RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

NANDYAL-518501, KURNOOL DIST., A.P., INDIA

MECHANICAL ENGINEERING

ESTD: 1995

II, III & IV B.Tech SYLLABUS

Applicable for students admitted into B.Tech (Regular) from 2012-13
&
B.Tech (Lateral Entry Scheme) from 2013-14

REGULATIONS, COURSE STRUCTURE & DETAILED SYLLABUS

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY,
NANDYAL-518501, KURNOOL (DIST), A.P., INDIA

AUTONOMOUS INSTITUTE

(Affiliated to J.N.T.U.A, Anantapur)

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI

B.Tech (Regular) from 2012-13 and B.Tech (Lateral Entry Scheme) from 2013-14

For pursuing four year under graduate Bachelor Degree Programme of study in Engineering (B.Tech), Two year Master (post graduate) Degree of study in Engineering (M.Tech), Two year Master (post graduate) degree of study in Business Administration (MBA), Three year Master (post graduate) Degree of study in Computer Applications (MCA) offered by Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal - 518501 under Autonomous status and herein referred to as RGMCET (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2012-13 onwards. Any reference to "Institute" or "College" in these rules and regulations shall stand for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Rajeev Gandhi Memorial College of Engineering and Technology shall be the Chairman, Academic Council.

The candidate seeking admission into the first year of study of four year B.Tech degree Programme should have

i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics and chemistry as optional subjects (or any equivalent examination certified by Board of Intermediate Examinations) or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or any equivalent certified by State Board of Technical Education) for admission.

ii) Secured a rank in the EAMCET examination conducted by AP State Council for Higher Education (APSCHE) for allotment of a seat by the Convener, EAMCET, for admission.

Admission Procedure:

As per the norms of A.P. State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made to the first year of Four year B.Tech. Degree programme as follows:-

a) As per the norms of Government of Andhra Pradesh, A-Category (based on the rank obtained in EAMCET) seats will be filled by the Convener, EAMCET.

b) As per the norms of Government of Andhra Pradesh, B-Category seats will be filled by the management.

Admission to the Second year of Four year B.Tech. Degree Programme in Engineering:

i) Candidates qualified in ECET and admitted by the Convener, ECET, in such cases for admission, when needed permission from the statutory bodies is to be obtained.

ii) 20% of the sanctioned strength in each programme of study (of RGMCET) shall be filled by the Convener, ECET as lateral entry.

List of Programs offered

1. B.Tech – Regular (& Lateral Entry)
2. M.Tech – Regular
3. MBA – Regular
4. MCA – Regular

Academic Regulations for 2012 B. Tech (Regular)

(Effective for the students admitted into the I year from the Academic Year 2012-2013)

The B.Tech degree will be conferred by the Jawaharlal Nehru Technological University, Anantapur, to those students who are admitted to the program and fulfil all the requirements for the award of the Degree as specified below.

1.0 Award of B.Tech. Degree

1.1 The student will be declared eligible for the award of the B. Tech. degree if he fulfils the following academic regulations:

1.2 Pursued a course of study for not less than prescribed course work duration and not more than double the prescribed course work duration.

1.3 Registered for 196 credits and secured 190 credits with compulsory subjects as listed in Table-1 below.

Table 1: Compulsory Subjects

S.NO	SUBJECT PARTICULARS
1.	All the first year subjects
2.	All practical subjects
3.	Skill Development Courses
4.	Mini project
5.	Seminar
6	Comprehensive viva voce
7.	Project work

2.0 Forfeit of seat

Students, who fail to fulfil all the academic requirements for the award of the degree within ***eight academic years*** from the year of their admission, shall forfeit their seat in B.Tech course.

3.0 Courses of study

The following courses of study are offered at present as specializations for the B. Tech. Course

1. Civil Engineering.
2. Computer Science and Engineering.
3. Electrical and Electronics Engineering.
4. Electronics and Communication Engineering.
5. Electronics and Instrumentation Engineering.
6. Information Technology.
7. Mechanical Engineering.

and any other course as approved by the authorities of the University from time to time.

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Table 2: Credits

	I Year				Semester			
	Periods /Week	Credits	Internal Marks	External Marks	Periods / Week	Credits	Internal Marks	External Marks
Theory	02	02	30	70	04	03	30	70
	03	03	30	70				
	03+1*	03	30	70				
	03+1*	04 or 05	30	70				
Practical	03	03	25	50	03	02	25	50
Practical / Drawing	3+1*	02			06	03		
	06	04	30	70			30	70
Skill Development Courses	03					02**	100	
Mini Project						02	25	50
Seminar						02	50	
Comprehensive Viva-voce						03		50
Project						10	50	100

[*Tutorial

****Skill Development Courses credits will not be considered for the award of division. However all these courses have to be cleared through Internal evaluation by scoring minimum of 40%.The credits obtained in these courses will be taken in to account for award of degree.]**

4.0 Distribution and Weightage of Marks

4.1 The performance of the student in each semester / I year shall be evaluated subject – wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, mini-project, comprehensive viva, seminar shall be evaluated for 50 marks each and the project work shall be evaluated for 150 marks.

4.2 For theory subjects the distribution shall be 30 marks for Internal Evaluation (25 marks for Internal test and 05 marks for assignments) and 70 marks for the End-Examination.

4.3 For the semester system, during the semester there shall be 2 tests for theory subjects. In each Internal test there shall be one compulsory (short answers) question and 3 descriptive questions are to be answered. The duration of Internal test will be for 2hrs. First test to be conducted in 3 units and second test to be conducted in remaining 3 units of each subject. For awarding of 25 Internal marks the performance of the student in two Internal examinations conducted one in the middle of the semester and the other towards the end of the semester giving a weightage of 0.75 for the better score and 0.25 for the other score will be considered. There shall be two assignments (problem based) in each semester for award of 05 marks so that Internal component (marks) will be 30 marks (25 marks for Internal test+05 marks for assignments).

4.4 For the I year class which shall be on yearly basis, there shall be 3 tests. For awarding of 25 Internal marks the performance of the student in three Internal examinations conducted as per the schedule giving a weightage of 0.5 for the best score, 0.25 for better score and 0.25 for the

other score will be considered. The distribution of syllabus for the conduct of Internal tests in the first year shall be as follows:

Table 3: Units for Internal Tests

I Year	Semester
2 Units First Internal test. 2 Units Second Internal test. 2 Units Third Internal test.	3 Units First Internal test. 3 Units Second Internal test.

