

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

An Autonomous Institution

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



ACADEMIC REGULATIONS (R15)

for

B.Tech Four Year Degree Programme

(Applicable for the batches admitted from the Academic Year 2017-2018 onwards)

Definitions of Key Words:

Academic Year: An academic year is referred as the period consisting of two consecutive semesters with 16 weeks each of instructional period followed by both the semester exams.

Course: A plan of study of a particular subject leading to an examination. All the courses need not carry the same weight. A course may be designed to comprise of lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/ viva/ seminars/ assignments/ presentations etc. or a combination of some of these.

Choice Based Credit System (CBCS): Choice Based Credit System (CBCS) is the programme in which the students have a choice to choose from the prescribed courses and can learn at their own pace and the entire assessment is graded-based on a credit system.

Credit Point: It is the product of Grade Point and Number of Credits for a course.

Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/ field work per week.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student of all the semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to 2nd decimal place.

Grade Point: It is a numerical weight allotted to each letter Grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course.

Grades are denoted by letters O, A+, A, B+, B, C, P and F.

Programme: An Educational Programme leading to the award of a Degree.

Semester: Each semester will consist of 16-18 weeks of academic work equivalent to 90 actual teaching days.

Semester Grade Point Average (SGPA): It is a measure of performance of the work done by the student in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to 2nd decimal place.

Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

Types of Courses: The Courses in under B.Tech, program may be of three kind's viz., Core, Elective and Mandatory.

a) Core Course:-

There may be a Core Course in every semester, and are to be compulsorily studied by a student and is essential requirement for a given Programme.

b) Elective Course:-

Elective Course is a course which can be chosen by the students from a pool of subjects. In general, the elective course is,

- Supportive to the discipline of study
 - Providing an expanded scope of the course subjects
 - Nurturing student's proficiency/skill/Research.
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- In case an elective is "Discipline centric" and is offered by the student's department itself, the elective is called **Professional elective**.
 - On the other hand, if the elective is offered by the other departments or if the choice is given to the students to choose from other disciplines, the elective is called an "**Open Elective**."

c) Mandatory Courses (Non-Credit Courses)

AICTE considers that the Course work of certain subjects is essential and as such for the award of a B.Tech degree a pass in these subjects is made mandatory. Therefore, such types of courses are referred as **mandatory courses**. As the AICTE also feels that only a familiarity with the subject content of these courses is essential, only a pass in each of these courses is required. Therefore, these subjects are included in the curriculum as non-Credit courses.

ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2015-16 onwards.

1. Courses of Study:

The following Four year Bachelor of Technology (B.Tech.) Programmes under Choice Based Credit System (CBCS) are offered with effect from the Academic Year 2015-16 onwards:

S. No.	Branch	Branch Code
I	Civil Engineering	01
II	Electrical and Electronics Engineering	02
III	Mechanical Engineering	03
IV	Electronics and Communication Engineering	04
V	Computer Science and Engineering	05
VI	Information Technology	12

2. Admission Procedure

- 2.1. Admissions will be done as per the norms prescribed by the Government of Telangana State.
- 2.2. The Government orders with regard to the admissions in vogue shall prevail.
- 2.3. The candidate should have passed the prescribed qualifying examination on the date of Admission.

3. Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. Degree if he/she fulfills the following academic requirements:

- 3.1 The candidate shall register for 192 credits and secure all the 192 credits by securing a minimum CGPA of 5.0.
- 3.2 The external examination in all the subjects shall be conducted at the end of each semester for all the eight semesters.
- 3.3 Students joining the B.Tech. Programme shall have to complete the programme within 8 years from the year of joining. Similarly, the students joining the B.Tech. Programme in the third semester directly through Lateral Entry Scheme (LES) shall have to complete the programme within 6 years from the year of joining otherwise they shall forfeit they will not be permitted to pursue their studies nor will be allowed to write the exams.

4. Course Structure:

- 4.1 The course shall be of four Academic year's duration, each academic year having two semesters. Each semester shall have a minimum **16** weeks of instruction, with a minimum of **90** Instructional Days per Semester.

4.2 Credits:

Credits shall be assigned to each Subject/ Courses in an L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods: Credits) Structure, based on the following general pattern.

Type of course		Clock hour/week			
		L	T	P	C
Theory	1)	04	01	-	0
	2)	03	01	-	0
	3)	02	01	-	0
Practical		0	0	03	0
Drawing	1)	0	04	-	0
	2)	02	02	-	0
	3)	00	06	-	0
Mini project, Comprehensive Viva Voce Seminar, Major project		-	-	-	16

5. Attendance Requirements

- 5.1 A student is eligible to write the Semester End examinations only if he / she acquire a minimum of 75% of attendance in aggregate of all the subjects/Courses in that Semester.
- 5.2 Condonation for the shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds with a documentary evidence approved by the Academic Committee.
- 5.3 A stipulated fee shall be payable towards condonation of attendance shortage.
- 5.4 Students, whose shortage of attendance is not condoned, are not eligible to write semester end examinations of that semester. Such students are detained and their registration for the examination stands cancelled.
- 5.5 A student detained due to shortage of attendance in a semester may seek re-admission into that semester, as and when offered, within four weeks from the date of the commencement of class work with the academic regulations of the batch into which he/she gets admitted.
- 5.6 A student will be promoted to the next semester if he/she satisfies the attendance requirement of the present semester.
- 5.7 For all mandatory, non credit courses offered in a semester, a "Satisfactory Participation Certificate" shall be issued to the student, only after securing 75% attendance in such course. Letter Grade shall be allotted for these courses.

The courses offered in 8 semesters spread over 4 years have been classified into 8 categories under CBCS.

S. No.	Subject categories	No. of Credits
1	Humanities and Social Sciences (HS) Subjects, English, Management and the courses dealing with personality development	15
2	Basic Sciences (BS) Subjects including Mathematics, Physics and Chemistry	30
3	Engineering Sciences (ES), Engg. Workshop, Drawing, Fundamentals of computer Science and courses dealing with the basics of Electrical/ Electronics/ Mechanical engineering	30
4	Professional Core (PC) Subjects, Courses dealing with the concerned engineering branch	81
5	Professional Elective (PE) Subjects. The students opt electives offered by the department	12
6	Open Elective (OE) Subjects. Courses offered by the other branches representing technically important subjects from emerging areas.	9
7	Project Work, Seminar and/ or Internship in Industry or elsewhere along with mini project.	10+2+3 =15
8	Mandatory Courses (MC)	nil
Total Number of credits		192

B.Tech Year wise distribution of credits under CBCS

S.No.	Year	Semester	Credits	Total
1	1 st Year	I	25	48
		II	23	
2	2 nd Year	I	24	48
		II	24	
3	3 rd Year	I	24	48
		II	24	
4	4 th Year	I	24	48
		II	24	
Total No. of Credits				192

6. Promotion regulations

- 6.1 A student shall be promoted from B.Tech., I Year to II Year only if he/she fulfills the academic requirements of securing 50% of total credits (24 credits out of 48 credits, upto I year II Semester), from all the examinations, whether or not the candidate takes the examinations.
- 6.2 A student shall be promoted from B.Tech., II Year to III Year only if he/she fulfills the academic requirements of securing 50% of total credits (48 out of 96 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.
- 6.3 A student shall be promoted from B.Tech., III year to IV year only if he/she fulfills the academic requirements of securing 50% of total credits (72 out of 144 credits) up to III year II semester), from all the examinations, whether or not the candidate takes the examinations.

7. Minimum Academic Requirements

The following minimum academic requirements are to be satisfied in addition to the requirements mentioned in item no.5.

