networks – decomposition method.

UNIT-III:

Reliability Functions: f(t), F(t), R(t), h(t) and their relationships – exponential distribution – Expected value and standard deviation of exponential distribution – Bath tub curve – reliability analysis of series parallel networks using exponential distribution – reliability measures MTTF, MTTR, MTBF.

UNIT – IV:

Markov Modeling: Markov chains – concept of stochastic transitional probability Matrix, Evaluation of limiting state Probabilities. – Markov processes one component repairable system – time dependent probability evaluation using Laplace transform approach – evaluation of limiting state probabilities using STPM – two component repairable models.

UNIT – V:

Frequency & Duration Techniques: Frequency and duration concept – Evaluation of frequency of encountering state, mean cycle time, for one , two component repairable models – evaluation of cumulative probability and cumulative frequency of encountering of merged states.

TEXT BOOK:

1. Reliability Evaluation of Power systems – R. Billinton, R.N.Allan, Pitman Advance Publishing Program, New York, reprinted in India by B.S.Publications, 2007.

Outcome:

After going through this course the student gets a thorough knowledge on, basic probability theory, distribution functions , reliability analysis of various models through different methods, reliability functions, repairable irreparable systems reliability through markov modeling frequency and duration techniques, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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IV Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A80234) ADVANCED CONTROL SYSTEMS

(**Elective – IV**)

Objective:

This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

UNIT – I:

Stability Analysis-I: Frequency Domain: Polar Plots-Nyquist Plots-Stability Analysis. Lag, Lead, Lead-Lag Controllers design in frequency Domain.

UNIT –II: S

Stability Analysis-II: Stability in the sense of Lyapunov. Lyapunov's stability and Lypanov's instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

UNIT –III:

Phase-Plane Analysis: Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

UNIT – IV:

Describing Function Analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

UNIT – V:

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS:

1. Advanced Control Systems, B. N. Sarkar, PHI Learning Private Limited.
2. Advanced Control Theory, Somanath Majhi, Cengage Learning.

REFERENCE BOOKS:

1. Control Systems theory and applications, S.K Bhattacharya, Pearson.
2. Control Systems, N.C.Jagan, BS Publications.
3. Control systems, A.Ananad Kumar, PHI.

4. Control Systems Engineering, S.Palani, Tata-McGraw-Hill.
5. Control systems, Dhanesh N.Manik, Cengage Learning.
6. Control Systems Engineering, I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
7. Control Systems, N.K.Sinha, New Age International (P) Limited Publishers.
8. Modern Control Engineering, Yaduvir Singh, S. Janardhanan, Cengage Learning.
9. Modern Control Engineering, K. Ogata, Prentice Hall of India, 3rd edition, 1998.
10. Modern Control System Theory, M. Gopal, New Age International Publishers.
11. Modern Control Engineering, D. Roy Choudhury, PHI Learning.
12. Digital Control and State Variable Methods, M. Gopal, Tata Mc Graw-Hill Companies.

Outcome:

After going through this course the student gets a thorough knowledge on, , basics of advanced control systems, stability analysis of control systems in frequency domain through polar & nyquist plots , design of lag, lead, lag-lead compensators in frequency domain, stability analysis through lypanov stability , phase-plane analysis, non-linear systems , describing functions ,state space analysis of continuous systems and concept of controllability and observabilty, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
IV Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A80235) EHV AC TRANSMISSION
(Elective-IV)

Objective:

This course introduces the concepts of extra high voltage AC transmission. It also emphasis on the behavior of the line parameters for extra high voltages, voltage gradients of the transmission line conductors gradients, the effect of corona, electrostatic filed calculations, travelling wave theory concept, voltage control when the line carries extra high voltages.

UNIT – I:

Introduction : Necessity of EHV AC transmission – advantages and problems–power handling capacity and line losses- mechanical considerations – resistance of conductors – properties of bundled conductors – bundle spacing and bundle radius- Examples.