In a year there shall be at least three assignments and in each semester there shall be two assignments for the award of 5 marks.

4.5 In the case of Skill Development Coursestwo Internal examinations shall be conducted one in the middle of the semester and the other at the end of the semester for 70 marks and the marks scored by the student in these exams with a weightage of 0.75 for better score and 0.25 for the other score will be awarded as Internal marks for 70.The remaining 30 marks are based on the average marks scored in two assignment. No external exam for these courses.

4.6 No makeup test for Internal examination or assignments will be conducted in any subject or practical. The student, who is absent for any test shall be deemed to have scored zero in that test.

5.0 Question Paper Pattern:

5.1 Each Internal Test question paper shall contain 5 questions, of which the First question is compulsory and three questions are to be answered from the remaining four. Compulsory question carries 10 marks (It contains 5 questions of two marks - no choice in first question). The remaining 3 questions carry 5 marks each.

5.2 The End Examination question paper will have 7 questions and students have to write 5 questions. However, the first question is compulsory and it consists of 7 short answer questions, each carrying 2 marks. The next 4 questions are to be answered from the remaining 6 questions and each carries 14 marks.

5.3 For practical subjects there shall be a continuous evaluation during the semester for 25 Internal marks and 50 End Examination marks. Of the 25 marks for Internal, 20 marks shall be awarded for day-to-day work and 5 marks to be awarded by conducting an Internal laboratory test. The End Examination shall be conducted by the teacher concerned and an external Examiner from other institutions.

5.4 For the subject having design and / or drawing, (such as Engineering Graphics, Machine Drawing etc) and estimation, the distribution shall be 30 marks for Internal evaluation (15 marks for day-to-day work and 5 marks for Internal tests and 10 marks for assignments) and 70 marks for End Examination. There shall be two Internal tests in a Semester and the best of the two shall be considered for the award of marks for Internal tests. However in the I year class, there shall be three Internal tests and the average of best two will be taken into consideration for award of Internal marks.

5.5 The Engineering Drawing Practice Lab, wherever offered is to be treated as a theory subject. Evaluation method adopted for theory subjects shall be followed here as well.

5.6 There shall be mini-Project, in collaboration with an industry (wherever possible) of their specialization, to be taken up during the vacation(data collection, components etc) after III year II Semester examination and implementation/simulation shall be carried out in IV year first semester during lab classes. Implementation or construction of mini project will be treated as laboratory. However, the mini project and its report shall be evaluated in IV year I

Semester. The 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 25 Internal marks for mini project which will be awarded based on the performance and involvement of the student during mini project period.

5.7 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 over the topic, and submit to the Department, which shall be evaluated by the Departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member of the department. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

5.8 There shall be a comprehensive viva voce examination at the end of IV year II semester for 50 marks which shall be conducted by HOD, senior faculty and external Examiner from other institute.

5.9 The project topic should be approved by Internal Department Committee (IDC). Out of total 150 marks for the project work, 50 marks shall be for Internal Evaluation and 100 marks for the End Semester Examination. The evaluation of project work shall be conducted at the end of the IV year II semester. The project viva voce examination will be conducted by the committee consists of an external Examiner from other institute, Head of the Department and the supervisor of the project. The Internal evaluation for 50 marks shall be on the basis of two seminars given by each student on the topic of the project. The Internal evaluation of the project work for 50 marks shall be conducted by the committee consists of head of the Department or his nominee, senior faculty member and the supervisor of project.

Table4: Distribution of weightages for examination and evaluation:

S.No	Nature of subject	Marks	Type of examination and mode of assessment		Scheme of Examination
1	Theory	70	End Examination Double Evaluation (Internal+External evaluation)		End Examination in theory subjects will be for 70 marks.
		30	25	Internal examinations (Internal evaluation)	These 25 marks are awarded to the students based on the performance in three(yearly) or two(semester) Internal examinations with a weightage of 0.5 for best score ,0.25 for better score ,0.25 for other score (yearly) and 0.75 for better score and 0.25 for the other score(semester) respectively.
			05	Assignments (Internal evaluation)	Average of Three/two assignments in a year/ semester each of 05 marks.
2	Practical	50	End lab examination (External evaluation)		This End Examination in practical subjects will be for a maximum of 50 marks.
		25	20	Internal evaluation	Day-to-day performance in lab experiments and record
			05	Internal evaluation	Internal lab examination at the end of year/semester
3	Mini Project	50	End Examination (External evaluation)		This End Examination in miniproject will be for a maximum of 50 marks.
		25	Internal evaluation		Day-to-day performance in executing mini project .
4	Seminar	50	Internal evaluation		Based on the performance in two seminars during semester
5	Comprehensive Viva	50	External evaluation		This end viva voce examinations in all the subjects for 50 marks
6	Project work	100	External evaluation		This end viva voce in project work for 100 marks
		50	Internal evaluation		These 50 marks will be based on the performance of the student in the project reviews apart from attendance and regularity
7	Skill Development Courses	70	Internal evaluation		These 70 marks are awarded to the students based on the performance of two Internal examinations with a weightage of 0.75 for better score and 0.25 for the other score
		30	Internal evaluation		Based on the two assignments

6.0 Attendance Requirements:

6.1 The student shall be eligible to appear for End Examinations of the semester/ year if he acquires a minimum of 75% of attendance in aggregate of all the subjects of that semester/year.

6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester / year may be granted by the College Academic Committee.

6.3 The student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / year, as applicable. They may seek re-admission for that semester / year when offered next.

6.4 **Shortage of Attendance below 65% in aggregate shall in NO case be condoned.**

6.5 Students whose shortage of attendance is not condoned in any semester / year are not eligible to take their End Examination of that class and their registration shall stand cancelled.

6.6 The stipulated fee shall be payable towards condonation of shortage of attendance.

7.0 Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6.0.

7.1 The student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical or design or drawing subject or Skill Development Courses or project if he secures not less than 35% of marks in the End Examination and he has to score minimum of 40% marks from Internal and external exam marks put together to clear the subject.