- 7.1 A student shall be deemed to have satisfied the minimum academic requirements and has earned the credits allotted to each theory/practical/design/drawing subject/project and secured not less than 35% marks in Semester End Examination (SEE), and minimum 40% of marks in the sum total of the internal evaluation and end examination taken together.
- 7.2 The student has to pass the failed course by appearing the supplementary examination as per the requirement for the award of degree.
- 7.3 Students, who fail to earn 192 credits as indicated in the course structure within eight academic years from the year of their admission, shall forfeit their seat in B. Tech. course and their admission stands cancelled.
- 7.4 A student shall register and put up minimum Attendance and earn all 192 Credits for the award of degree.
- 7.5 When a student is detained due to shortage of attendance in any semester, no Grade allotments or SGPA/CGPA calculations will be done for that entire Semester in which a student got detained.
- 7.6 When a Student is detained due to lack of Credits in any year, he may be readmitted after fulfillment of the Academic Requirements, with the Academic Regulations of the Batch into which he gets readmitted for readmitted candidates. If there are any Professional Electives / Open Electives, the same may also be re-registered if offered. However, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the SAME set of Elective Subjects offered under that category.

7.7 After securing 192 Credits as specified for the successful completion of the entire UGP, an exemption of 6 Credits (two subjects with 3 credits each) may be permitted to drop resulting in 186 Credits for UGP performance evaluation. Accordingly, the performance of student in 186 Credits shall be taken into account for the calculation of 'the final CGPA and shall be indicated in the Grade Card. However, the student's performances in the earlier individual Semesters, with the corresponding SGPA for which already Grade Cards are given, will not be altered. Further, the optional drop out for such 6 Credits shall not be allowed for i) Laboratory courses, ii) Industrial Training/ Mini-Project, iii) Seminar, iv) Major Project v) Open electives.

7.8 A student is eligible to appear in the End Semester Examination in any Subject / Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that subject /Course at the supplementary exam as and when the examinations are conducted. In such cases, his Continuous Internal Evaluation(CIE) assessed earlier for that subject/Course will be carried over, and added to the marks to be obtained in the supplementary examinations, for evaluating the performance in that subject.

7.9 A student with a final CGPA (at the end of the UGP) < 5.00 will not be eligible for the Award of the Degree.

8 Evaluation - Distribution and weightage of Marks

8.1 The performance of a student in each semester shall be evaluated Subject-wise (irrespective of Credits assigned) for a maximum of 100 marks for Theory or Seminar or Drawing/Design or Industry Oriented Mini-Project or Minor Course, etc. For Practical's a maximum of 75 Marks shall be evaluated. However the B. Tech. Project work (Major Project) will be evaluated for 200 Marks. These evaluations shall be based on 25% CIE (Continuous Internal Evaluation) and 75% SEE (Semester End Examinations) and a Letter Grade corresponding to the % marks obtained shall be given.

8.2 For theory subjects the distribution shall be 25 marks for Continuous Internal Evaluation (CIE) and 75 marks for the Semester End- Examination (SEE).

8.3 For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination will be conducted for 20 marks and consists of Part-A (Short Answer Questions) for 6 marks and Part-B (Long Answer Questions) for 14 marks with duration of 90 Minutes. First midterm examination shall be conducted for 2.5 units of syllabus and second midterm Examination shall be conducted for remaining 2.5 units. The Average marks secured by a student in I and II Midterm examination are considered and shall be taken as the final marks secured by the student towards Continuous Internal Evaluation in the theory subject.

8.4 In case a few students are absent due to health reasons or any other unavoidable circumstances, or if the performance of some of the students is very poor, all such cases will be referred to a standing committee consisting of the Controller of examinations (Chairman), HoD of the concerned dept. and the Academic coordinator. On the recommendation of the committee, a makeup test will be conducted on payment of fee fixed by the examination branch.

- 85 In order to improve the attendance and to encourage the students who are regular to the college, 5 marks in each subject will be given to the students as per the percentage of attendance shown in the table,

Table: - Marks for attendance

S.No	Percentage of attendance	Marks to be awarded
1.	Less than 75%	nil
2.	75% to 80%	3
3.	80% to 85%	4
4.	85% and above	5

- 86 The Semester End Examination will be conducted for 75 marks which consist of two parts viz. i). Part-A for 25 marks, ii). Part –B for 50 marks. Part-A is compulsory, which consists of ten questions (numbered from 1 to 10) two from each unit carrying 2/3 marks each. Part-B consists of five questions (numbered from 11 to 15) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice (i.e., there will be two questions from each unit and the student should answer any one question).
- 87 For practical subjects there shall be a continuous evaluation during the Semester for 25 marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the concerned laboratory teacher.
- 88 The Practical End Semester Examination shall be conducted with an external examiner and the laboratory teacher for 50 marks. The external examiner shall be appointed by the Principal from the panel of examiners recommended by Chairman, Board of Studies in respective Branches.
- 89 For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, and Machine Drawing), the distribution shall be 25 marks for Internal Evaluation (5 marks for day-to-day work and 20 marks for internal tests) and 50 marks for Semester End Examination. There shall be one internal test in a semester and shall be considered for the award of marks for internal test.
- 8.10. There shall be an industry-oriented mini-Project, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated in IV year I Semester at the time of practical exams. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, Head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

8.11. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, Seminar Supervisor and a Senior Faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for the seminar.

8.12 . There shall be a Comprehensive Viva-Voce in IV year II semester. The 'Comprehensive Viva-Voce will be conducted by a committee consisting of Head of the Department and two Senior Faculty members of the department and is evaluated for 100 marks. The Comprehensive Viva-Voce is intended to assess the students understanding of the subjects he studied during the B. Tech. course. There will be no External Examiner for the Comprehensive Viva-Voce.

8.13 . Out of a total of 200 marks for the major project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester evaluation. The End Semester evaluation (viva-voce) shall be conducted by committee. The committee consists of an external examiner, Head of the Department, the supervisor of project and a senior faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year II Semester. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.

8.14 . The Laboratory marks and the sessional marks awarded by the faculty are subject to scrutiny by the Institution whenever/wherever necessary. In such cases, the sessional and laboratory marks awarded by the teacher will be referred to a College Academic Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved as per the University rules and produced before the Committees of the University as and when asked for.

8.15 Candidates shall be permitted to apply for recounting/revaluation of SEE scripts within the stipulated period with payment of prescribed fee.

9.0. Malpractice Rules

S.No.	Nature of Malpractices / Improper conduct during examinations	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The hall ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Chief Superintendent/ Assistant Superintendent/ any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer – in charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work & shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all Semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If a student of the college, who is not a candidate for the particular examination or any person not connected with the examination or college indulges in any type of malpractice or improper conduct mentioned in clauses 6 to 8.	Student of the college will be expelled from the examination hall and cancellation of the performance in that subject and all other subjects. If the candidate has already appeared including practical examinations and project work shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and a police
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during Special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the head of Institute for further action for a suitable punishment.	

All the cases pertaining to malpractices in examinations will be referred to a committee constituted by the Chief Controller of Examination and the committee will suggest action as per the guidelines mentioned above.

10. Grading Procedure:

10.1. Marks will be awarded to indicate the performance of each student in each theory subject, or Lab/Practical, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % marks obtained in CIE+SEE(Continuous Internal Evaluation + Semester End Examination, both taken together) as specified, and a corresponding Letter Grade shall be given.

10.2. As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed.

Letter Grade	Performance	Grade Points	% of marks Secured (Class Intervals)
O	Outstanding	10	Greater than or equal to 90%
A+	Excellent	9	80% and less than 90%
A	Very Good	8	70% and less than 80%
B+	Good	7	60% and less than 70%
B	Average	6	50% and less than 60%
C	Pass	5	40% and less than 50%
F	Fail	0	Below 40%
Ab	Absent	0	Absent

10.3. A student obtaining F Grade in any subject shall be considered 'Failed' and will be required to reappear as 'Supplementary Candidate' in the end Semester Examination (SEE), as and when offered. In such cases; his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

10.4. A Letter Grade does not imply any specific % of Marks.

10.5. In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.

10.6. A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ course. Credit Points (CP) = Grade Point (GP) x Credits for a Course.