Line and ground reactive parameters: Line inductance and capacitances – sequence inductances and capacitances – modes of propagation – ground return - Examples

UNIT – II:

Voltage Gradients of Conductors: Electrostatics – field of sphere gap – field of line changes and properties – charge – potential relations for multi-conductors – surface voltage gradient on conductors – distribution of voltage gradient on sub-conductors of bundle – Examples.

UNIT – III:

Corona Effects: Power loss and audible noise (AN) – corona loss formulae – charge voltage diagram – generation, characteristics - limits and measurements of AN – relation between 1-phase and 3-phase AN levels – Examples. Radio interference (RI) - corona pulses generation, properties, limits – frequency spectrum – modes of propagation – excitation function – measurement of RI, RIV and excitation functions – Examples.

UNIT – IV:

Electro Static Field: Electrostatic field: calculation of electrostatic field of EHV/AC lines – effect on humans, animals and plants – electrostatic induction in unenergized circuit of double-circuit line – electromagnetic interference-Examples.

Traveling wave theory: Traveling wave expression and solution- source of excitation- terminal conditions- open circuited and short-circuited end-reflection and refraction coefficients-Lumped parameters of distributed lines-generalized constants-No load voltage conditions and charging current.

UNIT –V:

Voltage Control: Power circle diagram and its use – voltage control using synchronous condensers – cascade connection of shunt and series compensation – sub synchronous resonance in series capacitor – compensated lines – static VAR compensating system.

TEXT BOOKS:

1. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (p) Ltd.
2. HVAC and DC Transmission by S. Rao.

REFERENCE BOOKS:

1. Rokosh Das Begamudre,"Extra High Voltage AC Transmission Engineering"– Wiley Eastern LTD.
2. Edison,"EHV Transmission line"- Electric Institution.

Outcome:

After going through this course the student gets a thorough knowledge on, general aspects and necessity of extra high voltage (EHVAC) transmission, advantages and disadvantages of EHVAC, concepts of voltage gradient, effects of corona, electro static field calculations, theory of travelling waves and voltage control of EHVAC transmission, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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	L	T/P/D	C
IV Year B.Tech. EEE-II Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

(A82909) NANO TECHNOLOGY
(Elective-IV)

Objective:

Nano-Technology is one of the core subjects of multidisciplinary nature. This has extensive applications in the field of energy, electronics, Biomedical Engineering. Etc. Built to specifications by manufacturing matter on the atomic scale, the Nano products would exhibit an order of magnitude improvement in strength, toughness and efficiency. The objective here is imparting the basic knowledge in Nano Science and Technology.

UNIT-I:

Introduction: History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges and Future Prospects.

UNIT-II:

Unique Properties Of Nanomaterials: Microstructure and Defects in Nano-crystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple and disclinations, **Effect of Nano-dimensions on Materials Behavior:** Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, Enhanced solid solubility, **Magnetic Properties**: Soft magnetic nanocrystalline alloy, Permanent magnetic nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties and Mechanical Properties.

UNIT-III:

Synthesis Routes: Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Sol-gel method ,Self assembly, **Top down approaches:** Mechanical alloying, Nano-lithography, **Consolidation of Nanopowders**: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing Spark plasma sintering.

UNIT-IV:

Tools to Characterize Nanomaterials: X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation.

UNIT-V:

Applications of Nanomaterials: Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water- Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications, Concerns and challenges of Nanotechnology.

TEXT BOOKS:

1. Text Book of Nano Science and Nano Technology, B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM.
2. Introduction to Nanotechnology, Charles P. Poole, Jr., and Frank J. Owens, WIey India.

REFERENCES BOOKS:

1. Nano: The Essentials, T.Pradeep, Mc Graw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design, Michael F. Ashby, Paulo J. Ferreira and Daniel L.Schodek.
3. Transport in Nano structures, David Ferry, Cambridge University press.
4. Nanofabrication towards biomedical application: Techniques, tools, Application and impact, Ed. Challa S.S. R. Kumar, J. H. Carola.
5. Carbon Nanotubes: Properties and Applications, Michael J. O'Connell.
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Outcome:

The present syllabus of "Introduction to Nano Technology" will give insight into many aspects of Nanoscience, technology and their applications in the prospective of materials science.

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