7.2 The student shall be promoted from II to III year only if he fulfils the academic requirement of securing 46 out of 92 credits from all the exams conducted upto and including II year II semester regular examinations **(Two regular and one supplementary examinations of I year; one regular and one supplementary examinations of II year I semester; one regular examination of II year II semester)** irrespective of whether the candidate takes the examination or not.

7.3 The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing total 72 out of 144 credits from all the exams conducted upto and including III year II semester regular examinations ,whether the candidate takes the examinations or not. (**Three regular and two supplementary examinations of I year; Two regular and two supplementary examinations of II year I semester ; Two regular and one supplementary examinations of II year II semester ; One regular and one supplementary examination of III year I semester ; One regular examination of III year II semester)**

Table 5: Promotion rules

Promotion from	Total credits to register	Total credits to obtain for promotion
II yr to III yr	92	46
III yr to IV yr	144	72

7.4 The student shall register and put up minimum attendance in all 196 credits and earn the 190credits. Marks obtained in the best 178 credits (excluding the credits obtained in Skill Development Courses) shall be considered for the calculation of percentage of marks.

7.5 Students who fail to earn 190 credits as indicated in the course structure including compulsory subjects as indicated in Table-1 within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

8.0 Course pattern:

8.1 The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years shall be on semester pattern.

8.2 The student is eligible to appear for the End Examination in a subject, but absent at it or has failed in the End Examination may appear for that subject at the supplementary examination.

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Table: 6: Course pattern

Year	Semester	No. of Subjects	No. of Skill Development Courses	Number of Labs	Total credits	
First year		O7 {ENG-3 EP-4, EC-4, M1-4, MM/EM-4, CP-5,ED-4}	00	04	1X3=03 4X5=20 5X1=05 4X3=12	40
Second year	First	06	01	03	6X3=18 1X2=02 3x2=06	26
	Second	06	01	03	6X3=18 1X2=02 3x2=06	26
Third year	First	06	01	03	6X3=18 1X2=02 3x2=06	26
	Second	06	01	03	6X3=18 1X2=02 3x2=06	26
Fourth year	First	06	01	02 Mini project	6X3=18 1X2=02 3x2=06	26
	Second	03	01	Subjects Open elective Seminar Comprehensive Viva Project Viva	3x3 =09 1X2=02 1X2=02 1X3=03 1X10=10	26
GRAND TOTAL						196

9.0 Transitory Regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone this course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered subject to section 2.0 and they continues to be in the academic regulations they were first admitted.

10.0 With-holding of results:

If the candidate has any dues not paid to the Institute or if any case of indiscipline of malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

11.0 Award of Class:

After the student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech. degree he shall be placed in one of the following four classes:

Table 7: Award of Division

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the best 178 Credits (excluding Skill Development Courses)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in Internal evaluation and End Examination shall be shown separately in the marks memorandum)

11.0 Supplementary Examinations:

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

12.0 Transcripts:

After successful completion of prerequisite credits for the award of degree 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 and also as per norms in vogue.

13.0 Rules of Discipline:

12.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

12.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that subject(s) and grading is done accordingly.

12.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).

12.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

14.0 Minimum Instruction Days:

The minimum instruction days for each semester / I year shall be 95/180 clear instruction days excluding the days allotted for tests/examinations and preparation holidays declared if any.

15.0 Amendment of Regulations:

The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi. However the academic regulations of any student will be same throughout the course of study in which the student has been admitted.

16.0 Transfers

There shall be no branch transfers after the completion of admission process.

17. 0 General:

16.1 The Academic Regulation should be read as a whole for the purpose of any interpretation.

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

16.3 The Institute may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

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

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Academic Regulations for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2013-2014 on wards)

1.0 The Students have to acquire 150 credits out of 156 from II to IV year of B.Tech. Program (Regular) for the award of the degree.

2.0 Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

3.0 The same attendance regulations are to be adopted as that of B. Tech. (Regular).

4.0 **Promotion Rule:**

The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 52 out of 104 credits from all the exams conducted upto and including III year II semester regular examinations, whether the candidate takes the examinations or not. (**Two regular and Two supplementary examinations of II year I semester; Two regular and one supplementary examinations of II year II semester; One regular and one supplementary examination of III year I semester; One regular examination of III year II semester**).

5.0 **Award of Class:**

After the 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: The marks obtained in the best 138 credits will be considered for the calculation of percentage and award of class.

Table 1: Award of Division

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for best 138 Credits. (i.e. II year to IV year) excluding Skill Development Courses
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in Internal evaluation and End Examination shall be shown separately in the marks memorandum)

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

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I B.Tech

COURSE STRUCTURE

(Common to Branches: ME & CE))

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0001121	Professional English	3+1*	-	3	30	70	100
A0002121	Engineering Physics	3+1*	-	4	30	70	100
A0003121	Engineering Chemistry	3+1*	-	4	30	70	100
A0004121	Mathematics – I	3+1*	-	4	30	70	100
A0302121	Engineering Mechanics	3+1*	-	4	30	70	100
A0501121	Fundamentals of Computers & C Programming	3+1*	-	5	30	70	100
A0301121	Engineering Drawing	6	-	4	30	70	100
Practical							
A0591121	Computer Programming Lab	-	3	3	25	50	75
A0391121	Engineering and IT Workshop	-	3	3	25	50	75
A0091121	Engineering Physics Lab and Engineering Chemistry Lab	-	3	3	25	50	75
A0092121	English Language Communication Skills Lab	-	3	3	25	50	75
	Total	**30**	**12**	**40**	**310**	**690**	**1000**

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II B.TECH, I-SEMESTER COURSE STRUCTURE

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0006123	Mathematics-II	3+1*	-	3	30	70	100
A0304123	Engineering Thermodynamics	3+1*	-	3	30	70	100
A0305123	Mechanics of Solids	3+1*	-	3	30	70	100
A0201123	Electrical & Electronics Engineering	3+1*	-	3	30	70	100
A0306123	Machine Drawing	2+4*	-	3	30	70	100
A0307123	Material Science & Metallurgy	3+1*	-	3	30	70	100
A0009123	Corporate Management Skill (Skill Development Course)	3	-	2	30+70	-	100
Practical							
A0291123	Electrical & Electronics Engg. Lab	-	3	2	25	50	75
A0392123	Mechanics of Solids Lab	-	3	2	25	50	75
A0393123	Material Science Lab	-	3	2	25	50	75
	Total	**20+9***	**9**	**26**	**355**	**570**	**925**