10.7. The Student passes the Subject/ Course only when he gets $GP \geq 4$ (P Grade or above).

11. Registration/Dropping

11.1. Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the academic calendar. It is absolutely necessary for the student to register for courses in time.

11.2. The student has to register for a minimum of 20 credits and may register up to a maximum of 28 credits based on the advice of the Faculty Advisor. On an average, a student is expected to register for 24 credits.

11.3. A student at the end of II year II semester either having CGPA of ≥ 7.0 or having passed all previous courses in the first attempt with a minimum SGPA ≥ 5.0 is allowed to register for an additional course/ credits from the offered open electives.

- 11.4. A series of open Electives will be offered to the students of III year I & II sems. and IV year I sem., which can be registered by the students as and when the notifications are issued at the end of II year II sem. and III year II sem. Prior permission for registration of open Electives as an additional course is compulsory.
- 11.5. A student would be allowed to register for an additional course only if he/she satisfies the prerequisites.
- 11.6. Departments will notify at the time of registration about the minimum number of students to be enrolled for a particular open elective to be offered.
- 11.7. Any student may be barred from registering for any course for specific reasons like disciplinary reasons or any other activities carried out by a student, which detrimental to the discipline of the college.
- 11.8. Dropping of Courses: Within four weeks after the commencement of the semester, the student may, in consultation with his / her faculty advisor, drop one or more courses without prejudice to the minimum number of credits. The dropped courses are not recorded in the Grade Card.
- 11.9. After Dropping, minimum credits registered shall be 20.

12. Earning of Credits

A student shall be considered to have completed a Course successfully and earned the credits if he/she secures an acceptable letter grade in the range 'O' to 'P'. Letter grade 'F' in any Course implies failure of the student in that Course and no credits earned.

13. Passing Standards:

- 13.1. A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA ≥ 5.00 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UGP, only when he/she gets a CGPA ≥ 5.00 ; subject to the condition that he secures a GP ≥ 4 (P Grade or above) in every registered Subject/ Course in each Semester (during the entire UGP) for the Degree Award, as required.
- 13.2. (i) In spite of securing P Grade or above in some (or all) Subjects/ Courses in any Semester, if a Student receives a SGPA < 5.00 and/ or CGPA < 5.00 at the end of such a Semester, then he 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) to be promoted to the next year in the course.
- (ii) If a student gets P grade or an SGPA is less than 5, is eligible to re appear for one or more of the same Subject(s)/ course(s) in which he has secured P Grade(s) in that Semester, at the Supplementary Examinations to be held in the next subsequent Semester(s). In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

13.3. A Student shall be declared successful or 'passed' in any Non-Credit Subject/ Course, if he secures a 40% marks or **P** grade in the end sem exam conducted by the college along with the other examinations.

13.4. After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the registered students of that semester, indicating the Letter Grades and Credits earned. It will show the details of the courses registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA, and CGPA.

14. Eligibility for the award of B.Tech. Degree

A student shall be eligible for award of the B.Tech degree if he/she fulfils all the following Conditions:

14.1. The students should successfully complete all the components prescribed in the Programme of study to which he/ she is admitted.

14.2. The student should also obtain CGPA greater than or equal to 5.0.

14.3. Not having any pending disciplinary action.

15. Evaluating of Grade Point Averages:

15.1. SGPA and CGPA the *credit index* can be used further for calculating the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA), both of which being important performance indices of the student. While SGPA is equal to the *credit index* for a semester divided by the total number of *credits* registered by the student in that semester, CGPA gives the sum total of *credit indices* of all the previous semesters divided by the total number of *credits* registered in all these semesters. Thus, The Grade Point Average (GPA) will be calculated according to the formula:

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

where C_i = number of credits for the course i ,

G_i = grade points obtained by the student in the course.

15.2. Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation. SGPA is rounded off to TWO Decimal Places.

SGPA will be computed as follows;

$\sum [(Course\ credits) \times (Grade\ points)]$ (for all Courses passed in that semester)

 $\sum [(Course\ credits)]$ (for all courses registered in that semester)

15.3. To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time. CGPA is rounded off to TWO Decimal Places.

CGPA will be computed as follows:

$$\sum [(Course\ credits) \times (Grade\ points)] \text{ (for all Courses passed up to that semester)}$$

$$\sum [(Course\ credits)] \text{ (for all Courses registered until that semester)}$$

CGPA is thus computed from the I Year First Semester onwards, at the end of each Semester, as per the above formula. However, the SGPA of I year I Semester itself may be taken as the CGPA, as there are no cumulative effects.

15.4. Illustrative Example:

An illustrative example given in below Table below indicates the use of the above two equations in calculating SGPA and CGPA, both of which facilitate the declaration of academic performance of a student, at the end of a semester and at the end of successive semesters respectively. Both of them shall be normally calculated up to the second decimal position, so that the CGPA, in particular, can be made use of in rank ordering the student's performance in a class. If two students get the same CGPA, the tie should be resolved by considering the number of times a student has obtained higher SGPA; But, if it is not resolved even at this stage, the number of times a student has obtained higher grades like O, A, B etc shall be taken into account in rank ordering of the students in a class.

Year and Semester	Course No.	Credits	Grade	Grade Points	Credit Points
I Year I sem	XX101	5	A	8	40
I Year I sem	XX102	4	F	0	00
I Year I sem	XX103	3	A+	9	27
I Year I sem	XX104	4	F	0	00
I Year I sem	XX105	5	C	5	25
I Year I sem	XX106	5	P	4	20
Total		26(18*)			112
SGPA = 112/26 = 4.31			CGPA = 4.31		
I Year II Sem	XX107	5	B+	7	35
I Year II Sem	XX108	4	A	8	32
I Year II Sem	XX109	3	C	5	15
I Year II Sem	XX110	5	P	4	20
I Year II Sem	XX111	4	A+	9	36
I Year II Sem	XX112	2	F	0	00
I Year II Sem	Xx113	2	A	8	16
Total		25(23*)			154
SGPA = 154/25 = 6.16			CGPA = 266/51 = 5.22		

*Total No. of credits excluding those with 'F'; this is particularly important to keep track of the number of credits earned by a student up to any semester.

16. Award of Class

16.1. After a student has satisfied the requirements prescribed for the completion of the program and is Eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

CGPA	Class Awarded	From the CGPA secured from 192 credits
≥ 8.00	First Class with Distinction	
$\geq 6.50 - < 8.00$	First Class	
$\geq 5.50 - < 6.50$	Second Class	
$> 5.00 - < 5.50$	Pass Class	

16.2. The marks obtained in Internal Evaluation (IE) and Semester End Examination (SEE) will be shown in the memorandum of marks.

16.3. For the purpose of awarding first Class with Distinction (CGPA ≥ 8.0), the student must obtain the minimum required CGPA within 4 academic years or within 3 academic years in case of Lateral Entry candidates by clearing all the courses.

16.4. Candidates detained/ prevented from writing the semester end examinations due to any reason in any semester are not eligible for the award of First Class with Distinction. Such candidate's even if the CGPA ≥ 8.0 shall be placed in first class.

16.5. For the purpose of awarding First, Second and Pass Class, CGPA obtained in the examinations appeared within the maximum period allowed for the completion of course shall be considered as per the regulations.

16.6. A student with final CGPA (at the end of the UGP) < 5.00 will not be eligible for the award of the Degree.

16.7. The CGPA can be converted to equivalent percentage of marks by using the equation,
 $\% \text{ of Marks} = (\text{CGPA} - 0.5) \times 10$

17. Consolidated Grade Card

A consolidated grade card containing credits & grades obtained by the candidates will be issued after completion of the four years B. Tech Programme.

18. Withholding of Results

If a student is having any indiscipline related issues pending, the result of the student will be withheld and will not be allowed to move into the next semester. His/ her degree will be withheld in such cases and the matter will be referred to the academic council for final decision.

19. Transitory Regulations

19.1. Discontinued, detained for attendance, detained for want of credits, or failed students are eligible for readmission as and when the course is offered during the subsequent academic year as per the college admission procedures.

19.2. Students on transfer from a non- autonomous or from an autonomous college shall complete all the courses of the concerned programme not covered in the earlier organization. However, he/she should take the remaining courses in the programme along with the other students.

19.3. There shall be no branch transfers after the cutoff date of admissions made in the B.Tech. I year.

20. Transcripts

After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee.

21. Supplementary Examinations

In addition to the Regular end semester examinations, Supplementary Examinations for the previous semesters will be conducted along with end sem. Examinations. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstances.

22. Graduation Ceremony

23.2. The College shall have its own annual Graduation Ceremony for the award of degree to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

23.3. The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Ceremony.

24. Termination from the Program

The admission of a student to the program may be terminated and the student may be asked to leave the Institute in the following circumstances:

24.2. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

24.3. The student fails to satisfy the norms of discipline specified by the institute from time to time.

25. Non-Credit Courses (Mandatory Courses)

25.2. Requirement of 75% attendance as per the college regulations is compulsory for completing the mandatory courses.

25.3. Specified number of Mandatory Courses among the designated ones is compulsory requirement for all the students for the award of B.Tech. Degree.

25.4. Although these courses do not carry any credits, performance in these subjects is evaluated following the procedure adopted for other subjects with the same marks. However, their performance will be indicated in the student's memo of marks as Satisfactory/ Unsatisfactory.

25.5. Although mandatory courses are Non-Credit Course, all the students should secure a minimum of 40% marks in the end sem. exam conducted by the college along with the other examinations for the award of B.Tech., degree.

26. Amendments

The Academic regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

27. General

27.2. Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

27.3. The academic regulation should be read as a whole for the purpose of an interpretation.

27.4. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

27.5. The college may change the academic regulations, course structure & syllabi at any time.

ACADEMIC REGULATIONS FOR B. TECH. (LATERAL ENTRY STUDENTS)

Applicable for the students admitted into II year B. Tech. (Lateral Entry Scheme) from the Academic Year 2016-17 and onwards.

1. Eligibility for award of B. Tech. Degree (LES)

- 1.1 The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.
- 1.2 The candidate shall register for 144 credits and secure 144 credits by securing a minimum CGPA of 5.0 from the exams. of B.Tech. II to IV year for the award of B.Tech. Degree.
- 1.3 The students, who fail to fulfill the requirement for the award of the degree in six Academic years from the year of admission, shall forfeit their seats. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech.(LES).

2. Promotion Rule

- 2.1. A student shall be promoted from B.Tech., II Year to III Year if he/she gets at least a minimum of 24 out of 48 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.
- 2.2. A student shall be promoted from III year to IV year if he/she gets a minimum of 48 out of 96 credits, up to III year II semester, from all the examinations, whether or not the candidate takes the examinations.
- 2.3. A student shall register and put up minimum attendance in all 144 credits and earn all 144 credits to be eligible for the award of B.Tech degree.
- 2.4. A student, who fails to earn 144 credits as indicated in the course structure within six academic years, shall forfeit his/her admission in B.Tech. Course.

3. Award of Class

A student, who satisfies all the requirements prescribed for the completion of the B.Tech. program, is eligible for the award of the said degree, in any one of the following four classes:

CGPA	Class Awarded	From the CGPA secured from 144 credits
≥8.00	First Class with Distinction	
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

4. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme).

5. The malpractice rules and procedures for evaluating the SGPA and CGPA mentioned under points 9 - 27, are also applicable to the later entry students.

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Part – B

Course Structure & Syllabi of

B.Tech., II Year I Semester

Academic Calendar of II/III B.Tech (I & II Sem.) for the Academic Year, 2017-18

II/III YEAR I SEMESTER		Commencement of Class Work 12-06-2017	
	From	To	Duration
Registrations	12.06.2017	17.06.2017	1 Week
I Spell of Instruction	19.06.2017	14.08.2017	8 Weeks
I Mid Examinations	16.08.2017	19.08.2017	4 Days
II Spell of Instruction	21.08.2017	23.09.2017	5 Weeks
Dussehra Holidays	24.09.2017	02.10.2017	10 Days
II Spell of Instruction Continuation	03.10.2017	21.10.2017	3 Weeks
II Mid Examinations	23.10.2017	26.10.2017	4 Days
Preparation & Practical Examinations	27.10.2017	04.11.2017	10 Days
III Mid Examinations (Lateral Entry/ Re-Admitted/Betterment)	06.11.2017	09.11.2017	4 Days
End Semester Examinations	13.11.2017	25.11.2017	2 Weeks
Supply Exams	27.11.2017	09.12.2017	2 Weeks
II YEAR II SEMESTER		Commencement of Class Work 11-12-2017	
I Spell of Instruction	11.12.2017	06.02.2018	8 Weeks 3 Days
I Mid Examinations	07.02.2018	10.02.2018	4 Days
II Spell of Instruction	12.02.2018	09.04.2018	8 Weeks
II Mid Examinations	10.04.2018	13.04.2018	4 Days
Preparation and Practical Examinations	16.04.2018	21.04.2018	1 Week
End Semester Examinations	23.04.2018	05.05.2018	2 Weeks
Supplementary Examinations	07.05.2018	19.05.2018	2 Weeks
Summer Vacation	14.05.2018	09.6.2018	3 Weeks

MECHANICAL ENGINEERING

II YEAR I SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A13013	Numerical Methods	3	1	0	3	4	100
A13207	Electrical and Electronics Engineering	3	1	0	3	4	100
A13308	Mechanics of Solids	4	1	0	4	5	100
A13309	Thermodynamics	4	1	0	4	5	100
A13310	Metallurgy and Material science	4	1	0	4	5	100
A13011	Environmental science	3	1	0	2	4	100
A13282	Electrical and Electronics Engineering Lab	0	0	3	2	3	75
A13383	Metallurgy and Mechanics of solids Lab	0	0	3	2	3	75
MC-I	Mandatory Course –I	2	0	0	0	2	75
	Total	23	6	6	24	35	825

II YEAR II SEMESTER

COURSE STRUCTURE

Subject Code	Subject Name	L	T	P/D	Total Credits	Total Hours	Total Marks
A14312	Production Technology	3	1	0	3	4	100
A14313	Kinematics of Machinery	4	1	0	4	5	100
A14314	Thermal Engineering-I	3	1	0	3	4	100
A14315	Mechanics of Fluids and Hydraulic Machines	4	1	0	4	5	100
A14316	Machine Drawing	0	6	0	3	6	100
A14015	Probability and Statistics	3	0	0	3	3	100
A14384	Production Technology Lab	0	0	3	2	3	75
A14385	Mechanics of Fluids and Hydraulic Machines Lab	0	0	3	2	3	75
MC-II	Mandatory Course –II	2	0	0	0	2	75
	Total	19	10	6	24	35	825

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

L – Lecture

T – Tutorial

P – Practical

D – Drawing

II Year B.Tech Mech - I Sem.
NUMERICAL METHODS
(COMMON TO ME& CE)

L T P C
3 1 0 3

Course 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.

Course 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 System of Linear 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

Curve Fitting & Numerical Integration

Curve Fitting: Fitting a straight line – Second degree curve – exponential curve-power curve by method of least squares.

Numerical Integration: Generalized Quadrature (Newton's Cote's formula), Trapezoidal, Simson's and Weddle's rules and problems.

UNIT – IV

Numerical Solution of Initial Value Problems in Ordinary Differential Equations

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

Boundary Value and Eigen Value Problems

Shooting method, Finite difference method and solving Eigen Value problems-Power method.