II B.TECH,II-SEMESTER COURSE STRUCTURE

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0010123	Environmental Studies	3+1*	-	3	30	70	100
A0012123	Probability & Statistics	3+1*	-	3	30	70	100
A0308124	Kinematics of Machinery	3+1*	-	3	30	70	100
A0309124	Internal Combustion Engines	3+1*	-	3	30	70	100
A0303123	Fluid Mechanics & Hydraulic Machinery	3+1*	-	3	30	70	100
A0310124	Manufacturing Technology	3+1*	-	3	30	70	100
A0007123	Aptitude Arithmetic Reasoning & Comprehension (Skill Development Course)	3	-	2	30+70	-	100
Practical							
A0394124	Manufacturing Technology Lab	-	3	2	25	50	75
A0391123	Fluid Mechanics & Hydraulic Machinery Lab	-	3	2	25	50	75
A0395124	Internal Combustion Engines Lab	-	3	2	25	50	75
	Total	**21+6***	**9**	**26**	**355**	**570**	**925**

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III B.TECH, I-SEMESTER COURSE STRUCTURE

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0011123	Managerial Economics & Financial Analysis	3+1*	-	3	30	70	100
A0311125	Thermal Engineering	3+1*	-	3	30	70	100
A0312125	Design of Machine Elements-I	3+1*	-	3	30	70	100
A0313125	Dynamics of Machinery	3+1*	-	3	30	70	100
A0314125	Mechanical Measurements	3+1*	-	3	30	70	100
A0315125	Machine Tools	3+1*	-	3	30	70	100
A0316125	Computer Aided Drafting (Skill Development Course)	3	-	2	30+70	-	100
Practical							
A0396125	Thermal Engineering Lab	-	3	2	25	50	75
A0397125	Dynamics & Instrumentation Lab	-	3	2	25	50	75
A0398125	Computer Aided Drafting Lab	-	3	2	25	50	75
	Total	**21+6***	**9**	**26**	**355**	**570**	**925**

III B.TECH, II-SEMESTER COURSE STRUCTURE

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0317126	Industrial Management	3+1*	-	3	30	70	100
A0318126	Heat Transfer	3+1*	-	3	30	70	100
A0319126	Engineering Metrology	3+1*	-	3	30	70	100
A0320126	Design of Machine Elements- II	3+1*	-	3	30	70	100
A0321126	Tool Design	3+1*	-	3	30	70	100
A0322126	Finite Element Methods	3+1*	-	3	30	70	100
A0013125	Professional Ethics & Soft Skills (Skill Development Course)	3	-	2	30+70	-	100
Practical							
A0399126	Metrology & Machine Tools Lab	-	3	2	25	50	75
A0381126	Heat Transfer Lab	-	3	2	25	50	75
A0382126	Parametric Modelling-I Lab	-	3	2	25	50	75
	Total	**21+6***	**9**	**26**	**355**	**570**	**925**

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IV B.TECH, I-SEMESTER COURSE STRUCTURE

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0323127	CAD/CAM	3+1*	-	3	30	70	100
A0324127	Operations Research	3+1*	-	3	30	70	100
A0325127	Automobile Engineering	3+1*	-	3	30	70	100
A0326127	Composite Materials	3+1*	-	3	30	70	100
	Elective-I	3+1*	-	3	30	70	100
	Elective-II	3+1*	-	3	30	70	100
A0333127	Parametric Modeling–II (Skill Development Course)	3	-	2	30+70	-	100
Practical							
A0383127	CAM Lab	-	3	2	25	50	75
A0384127	Parametric Modeling – II Lab	-	3	2	25	50	75
A0385127	Mini Project	-	3	2	25	50	75
	Total	**21+6***	**9**	**26**	**355**	**570**	**925**

IV B.TECH, II-SEMESTER COURSE STRUCTURE

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0334128	Robotics	3+1*	-	3	30	70	100
	Elective-III	3+1*	-	3	30	70	100
	Elective-IV	3+1*	-	3	30	70	100
A0340128	Modeling & Analysis (Skill Development Course)	3	-	2	30+70	-	100
Practical							
A0386128	Seminar	-	-	2	50	-	50
A0387128	Core Comprehensive Viva Voce	-	-	3	-	50	50
A0388128	Project Work	-	-	10	50	100	150
	Total	**12+3***		**26**	**290**	**360**	**650**

Elective-I:

A0327127	Power Plant Engineering
A0328127	Computational Fluid Dynamics
A0329127	Nanotechnology

Elective-II:

A0330127	Micro Electro Mechanical Systems
A0331127	Non-Conventional Energy Sources
A0332127	Refrigeration& Air Conditioning

Elective-III:

A0335128	Modern Manufacturing Methods
A0016128	Entrepreneurship
A0336128	Hydraulic& Pneumatic Control

Elective-IV

A0337128	Production& Operations Management
A0338128	Automation in Manufacturing
A0339128	Mechanical Vibrations

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGG.& TECH., NANDYAL-518 501

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

I B.Tech (ME)

T	C
3+1*	3

(A0001121) PROFESSIONAL ENGLISH

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

OBJECTIVES:

The recent two decades have witnessed a great upsurge of job opportunities for student holding Engineering Graduate degree, in ever increasing number of Engineering and Management Colleges, in outsourcing sector, in Marketing jobs and of course, in the colleges and universities. A student, able to communicate in fluent English is liable to achieve success in every walk of life – be it professional, social or economical. The syllabus has been designed keeping in view of the track record, needs and goals of the generation next undergraduates. It comprises essentials of language development along with technical, social, environmental & spiritual aspects which in turn mould students as dynamic professionals. The course of Professional English has been designed with the following objectives.

- To ignite the spark of professionalism among students with the purpose to acquire success in every walk of life.
- To enable them to accomplish effective Technical writing
- To focus on complete language basics through LSRW skills
- To develop critical thinking skills and emotions of students through inspiring and literary texts.
- To eliminate the errors of language by practical English usage patterns and to improve the performance of students in English. This will facilitate students to be more articulate and confident. By this, new vistas of better job opportunities can be opened up for them.
- The greatest contribution of this course shall be to chisel Communicative skills of students at the global level.