TEXT BOOKS

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Numerical Methods for Scientific & Engineering computation M.K.Jain, R.K.Iyengar, R.K.Jain, New Age Intenational Pvt.Ltd.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley Publications.
5. Introductory Methods of Numerical Analysis. S.S. Sastry, Prentice Hall.

REFERENCE BOOKS

1. Srimanta Pal, Subodh C. Bhunia, (2015), Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press.
2. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

ELECTRICAL AND ELECTRONICS ENGINEERING

L T P/D C
3 1 0 3

Course Objectives:

This course introduces the fundamental concepts of DC and AC circuits, basic law's of electricity, instruments to measure the electrical quantities, different methods to solve the electrical networks, construction and operational features of energy conversion devices i.e. DC and AC machines, transformers. It also emphasizes on basics of electronics, semiconductor devices and their characteristics and operational features.

Course Outcomes:

After going through this course the student gets a thorough knowledge on basics of electrical and electronics devices, circuits, machines and their measuring instruments with which he/she can able to apply the above conceptual things to real-world electrical and electronic problems and applications.

UNIT-I:

Electrical Circuits: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

Instruments: Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments

UNIT-II:

DC Machines: Principle of operation of DC Generator – EMF equation - DC motor types torque equation – applications – three point starter.

UNIT-III:

Transformers: Principle of operation of single phase transformers –EMF equation – losses – efficiency and regulation.

AC Machines: Principle of operation of alternators – regulation by synchronous impedance method –Principle of operation of induction motor – slip – torque characteristics – applications.

UNIT-IV:

Diodes: P-n junction diode, symbol, V-I Characteristics, Diode Applications, and Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems).

Transistors: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

UNIT-V:

Cathode Ray Oscillo Scope: Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

EEE: TEXT BOOKS:

1. Principles of Electrical Engineering, V.K Mehta, Rohit Mehta, S. Chand Publications
2. Basic Electrical Engineering, S.N. Singh, PHI.

EEE: REFERENCE BOOKS:

1. Basic Electrical Engineering, Abhijit Chakrabarthy, Sudipta nath, Chandrakumar Chanda, Tata-McGraw-Hill.
2. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press.
3. Fundamentals of Electrical Engineering, RajendraPrasad, PHI.
4. Basic Electrical Engineering by D.P.Kothari, I.J. Nagrath, McGraw-Hill.

ECE: TEXT BOOKS:

1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar, A.Vallavaraj,Tata McGraw-Hill Companies.
2. Electronic Devices and Circuits, K. Lal Kishore,BS Publications.

ECE: REFERENCE BOOKS:

1. Millman's Electronic Devices and Circuits,J. Millman, C.C.Halkias, and Satyabrata Jit, Tata McGraw-Hill companies.
2. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky,PEI/PHI.
3. Introduction to Electronic Devices and Circuits, Rober T. Paynter,PE.
4. Integrated Electronics, J. Millman and Christos C. Halkias, Tata McGraw-Hill companies.
5. Electronic Devices and Circuits, Anil K. Maini, Varsha Agarwal,Wiley India Pvt. Ltd.

II Year B.Tech Mech - I Sem.
MECHANICS OF SOLIDS

L T P/D C
4 1 0 4

Course Objectives:

The objective is to learn the fundamental concepts of stress, strain, and deformation of solids with applications to bars, beams, and columns. Detailed study of engineering properties of materials is also of interest. Fundamentals of applying equilibrium, compatibility, and force-deformation relationships to structural elements are emphasized. The students are introduced to advanced concepts of flexibility and stiffness method of structural analysis. The course builds on the fundamental concepts of engineering mechanics course.

This course will advance the students' development of the following broad capabilities:

- I. Students will be able to understand basic concepts of stress, strain and their relations based on linear elasticity. Material behaviors due to different types of loading will be discussed.
- II. Students will be able to understand and know how to calculate stresses and deformation of a bar due to an axial loading under uniform and non-uniform conditions.
- III. Students will understand how to develop shear-moment diagrams of a beam and find the maximum moment/shear and their locations.

Course Outcomes:

1. Analyze the behavior of the solid bodies subjected to various types of loading;
2. Apply knowledge of materials and structural elements to the analysis of simple structures;
3. Undertake problem identification, formulation and solution using a range of analytical Methods.
4. Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.
5. Expectation and capacity to undertake lifelong learning.

UNIT – I

Simple Stresses & Strains:

Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel –Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic module & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, Sudden & Impact and shock loadings.

UNIT – II

Shear Force and Bending Moment:

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F.,B.M and rate of loading at a section of a beam.

UNIT – III

Flexural Stresses:

Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis –Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

Shear Stresses:

Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV

Deflection of Beams:

Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT – V

Thin Cylinders:

Thin seamless cylindrical shells – Derivation of formula for, longitudinal and circumferential stresses –hoop, longitudinal and volumetric strains – changes in dia, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

Thick Cylinders:

Lame's equation – cylinders subjected to inside & outside pressures – compound cylinders.

TEXT BOOKS

1. Strength of materials – R.S Kurmi and Gupta.
2. Solid Mechanics, by Popov
3. Strength of materials – Ryder, G.H, Macmillan long man publications.
4. Strength of materials – W.A Nash , TMH

REFERENCES

1. Strength of materials by R.Subramanian/oxford.
2. Strength of materials – by Jindal, Umesh Publications.
3. Analysis of structures by Vazirani and Ratwani.
4. Mechanics of structures Vol-III, by S.B. Junnarkar.
5. Strength of materials by S. Timshenko

THERMODYNAMICS

L T P/D C
4 1 0 4

Course Objective:

To understand the treatment of classical Thermodynamics and to apply the First and Second laws of Thermodynamics to engineering applications

Course Outcomes:

At the end of the course, the student should be able to Understand and differentiate between different thermodynamic systems and processes. Understand and apply the laws of Thermodynamics to different types of systems undergoing various processes and to perform thermodynamic analysis. Understand and analyze the Thermodynamic cycles and evaluate performance parameters.

UNIT – I

Introduction : Basic concepts: System, Control volume, Surrounding boundaries, Universe, Types of systems, Macroscopic and Microscopic view points, Concept of Continuum, Thermodynamics Equilibrium, state, Property, Process, Cycle – Reversibility – Quasi – static Process irreversible process, Causes of irreversibility – Energy in state and Transition, Types , Work and heat, Point and path function. Zeroth Law of Thermodynamics – Concept of quality of temperature – Principles of Thermometry – Reference points – Const. Volume gas thermometer – Scales of temperature, Ideal gas scale.

UNIT – II

PMM I – Joule’s experiments – First law of thermodynamics – Corollaries – First law applied to a process – applied to a flow system – Steady flow energy equation. Limitations of the first law – Thermal Reservoir, Heat pump, Parameters of performance, Second law of thermodynamics, Kelvin planck and Clausius Statements and their Equivalence/ Corollaries, PMM of second kind, Carnot’s principle, Carnot cycle and its specialities, Thermodynamic scale of temperature, Clausius inequality, Entropy, Principle of Entropy increase – Energy equation, Availability and irreversibility – Thermodynamic Potentials, Gibbs and Helmholtz functions, Maxwell Relations – Elementary Treatment of the third law of thermodynamics.

UNIT – III

Pure Substances, P-V-T- surfaces, T-S and h-s diagrams, Mollier Charts Phase Transformations – Triple point at critical state properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation, Property tables, Mollier charts – Various thermodynamic processes and energy transfer – Steam calorimetry.

UNIT –IV

Perfect Gas Laws – Equation of State, specific and universal Gas constants – various Non-flow processes, properties, end states, Heat and work Transfer, changes in internal energy – Throttling and free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander walls Equation of State – Compressibility charts – variable specific Heats – Gas tables.

Mixtures of perfect Gases – Mole Fraction, Mass fraction Gravimetric and volumetric Analysis – Dalton’s Law of partial pressure, Avogadro’s Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. And Molecular internal Energy, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases.

UNIT – V

Power Cycles : Otto Diesel, Dual combustion cycles, Sterling Cycle, Atkinson Cycle, Ericsson Cycle, **Lenoir Cycle** – Description and representation on P-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – comparison of Cycles.

TEXT BOOKS

1. Engineering Thermodynamics / PK Nag/TMH, III Edition
2. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
3. Engineering thermodynamics –P.Chattopadhyay/Oxford University press

REFERENCES:

1. An introduction to Thermodynamics – YVS Rao / University press
2. Solution Manual to introduction to Thermodynamics, YVC Rao/ University press
3. Engineering Thermodynamics – Jones & Dugan
4. Thermodynamics – Robert Balmer /Jaico pub.
5. Thermodynamics – J.P Holman/ McGrawHill
6. Engineering Thermodynamics – K.Ramakrishna/Anuradha publishers.
7. Fundamentals of thermodynamics – Sonntag, Borgnakke and van wylene,/John wiley & sons (ASIA) Pte Ltd.

METALLURGY AND MATERIAL SCIENCE

L	T	P/D	C
3	1	0	3

Course Objectives:

1. To equip the students with basic knowledge of various types of materials that is formed from various elements in the Periodic Table of Elements.
2. To gain very clear knowledge of different phases in any material with the knowledge of equilibrium phase diagrams
3. To gain an ability to predict micro structural changes taking place in materials during heat treatment and resulting properties.
4. To prepare the students to the adventurous materials with reduced dimensions and expose them to nonmaterial's with remarkable properties.

Course Outcomes:

1. Students will be able to know types of metals and alloys and their various phases and microstructures and their influence on various properties.
2. Students will have gained knowledge of changing the properties of materials by various alloying methods and different heat treatment techniques.
3. Students will have various ways and means to reduce overall weight and size of the product / component of any device /equipment with the knowledge of nano materials.
4. With the knowledge of exotic materials with less dimensions, students will be able to design new devices, sensors, robots and other host of products which function with high accuracy and better efficiency than weighty and bulky equipments/devices that are presently used.
5. Students will have gained enough back ground ultimately to undertake innovative projects/works not only to improve performance of existing products but also develop new materials exhibiting exotic properties with the acquired knowledge of phase transformations and varying concentration, size and shape of various phases and heat treatment. This will directly contribute to the progress of the society and overcome the scarcity of metals in the earth's crust.

UNIT-I

Structure of Metals: Crystals and microstructures, Slip systems, Allotropy, Crystallization, Single and polycrystalline metals, Grains, Defects in metals and their influence on properties, Determination of grain size, Hall-Petch relation.

Alloys: Necessity of alloying, Solid solutions-types with examples, Hume-Ruthery rules, Formation of intermediate phases and electron compounds, Different methods of strengthening metals.

UNIT-II

Equilibrium Phase Diagrams : Reasons for studying diagrams, Heating and cooling curves, Construction of phase diagrams with one or more components, Phase rule, Isomorphous systems, Different types of liquid and solid phase transformations, Coring , Miscibility gaps, Congruent and incongruent melting, Spinoidal decomposition , Estimation of various phases by Lever rule. Detailed study of Iron-Carbon phase diagram and different phases with microstructures. Identification of zones of steel and cast iron in the diagram.

UNIT-III

Steels: Influence of alloying elements on stability of different phases and mechanical properties, Hot-shortness and cold-shortness –remedies , Classification of steels- Plain, low-alloy and high – alloy steels including stainless steels, Hadfield steel, tool-steels and die steels . High-entropy alloys, Applications.

Cast-Iron: Role of carbon and its equivalent on microstructure and properties of cast iron, Various types of cast irons-white, grey, malleable, ductile and spheroidal, Microstructures and

properties. Uses of cast iron.

Heat Treatment (HT) Of Steels & Other Metals &Alloys: Principles of HT and different methods- Normalizing, Annealing, Quenching, Hardening, Tempering, TTT and CCC-diagrams, Austempering, Martempering, Intercritical annealing, Quenching and partitioning, Cryogenic treatment and Age hardening and Hardening and Hardenability: Effect of alloying elements , Surface hardening methods – carburizing , nitriding, chromizing, siliconizing, boronizing .

UNIT-IV

Non-Ferrous Metals: Structure and properties of copper and its alloys-brass and bronzes and applications.

Light-Weight Metals: Aluminum, titanium, magnesium, beryllium and lithium and their alloys and applications in modern age.

Ceramic Materials: Crystalline and amorphous materials-ceramics, glass, cermets, abrasive.High entropy oxides

Plastics: Polymers and their properties, Production of plastic components

UNIT-V

Nanomaterials: Reasons for their extraordinary properties, Production and applications.

Composite Materials: Rule of mixing, salient features, Advantages and disadvantages, Classification: Metal matrix composites (MMC), Ceramic matrix composites (CMC) and Polymer matrix composites (PMC), Production of composite materials. Carbon-carbon composites Biomaterials.

TEXT BOOKS

1. V. Raghavan “Material Science and Engineering-A First Course”, 5th Edition, 2011. Prentice-Hall of India (P) Ltd, New Delhi.
2. H. Sidney H. Avener, “Introduction to Physical Metallurgy”, 2nd Edition 2007, Tata-McGraw hill Education (P) Ltd, , New Delhi.
3. V.D Kodgiri, “Material Science and Metallurgy for Engineers”, 1st Edition, 2006, Everest , Pune.
4. R. Askeland Donald, “Essentials of Material Science and Engineering”, 5th Edition, 2000, Congage, New Delhi

REFERENCE:

1. William D. Callister & D.G. Rethwisch, “Material science and Engineering an Introduction”, 8th Edition, John Wiley and Sons Inc

II Year B.Tech Mech-I Sem.
ENVIRONMENTAL SCIENCE
Common to All Branches

L T P/D C
3 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, Geo-Thermal, 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); Acid 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 (4th 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

ELECTRICAL AND ELECTRONICS ENGINEERING LAB

L	T	P	C
0	0	3	2

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of KCL and KVL.
2. Magnetization characteristics of D.C. Shunt generator.
3. Speed control of DC motor.
4. Swinburne's Test on DC shunt machine.
5. Brake test on DC shunt motor.
6. OC and SC tests on Single-phase transformer.
7. Brake test on 3-phase Induction motor.
8. Regulation by an alternator by synchronous impedance method.

SECTION B: ELECTRONICS ENGINEERING:

1. PN Junction Diode Characteristics (Forward bias, Reverse bias)
2. Transistor CE Characteristics (Input and Output)
3. Study of CRO.
4. Class a Power Amplifier
5. Zener Diode Characteristics
6. Transistor CE Characteristics
7. Rectifier without Filters (Full wave & half wave)
8. Rectifier with Filters (Full wave & half wave).

Note: Total 12 experiments are to be conducted.
(Six experiments from PART-A, Six experiments from PART-B)

II Year B.Tech Mech-I Sem.
METALLURGY AND MECHANICS OF SOLIDS LAB

L	T	P/D	C
0	0	3	2

(A) METALLURGY LAB:

1. Preparation and study of the Micro Structure of pure metals like iron, Cu and Al.
2. Preparation and study of the Micro Structure of Mild steel, low carbon steels, high Carbon steels.
3. Study of the Micro Structure of Cast irons.
4. Study of the Micro Structure of Non-Ferrous alloys.
5. Study of the Micro Structure of Heat treated steels.
6. Hardenability of steels by Jominy End Quench test.
7. To find out the hardness of various treated and untreated steels.

(B) MECHANICS OF SOLIDS LAB:

1. Direct tension test
2. Bending test on a) simple supported, b) cantilever beam
3. Torsion test
4. Hardness test a) Brinells hardness test, B) Rockwell hardness test.
5. Test on springs
6. Compression test on cube
7. Impact test
8. Punch shear test

NOTE: Any 10 experiments from the above are to be performed taking atleast 4 from each section.