OUTCOMES:

- Be able to acquire basic vocabulary.
- Be able to use mechanics of writing.
- Be able to develop language proficiency & Grammar usage.
- Considerable improvement in LSRW skills and communicative ability.
- Increase in motivational level and Professional attitudes.
- Be able to possess wide range of relevant knowledge.

UNIT I

A.Reading: i) Developing Personality - Principles & Strategies– by J.R.Bhatti
ii) Inspiring Lives – Mokshagundam Visvesvaraya

B.Writing: Mechanics of Writing- Paragraph writing

C.Vocabulary -synonyms and antonyms

D. Language Development - Basics of Grammar – Naming Words- Concord

Student Tasks: Self analysis through questionnaires - Case Study on Successful Profiles.

UNIT II

A. Reading: i) Heaven's Gate by Pico Iyer
ii) Fish Philosophy – Enjoy Your Work by Harry Paul

B. Language Development: Tenses – Question Tags

C. Soft skills 1: The Art of Time Management by Gopala Swamy Ramesh & Mahadevan Ramash

UNIT III

A. Reading: i) Sir C.V. Raman – A Biography
ii) Inspiring Lives – Mother Theresa - Case Study – Joy of Giving.com

B. Writing: Letter Writing – Sample Analysis

C. Language Development: Discourse Markers

UNIT IV

A. Reading: i)Disaster Management -The Cuddalore Experience –Case study: Disaster Management - Japan Tsunami 2011.
ii) Neil Chambers' Green Living.
iii) Immortal Speeches – Mahatma Gandhi by Harsha Vardhan Datta

B. Writing: Report Writing

C. Language Development: Active & Passive Voice

UNIT V

A. Reading: i) Inspiring Lives - Viswanath Anand.
ii) Human Interest - The Connoisseur

B. Vocabulary – Idioms

C. Language Development – Direct & Indirect Speech

UNIT VI

A. Reading: i) Corporate Woman
ii) The Law of Pure. Potentiality by Deepak Chopra

B. Writing – Instruction Manuals – Checklists – Preventive Measures

C. Soft skills 2: Cross Cultural Communication-Profile of an Interculturally Effective Person (IEP).

TEXT BOOKS PRESCRIBED:

1. Enjoying EveryDay English by A.Ramakrishna Rao published by Sangam Books
2. Inspiring Lives published by Maruthi Publications

SUGGESTED READING:

- Practical English Usage (New Edition) by Michael Swan Oxford University Press
- Murphy's English Grammar (Third Edition) by Raymond Murphy Cambridge University Press 2004
- Technical writing 3rd edition by Sharon J. Gerson & Steven M. Gerson Pearson Education 2001
- The Dynamics of Successful Personality and projection (Second Edition) by– J.R. Bhatti, Pearson 2011

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

I B.Tech (ME)

T	C
3+1*	4

(A0002121) ENGINEERING PHYSICS

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

COURSE OBJECTIVES

- To understand fundamental principles of engineering physics specifically concern to optics, crystal structures, quantum mechanics & electron theory of metals, semiconductors, nano materials, magnetic materials, dielectric properties, superconductivity, Laser, and optical fiber.
- To provide problem solving experience and learning of concepts through it in engineering physics, in both the classroom and the laboratory learning environment.

OUTCOMES:

By the end of the course students will be able to

- Acquire fundamental understanding of concepts specifically concern to quantum physics, crystallography, superconductivity, lasers and optical fibers and their engineering applications.
- Develop the ability to recognize the appropriate physics that applies to experiments based on the Engineering Physics
- To develop a systematic, logical approach to problem-solving that can be applied to problems in physics and to problems in general.

UNIT- I

WAVE OPTICS: Interference - Interference in thin films by reflection - Newton's rings - Diffraction - Fraunhofer diffraction at a single slit - Fraunhofer diffraction at a double slit - Diffraction grating - Grating spectrum – Polarization – Nicol prism – Theory of circular and elliptical polarized light – Quarter and half wave plates.

UNIT- II

CRYSTAL STRUCTURES: Introduction -Space lattice - Basis - Unit cell - Lattice parameter - Bravais lattices - Crystal systems - Structure Simple cubic - Body Centered Cubic – Face Centered Cubic crystals- Crystal structure of diamond-Miller indices of planes and directions in crystals – Separation between successive (h k l) planes – X-ray diffraction technique – Powder method.

UNIT- III

PRINCIPLES OF QUANTUM MECHANICS & ELECTRON THEORY: Waves and Particles - de- Broglie's hypothesis – Heisenberg's uncertainty principle - Schroedinger's one dimensional time independent wave equation (qualitative treatment) - Particle in a one dimensional potential box – Energy levels - Fermi-Dirac distribution and effect of Temperature (qualitative treatment only) –Source of electrical resistance – Kronig-Penney model (qualitative treatment only - energy bands – metals, semi conductors & insulators.

UNIT- IV

PHYSICS OF SEMICONDUCTORS: Intrinsic and extrinsic semiconductors – Law of mass action –Drift & diffusion - Einstein's relation – Hall Effect – p-n junction - Band diagram of p-n junction diode – Diode Equation- Solar cell and its applications.

NANO MATERIALS: Introduction - Basic principles of nano materials – properties of nano materials – Synthesis of Nanomaterials by Ball Mill method and Sol-Gel method - carbon nanotubes – properties and applications of carbon nano tubes - Applications of nano materials.

UNIT- V

MAGNETIC MATERIALS: Introduction - Origin of magnetic moment – Classification of magnetic materials - Dia, Para , Ferro, anti-Ferro and Ferri magnetism - Hysteresis - Soft and hard magnetic materials

DIELECTRIC PROPERTIES: Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizations (qualitative treatment only) - Local field - Clausius-Mossotti equation- Frequency dependence of polarisability (qualitative treatment only).

SUPERCONDUCTIVITY: General properties - Meissner effect - Penetration depth- Type I and Type II superconductors– Flux quantization- Josephson effects – Applications of superconductors.

UNIT- VI

LASERS: Introduction – Characteristics of laser - Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby Laser - Helium-Neon Laser – GaAs Laser - Applications of Lasers.

FIBER OPTICS: Introduction - Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture – Types of Optical fibers and refractive index profiles – Attenuation in optical fibers – Applications of optical fibers.