Part – C

Syllabi of

B.Tech., II Year II Semester

II Year B.Tech. Mech-II Sem.
PRODUCTION TECHNOLOGY

L	T	P/D	C
3	1	-	3

Course Objectives:

Production technology is a subject composed of descriptive basic manufacturing process that can be helpful for a mechanical engineer .it comprises basics of casting welding and metal forming process. The product of industrial use assembled with many elemental components. These components can be manufactured by various production processes. The subject reveals the information about basic manufacturing processes.

Course Outcomes:

- An ability to contrast the different types of manufacturing process and apply the Technology Systems Model to manufacturing.
- Ability to identify, illustrates, solve, formulate, distinguish & compare different working process.
- An Ability to understand the design a system, component or process to meet desired needs within, realistic constraints such as manufacturability ,economic ,environmental, safety & sustainability etc.,
- An ability to apply knowledge of mathematics, science and engineering, to Identify, define, and clearly state a manufacturing design problem
- An ability to identify, formulates, analyzes and solves Engineering Problems in Optimum time.
- An ability to demonstrate ability to welding and conduct experiments, analyze and interpret data.
- An ability to use the techniques, skills and modern engineering tools necessary for engineering practice with the concept of virtual work.
- Recognition of the need for, and an ability to engage in self education and life-long learning.

UNIT-I

Casting: Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types, function and design, special casting processes
1) Centrifugal 2) Die, 3) Investment, Fettling of Castings

UNIT – II

Welding: Classification of welding process types of welds and welded joints and their characteristics, Types of Welding :ARC welding, Gas welding, Resistance welding, Solid state welding, Thermit welding Radiant Energy welding and Plasma (Air and water) welding.

Application Of Welding Processes: Inert Gas welding, TIG & MIG, welding, Friction welding, Induction welding, Explosive welding, Laser welding, Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies – Destructive & Nondestructive testing of welds

UNIT – III

Forging: Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts.

Forging Processes: Principles of forging, Tools and dies, Types Forging, Smith forging, Drop Forging, Roll forging, Rotary forging, forging defects.

UNIT – IV

Sheet Metal Operation: Stamping, Forming and other cold working processes: Blanking and piercing, simple die, compound die & progressive die-Bending and forming-Drawing and its types-wire drawing

Extrusion Of Metals: Basic extrusion process and its characteristics, Hot extrusion and cold extrusion, Forward extrusion and backward extrusion, Impact extrusion, Hydrostatic extrusion.

UNIT-V

Processing of Plastics: Types of Plastics, Properties, Applications and their Processing methods and Equipments (Blow and Injection moulding).

TEXT BOOKS:

1. Manufacturing Processes for Engineering Materials – Serope Kalpakjian and Steven R Schmid, Pearson Publication.
2. Manufacturing Technology – P.N Rao, TMH
3. Production Technology – Sarma P.C, S.Chand publication.

REFERENCES:

1. Production Technology / R.K Jain
2. Process and materials of manufacturing – Lindberg/PE
3. Principles of metal Castings – Roenthal.
4. Welding Process – Paramar
5. Production Engineering – Suresh Dalela & Ravi Shanker / Galgotia Publications Pvt. Ltd.
6. Manufacturing Engineering and Technology / Kalpakjin. S / Pearson Edu.

II Year B.Tech. Mech-II Sem.
KINEMATICS OF MACHINERY

L	T	P/D	C
4	1	0	4

Course Objectives:

The objective is to study the relative motion, velocity and accelerations of the various elements in a mechanism. In mechanical Engineering we come across number of mechanisms such as four bar/slider crank/double slider crank/straight line motion mechanism etc. Mechanism deals with only relative motions. Once we make a study considering for us also there it is called kinetics. The first course deals with mechanisms, their inversions straight line motion mechanisms steering mechanisms etc. Also study of cams/gears & gear trains & belts is also introduced.

Course Outcomes:

The main purpose is to give an idea about the relative motions obtained in all the above type of components used in mechanical Engineering

UNIT-I

Mechanisms: Elements or links – Classification – Rigid Link, Flexible and fluid link – Types of kinematics pairs – Types of constrained motion – kinetic chain. Mechanism - machine – Structure – inversions of mechanism – inversions of quadric cycle chain, single and double slider crank chains, Mechanical advantage – Grubler’s Criterion.

Straight-Line Motion Mechanism: Exact and approximate copied and generated types – Peaucellier- Hart – Scott Russel – Grasshopper – Watt – Tchebicheff’s and Robert Mechanism – Pantographs

UNIT-II

Kinematics: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration – Graphical method – Application of relative velocity method.

Plane Motion of Body: Instantaneous center of rotation – centrodes and axodes – Three centers in the theorem - Graphical determination of instantaneous center, determination of angular velocity of points and links by instantaneous center method.

Kliens construction – Coriolis acceleration – Determination of Coriolis component of acceleration.

UNIT-III

Steering Gears: Conditions for correct steering – Davis Steering gear, Ackermann’s Steering gear.

Hooke’s joint: Single and double Hooke’s joint – velocity ration – application – problems

UNIT-IV

CAMS: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above three cases.

Analysis of Motion of Followers: Tangent cam with Roller follower.

UNIT-V

Higher Pair: Friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion – velocity of sliding.

Gear Trains: Introduction – Types – Simple – Compound and reverted gear trains – Epicyclic gear train. Methods of finding train value or velocity ratio of Epicyclic gear trains. Selection of gear box – Differential gear for an automobile.

TEXT BOOKS:

1. Theory of Machines by Thomas Bevan, CBS
2. Theory of Machines – R.K Bansal
3. Theory of Machines R.S Khurmi & J.K Gupta
4. Theory of Machines and mechanisms 4th edition / Shigley / Oxford.

REFERENCES:

1. Theory of Machines – Rattan .S.S, TMH, 2009 Edition
2. Theory of Machines – PL. Ballaney / kharina publishers,
3. Theory of Machines Sadhu Singh Pearsons Edn
4. Mechanism and Machine Theory / JS Rao and RV Dukkipati / NewAge

II Year B.Tech Mech-II Sem.
THERMAL ENGINEERING – I

L	T	P/D	C
3	1	-	3

Pre-requisite: Thermodynamics

Course Objective:

To apply the laws of Thermodynamics to analyze air standard cycles and to understand and evaluate the perform analysis of the major components and systems of IC engines, refrigeration cycles and their applications.

Course Outcomes:

At the end of the course, the student should be able to evaluate the performance of IC engines and compressors under the given operating conditions. Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles. Understand the functionality of the major components of the IC Engines and effects of operating conditions on their performance

UNIT – I

ACTUAL CYCLES AND THEIR ANALYSIS

Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust blow down, Loss due to Gas exchange process, Volumetric Efficiency, Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of I.C. Engines.

UNIT – II

I. C. ENGINES

Classification, Working principles, Valve and Port Timing Diagrams, Air Standard, air-fuel and actual cycles, Engine systems; Fuel Systems, Simple Carburetor, Solex carburetor, Fuel Injection Systems; Ignition systems, Battery ignition, Magneto ignition, Modern ignition systems; Transistorized coil ignition (TCI) system, Capacitive Discharge Ignition (CDI) System, Cooling and Lubrication systems.

UNIT – III

COMBUSTION IN S. I. ENGINES

Homogeneous mixture, Heterogeneous mixture, Stages of combustion, Flame front propagation, Factors influencing the flame speed, Rate of pressure rise, Abnormal combustion, Phenomenon of Knock, Types of Combustion chambers, Fuel requirements and fuel rating

COMBUSTION IN C.I ENGINES

Combustion process, stages of combustion, Delay period and its importance, Factors affecting Delay period, Diesel Knock, Comparison of Knock in C.I and S.I engine, Combustion chambers in C.I. Engine, Fuel requirements and fuel rating

UNIT – IV

TESTING AND PERFORMANCE

Measurement and Testing; Friction power, Indicated power, Brake power, Fuel consumption, Air consumption, Emissions Performance parameters; Engine power, Engine efficiencies, Engine performance characteristics, Heat Balance

UNIT-V

AIR COMPRESSORS: Reciprocating Compressor: classifications, Principle of operation, Work required, Isothermal efficiency, Volumetric efficiency and effect of clearance, Multi stage compression with inter cooling, saving of work, Minimum work condition for stage compression.