TEXT BOOKS:

1. Avadhanulu M N and Kshirsagar P G, "A Textbook of Engineering Physics", S. Chand & Company Ltd, New Delhi, 2005 (Unit – I, IV, VI).
2. S.P. Basavaraju, "Applied Physics", Subhas Stores, Books Corner, Bengaluru, 2008 (Unit II-VI).

REFERENCES:

1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi (2003).
2. A Text Book of Optics by S.L. Kakani and K.C. Bhandari, Sultan Chand & Sons, Educational Publishers, New Delhi.
3. Physics Volume 2, by Halliday, Resnick and Krane; John Wiley India
4. Solid State Physics by C.Kittel, Wiley India
5. Introduction to Nanoscience & Nano Technology by K.K Chattopadhyay & A.N. Banarjee, Prentice – Hall of India Pvt. Ltd.

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

I B.Tech (ME)

T	C
3+1*	4

(A0003121) ENGINEERING CHEMISTRY

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

OBJECTIVES:

Chemistry is concerned with the changes of matter with its environment. The introduction of Engineering Chemistry to I B.Tech students to know the basic principles, concepts and familiarize the materials used in industries and software technologies .This will help the students to cope up with the continuous flow of new technology.

The importance of water and sustainable utilization of water resources and alternative methods for freshwaters like Reverse osmosis and the problems raised in the production of steam by using the boilers are included in Water technology.

The present syllabus aims to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering. The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application. The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example. The also include a comprehensive coverage of topics of applied chemistry including polymers, engineering materials, corrosion its control.

UNIT I:

Water Chemistry: Introduction- Impurities in Water, Water Quality Parameters and Standards, Water Analysis- Determination of different Constituents in water – Hardness, Alkalinity, Dissolved Oxygen, TDS. Numerical Problems on hardnes, Boiler Troubles-Scales and Sludges, Carry over, Boiler Corrosion, Caustic Embrittlement.

Water Treatment: Municipal Water treatment for domestical purpose, Desalination of Water –Reverse Osmosis.

UNIT II:

Electrochemistry: Conductance - Specific Conductance, Equivalent Conductance Molar Conductance - Effect of Dilution.

Electrochemical Cells: Reference Electrodes–Standard Hydrogen Electrode, Calomel electrode, Measurement of EMF, Standard electrode potential, Galvanic cells, concentration cells.

Ion Selective Electrodes-Principle, Chemistry and working of Electrodes - Applications for the determination of Fluorides, Chloride and nitrate.

Batteries: definition, Classification**, Examples:** Ni–Cd cell, Lithium Ion batteries.

Surface Chemistry: Adsorption-Definition, types, Langmuir Adsorption theorem, applications of adsorption.

Fuel cells: hydrogen oxygen fuel cell and methanol-Oxygen fuel cell.

UNIT III :

Chemistry of Corrosion and its Control: Definition, Types of corrosion: Dry Corrosion, (Direct Chemical attack type of Corrosion), Wet Corrosion, Mechanisms, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Pitting Corrosion.

Corrosion Control: Cathodic and Anodic Protection Methods, Electroplating-Principles and Mechanism, Electro plating of Chromium, Electro less plating of Copper and Nickel.

UNIT IV:

Polymers and Ceramics:

Polymers-Definitions of the terms involved, Types and mechanisms of Polymerization, Physical, mechanical and electrical properties of polymers. Preparation, properties and applications of Commercially important polymers Poly ethelene, PVC, Poly esters, Teflon, Bakelite and Nylon.

Natural Rubber – Processing of Natural Rubber and Vulcanization process.

Liquid Crystal polymers: Definition, Synthesis and applications of Kevlar, Electro Optic effect in Liquid Crystals, applications of Liquid Crystals.

Electro Ceramics: Introduction, Fabrication of ceramics, types of electro ceramics like conductors, dielectrics, and Insulators, non linear dielectrics, electro optic magnetic ceramics, properties and applications.

UNIT V:

Chemical Fuels & Lubricants: Introduction, Classification of chemical fuels Calorific value - High and Low calorific values, Determination of calorific value - solid or liquid fuel using Bomb calorimeter - numerical problems, Flue gas analysis by Orsat's analysis apparatus and Combustion Calculations.

Petroleum – Refining, Cracking, Knocking, Octane and Cetane numbers, synthesis of Unleaded petrol, Power alcohol and Biodiesel,

Lubricants: Definition, Lubrication mechanisms, Properties of Lubricants.

UNIT VI:

Modern Engineering materials :

Storage devices: materials used and working of Solid state drives, CD's ,pen drive

Photo &light responsive compounds: Sensors, biosensors-principle-few applications

Refractories: definition, classification with examples; criteria of a good refractory material; Properties, causes for the failure of a refractory material .

TEXT BOOKS:

1. Text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, 15th edition New Delhi (2008).
2. A text book of Engineering Chemistry by S.S. Dara, S.Chand & Co, New Delhi.
3. Text book of Engineering Chemistry by Sashi Chawla,Dhanpatrai Publishing Company ,New Delhi.
4. Chemistry for Engineers by Prof.K.N.Jayaveera, Dr.G.V.SubbaReddy, and Dr.C.Ramachandraiah, Tata McGraw Hill Higher Education, Hyd.2009.

REFERENCES:

1. Chemistry of Engineering Materials by C.V. Agarwal, Tara Publication, Varanasi.2008
2. Physical Chemistry - Glasston & Lewis.
3. Principles of Physical chemistry by B.R.Puri, L.R.Sharma and M.S.Pathania, S.Nagin, Chand and co.
4. Engineering Chemistry Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications(India) Pvt. Limted, Hyderabad. 2009.

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

I B.Tech (ME)

T	C
3+1*	4

(A0004121) MATHEMATICS – I

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

COURSE OBJECTIVES:

- To make aware students about the importance and symbiosis between mathematics and engineering. Achieve confidence with mathematical tools which an essential weapon in modern Graduate Engineer's Armory. Balance between the development of understanding and mastering of solution techniques with emphasis being on the development of student's ability to use Mathematics with understanding to solve engineering problems by retaining the philosophy learning by doing.

OUTCOMES:

- By the end of module students will be expected to demonstrate. The knowledge of Differential equations, Laplace Transformations, Real analysis, Curve tracing, Curvature, Multiple integrals and Vector calculus. By using the concept curve tracing we can draw the graph of any type of curves in Cartesian and Polar coordinates. The concept vector calculus has applications in fluid dynamics, heat flow in stars, study of satellites and Design of underwater transmission cables.

UNIT – I

Differential equations of first order and first degree – Exact, linear and Bernoulli equations. Applications L-C-R circuits, Orthogonal trajectories.

UNIT – II

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), method of variation of parameters.

UNIT – III

Rolle's Theorem – Lagrange's Mean Value Theorem – (excluding proof). Simple examples of Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

Raidus of Curvature – Curve tracing – Cartesian, polar and parametric curves.

UNIT – IV

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

UNIT – V

Differentiation and integration of Laplace transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – VI

Multiple integral: – Double and triple integrals – Change of Variables – Change of order of integration.

Vector Calculus: Gradient – Divergence – Curl and Their properties; Vector integration – Line integral - Potential function – Area , Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (excluding their proof). Verification of Green's – Stoke's and Gauss's Theorems.

TEXT BOOKS:

1. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
2. A Text Book of Engineering Mathematics, C. Sankaraiah, V.G.S. Book Links.
3. A Text Book of Engineering Mathematics-1,E. Rukmangadachari, E. Keshava Reddy, Pearson Education.

REFERENCES:

1. A Text Book of Engineering Mathematics, B.V. Ramana, Tata Mc Graw Hill.
2. A Text Book of Engineering Mathematics, Thomson Book Collection.
3. A Text Book of Advanced Engineering Mathematics – A Computer Approach, N.Bail, M.Goyal& C. Watkins.
4. Engineering Mathematics, Sarveswara Rao Koneru, Universities Press

I B.Tech (ME)

T	C
3+1*	4

(A0302121) ENGINEERING MECHANICS

COURSE OBJECTIVES:

At the end of the course,

- The student should understand the basic principles of mechanics applicable to rigid bodies in equilibrium and the kinematics and kinetics of particle motion.
- The student should be able to apply these principles to the solution of a variety of practical problems and be able to employ their knowledge to solve more complicated problems and study the affect of problem parameters.
- The student should be prepared to continue the study of the dynamics of rigid bodies and the mechanics of solids and fluids.

COURSE OUTCOMES:

Knowledge and understanding:

- Use engineering science principles to develop algebraic relationships among key physical parameters and variable based on analysis of an specified system.
- Extending the student's knowledge in system of forces and learning the applications of such systems.
- Understand and apply Newton's laws to problems systems consisting of rigid bodies in equilibrium and particles in motion.
- Practical and subject specific skills
- Use references that provide tabulated physical data that are useful to mechanical engineers.
- Communication skills (personal and academic)
- Students gain a lot of information by searching through the internet and references and from local industrial companies in order to design and solve the problems associated with this subject.

UNIT I

BASIC CONCEPTS – Units and Dimensions - System of forces – Laws of Mechanics - Parallelogram & triangular law of forces, Moment of forces and its application – Couples and Resultant of Force System.

EQUILIBRIUM OF RIGID BODIES: Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading - Lames theorem.

UNIT II

ANALYSIS OF PERFECT FRAMES: Types of frames – Cantilever frames and simply supported frames – Analysis of frames using method of joints for vertical, horizontal and inclined loads.

FRICTION: Types of friction – laws of coulomb friction – limiting friction – Cone of limiting friction-Static and dynamic friction - Motion of bodies on horizontal and inclined surfaces.

UNIT III

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures Viz,. Rectangle, Triangle, Semi Circle and quarter circle – Centroids of Composite figures – T section, I section, Angle section, Hollow sections, Centre of Gravity of bodies Viz,. Cone, Solid hemi sphere – Centre of Gravity of Composite bodies (Simple problems only) - Pappus theorem.

UNIT IV

AREA MOMENT OF INERTIA - Parallel axis and perpendicular axis theorems - Moments of Inertia of Simple and Composite Figures.

MASS MOMENT OF INERTIA: Derivation of mass moment of inertia for rectangular solids, prism, circular bar, sphere from first principle of Moment of Inertia of Simple solids.

UNIT V

KINEMATICS OF PARTICLES -Introduction – Velocity and Acceleration – Rectangular Components – Kinematical Relations and Applications – Newton's Law – Rectilinear Translation – Curvilinear motion.

DYNAMICS OF A PARTICLES- Review of laws of motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT VI

MECHANICAL VIBRATIONS: Definitions, basic concepts, Simple harmonic motion - Free Vibrations - Simple, Compound and Torsional Pendulums - Simple problems.

TEXT BOOKS:

1. Engineering Mechanics, Bhavikatti and Rajasekharappa, New Age International Publishers.
2. Engineering Mechanics, Fedrinand L.Singer – B.S. Publishers.
3. Engineering Mechanics, Shames & Rao – Pearson Education.

REFERENCES:

1. Engineering Mechanics-Statics and dynamics, A. Nelson, Tata McGraw-Hill Company.
2. Mechanics of Materials by Timoshenko & Gere, CBS.
3. Engineering Mechanics – B. Bhattacharya- Oxford University Publications.
4. Mechanics of Materials -Dr. B. C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publication
5. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning.

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

I B.Tech (ME) T C
3+1* 5

(A0501121) FUNDAMENTALS OF COMPUTERS & C PROGRAMMING

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

OBJECTIVES:

- To make students aware about fundamentals of computer programming.
- To provide exposure on C programming language.
- To provide exposure on various C programming concepts like arrays, functions, pointers, structures, etc.
- To develop solutions for various problems by using C Programming Language by students.
- To provide exposure on various sorting and searching techniques

OUTCOMES:

By the end of this course, students should be able

- To understand about the various techniques for problem solving**.**
- To understand the fundamental concepts of C language like data types, keywords, operators, Input/Output functions and control statements.
- To understand how to develop C programs to solve various kinds of problems by using different C programming concepts like arrays, functions, pointers and structures.
- To develop programs by performing I/O operations through Files.
- To implement various searching and sorting techniques.

UNIT I:

Overview of Computer Programming: Fundamentals of computers - Evolution of computer systems, Basic anatomy of computer system, Components of computer. Introduction to Computer Programming languages. Problem solving techniques - Algorithms and Flowcharts. How to trace an algorithm. Simple examples on how to write and trace an effective algorithms and how to draw an effective flow charts. Program control structures – sequence, selection and iteration. Software Development Method.