Rotary air compressor: roots blower, vanes blower, centrifugal compressor, axial air compressor.

TEXT BOOKS:

1. I.C Engines – V. GANESAN, TMH
2. IC Engines – Ramalingam, Sciotech publishers
3. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES:

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of IC Engines – Pulkrabek / Pearson / PHI
3. Thermal Engineering / Rudramoorhty – TMH
4. Thermodynamics & Heat Engines / B.Yadav / Central Book Depot, Allahabad.
5. I.C Engines / Heywood / McGrawHill.
6. Thermal Engineering – R.S Khurmi & J.K Gupta – S.Chand
7. Thermal Engineering data book – B. Srinivasulu Reddy / JK international.

II Year B.Tech. Mech-II Sem.
MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

L	T	P/D	C
4	1	-	4

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, irrotational flows, one, two and three dimensional flows.

Fluid Dynamics: Surface and Body forces, Euler's and Bernoulli's equation derivation, Application of Bernoulli's 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, 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, 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 Hydraulic 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.

II Year B.Tech Mech-II Sem.
MACHINE DRAWING

L T P/D C
0 6 0 3

Machine drawing conventions: Need for drawing conventions – introduction to IS conventions

- a) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views, Parts not usually sectioned.
- c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- d) Title boxes, their size, location and details – common abbreviations & their liberal usage.
- e) Types of Drawings – working drawings for machine parts.

I. Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportion.

- a) Popular forms of screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
- b) Keys, cottered joints and knuckle joint.
- c) Rivetted joints for plates
- d) Shaft coupling, spigot and socket pipe joint.
- e) Journal, pivot and collar and foot step bearings.

II. Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

- a) Engine parts – stuffing boxes, cross heads, Eccentric, Petrol Engine connecting rod, piston assembly.
- b) Other machine parts – Screws jacks, Machine vices Plummer block tailstock.
- c) Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

1. Machine Drawing – Ajeet Singh, TMH Publications
2. Machine Drawing – K.L Narayana, P.Kannaiah & K.Venkata Reddy/ New Age/publishers.
3. Machine Drawing – N.D Bhatt.

REFERENCES:

1. Machine Drawing – P.S. Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing – Rajput

II Year B.Tech Mech-II Sem.
PROBABILITY AND STATISTICS
(COMMON TO CSE, IT, ME& CE)

L T /P/D C
3 0 0 3

Course Objectives:

- To revise elementary concepts and techniques of probability & statistics
- To extend and formalize knowledge of the theory of probability and random variables
- To introduce new techniques for carrying out probability calculations and identifying probability distributions
- To motivate the use of statistical inference in practical data analysis
- To study elementary concepts and techniques in statistical methodology
- To provide a introduction to subsequent statistics courses

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

- Demonstrate an understanding of the basic concepts of probability and random variables.
- construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance
- Understand the concept of the sampling distribution of a statistic, and in particular describe the behavior of the sample mean.
- compute probabilities based on practical situations using the binomial and normal distributions
- use the normal distribution to test statistical hypotheses and to compute confidence intervals
- Application of Regression Analysis to analyze a problem

UNIT – I

Random Variables: Random variables – Discrete and continuous- Expectation- Properties, Moment Generating Function and Fitting of Binomial, Poisson & Normal distributions

UNIT – II

Testing of Hypothesis I: Sampling Distribution-Definition of Sample, Population, and Types of Sampling. Estimation- Point estimation, Interval estimation, Testing of Hypothesis- Null hypothesis – Alternative hypothesis, Type I, & Type II errors – critical region confidence interval for mean, testing of hypothesis for single mean and difference between the means for large samples.

UNIT – III

Testing of Hypothesis II: Confidence interval for the proportions, Tests of hypothesis for the proportions- single and difference between the proportions for large samples.
Small Samples - t-distribution, F-Distribution, χ^2 distribution

UNIT –IV

Correlation and Regression: Coefficient of correlation – The Rank correlation, Regression Coefficients – Properties of regression coefficients, the two lines of regression, Multi Linear Regression.

UNIT –V

Quality Control: Control Charts-Control lines, determination of control limits, Types of Control Charts-Control Charts for variables (mean chart, Range chart)-charts for attributes (fraction defective, no. of defectives and defects for unit).

Time Series: Components of Time Series-Measurement of Trend.

TEXT BOOKS:

1. Probability & Statistics by Dr. T.K.V.Iyengar, Dr.B.Krishna Gandhi et.al S.Chand Publications.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.
3. Probability & Statistics for Engineers by Miller and John E Freund, Prentice Hall of India.
4. R.C.Gupta: Statistical Quality Control.
5. Fundamentals of Applied Statistics by S C Gupta ,Sultan Chand and Sons

REFERENCES:

1. Fundamentals of Mathematical Statistics by S.C. Gupta & V.K. Kapoor, S-Chand & Sons.
2. Srimanta Pal, Subodh C. Bhunia, (2015) ,Engineering Mathematics, 1st Edition, New Delhi, Oxford University Press
3. Probability, Statistics and Queueing Theory, 2nd Edition, Trivedi, John Wiley and sons.
4. Probability and Statistics by E.Rukmangadachari , Pearson Education; First edition (2012).
5. Probability and Statistics for Engineering and the Sciences, 8th Edition, Jay L Devore, Cengage Learning.
6. Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley.
7. Statistical Quality Control, M.Mahajan,Dhanpat Rai & Sons.

II Year B.Tech. Mech-II Sem.
PRODUCTION TECHNOLOGY LAB

L	T	P/D	C
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I. Metal Casting Lab:

1. Pattern Design and making – for one casting drawing.
2. Sand properties testing – Exercise for strengths and permeability – 1
3. Moulding Melting and Casting – 1 Exercise

II. Welding Lab:

1. ARC Welding Lap & Butt Joint – 2 Exercises
2. Spot Welding – 1 Exercises
3. Gas Welding – 1. Exercise
4. Soldering and Brazing – 2 Exercises

III. Mechanical Press Working:

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press: Deep drawing and extrusion operation.
3. Bending operations.

IV. Processing of Plastics:

1. Injection Moulding
2. Blow Moulding

REFERENCE BOOK:

1. Dictionary of Mechanical Engineering – G.H.F Nayer, Jaico publishing.

II Year B.Tech Mech-II Sem.
MECHANICS OF FLUIDS AND HYDRAULIC MACHINES LAB

L	T	P/D	C
0	0	3	2

1. Impact of jets on Vanes
2. Performance test on Pelton wheel
3. Performance test on Francis Turbine.
4. Performance test on Kaplan Turbine.
5. Performance test on single stage centrifugal pump.
6. Performance test on Multi stage centrifugal pump.
7. Performance test on Reciprocating pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice mater.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli's theorems.

NOTE: Any 10 of the above experiments are to be performed.

Part – D

Syllabi of

MANDATORY COURSES

INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS

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.
2. 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

Course Objectives:

L	T	P/D	C
2	0	0	0

- To offer the students an appropriate set of values to live by
- To help them achieve a balanced life with appropriate attitudes and behaviour
- To ensure harmonious life with sustained happiness and prosperity
- To create awareness on Ethical human conduct, Engineering Ethics, Social responsibility as an engineer.

Course Outcomes:

- Cultivate the habit of Introspection; Inspirations from within and outside and journal writing to become Successful Engineers with hopes of a better human being.
- Ethical Responsibilities of Engineers while - dealing with the issues.
- To maintain work life –balance and societal well being.
- 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. Schumaner, 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.
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

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. (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).