UNIT II:

Introduction to C Language: History of C language, Importance of C language, Definition of a C Program, General Form of a C Program, Steps to execute C program. Various Data Types supported by the C language. C tokens – Identifiers, Key words, Variables, Constants, Operators. Operator precedence and Associativity. Expressions and their evaluation process. Type Conversions- Automatic and type casting. Managing Input/Output operations. Control Statements- Non iterative statement- if, if else, Nested if else, lf else ladder and switch statements. Loop Constructs - while, for, do-while. break, continue, return and go to statements. Example Programs on the topics covered in this unit.

UNIT III:

Arrays and Functions:

Arrays – Definition, Need of arrays while writing C programs. Types of arrays- One dimensional, Two dimensional, Multi-dimensional arrays. Declaration of One dimensional array, initialization of one dimensional array, storing and accessing the elements from a one dimensional array. Two-dimensional Arrays and their declaration, initialization, storing & accessing elements from it. Declaration of multi-dimensional array, initialization of multi-dimensional arrays, storing and accessing the elements from a multi-dimensional array. . Example Programs on the topics mentioned above.

Functions: Introduction, Library Functions and User defined functions. Need for user-defined functions. General form of declaring a function, Elements of an user defined functions- Function definition Function call, Function declaration, Function name, return type, parameters, return statements. Categorization of functions with respect to parameters and return values. Definition of Scope of a variable with suitable examples. Storage Classes - Automatic, External, Static, and Register. Arrays and functions - Passing an entire array as an Argument to a function. Recursion – Need of recursive functions, Solving Towers of Hanoi Problem using recursive function and its trace out. Preprocessor Commands. Example Programs on the topics mentioned above.

UNIT IV:

Strings and Pointers:

Strings - Definition, Declaring and initializing strings, Basic Operations on strings, String handling Functions, Table of strings. Example Programs on the topics mentioned above.

Pointers - Introduction, Need of using pointer variables, Pointer variable declaration, initialization of pointer variables, how to access a value from a memory location through it's pointer variable. Arithmetic operations on pointer variables, Scale factor length. Pointers and functions - pointers as function arguments (i.e., call-by-reference), Pointers and Arrays, Pointers and Strings, Array of Pointers, Pointers to Pointers, Generic Pointers, Pointer to Functions. Example Programs on the topics mentioned above.

UNIT V:

Structure and File Input/Output:

Structures – Introduction, Features of Structures. Declaration and Initialization of Structures, Accessing structure members, structure initialization. Nested Structures, Array of Structures, Arrays within structures and Pointers to Structures, Structures and Functions, Bit Fields, Unions, Union of Structures. Dynamic Memory Allocation Functions. Example Programs on the topics mentioned above.

File Input/Output: Introduction, Types of Files, File I/O Operations- High level I/O functions- Open & Close a file, Read and Write data into a file, Searching data in the file, Error handling during I/O operations on files. Command Line Arguments, Applications of Command Line Arguments. Example Programs on the topics covered in this unit.

UNIT VI:

Searchingand Sorting Techniques:

Searching Techniques- Linear search and Binary Search.

Sorting techniques- Bubble Sort, Selection Sort, Quick Sort, Insertion Sort, and Merge Sort.

Implementation of all the above mentioned techniques in C language and trace them by giving different test data.

TEXT BOOKS:

1. Computer programming and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill. 2009 revised edition.
2. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
3. The C Programming Language, Brian W.Kerninghan, Dennis M.Ritchie.

REFERENCES:

1. Let us C – Yeshwanth kanetkar, 8th Edition.BPB Publications
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.
5. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

I B.Tech (ME)

D	C
6	4

(A0301121) ENGINEERING DRAWING

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

COURSE OBJECTIVES

At the end of this course the student should able to:

- Apply engineering graphics as a communications tool.
- Able to describe the skills required to develop engineering working drawings, sketch three-dimensional objects.
- Able to create orthographic projections.
- Able to create auxiliary views, to create sectional views.
- Able to dimension properly and also develop skill in using free hand sketches.
- The student should able to apply the knowledge of Engineering drawing for Architectural and engineering designs, Mechanical and Automobile engineering designs, design of communication equipment etc.

COURSE OUTCOMES:

- Draw different engineering curves and know their applications.
- Draw orthographic projections of different objects.
- Visualize three dimensional objects and draw isometric projections.
- Use in techniques and able to interpret the drawing in engineering field.

UNIT – I

INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions of Engineering materials (Ferrous, Non ferrous metals, wood, plastic, glass and rubber).

Curves used in Engineering Practice:

a) Conic Sections including the Rectangular Hyperbola.
b) Cycloid, Epicycloid and Hypocycloid.
c) Involutes.
d) Helices.

UNIT – II

PROJECTION OF POINTS AND LINES: Principles of Orthographic Projection – Conventions –Projections of Points, Lines, Line inclined to one and both planes, Problems on projections (First Angle Projections only).

UNIT – III

PROJECTIONS OF PLANES & SOLIDS: Projections of regular Plane surfaces Viz., Triangle, Rectangle, square, pentagon and hexagon in simple position - inclined to one plane and inclined to both the planes (First Angle Projections only).

Projections of Regular Solids inclined to one and both planes (First Angle Projections only).

UNIT – IV

SECTIONS OF SOLIDS: Section Planes and Sectional views of Right Regular Solids – Prism, Pyramid, Cylinder and Cone – True shapes of sections.

UNIT – V

DEVELOPMENT OF SURFACES: Development of surfaces of right regular solids – Prisms, pyramids, cylinder, cone and their sectional parts. Parallel line and Radial line methods.

UNIT – VI

ISOMETRIC AND ORTHOGRAPHIC VIEWS: Types of Pictorial projections - Isometric View and Isometric projections of simple solids -solid objects (combination of two solids) – Conversion of Isometric Views to orthographic Views - Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat / Charotar, Charotar Publishers.
2. Engineering Drawing & Graphics, Venu Gopal, New Age Publications.
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Publications.

REFERENCES:

1. Engineering Drawing, B.V.R. Guptha, J.K. Publishesrs.
2. Engineering Drawing, Shah and Rana, 2/e Pearson Education.
3. Engineering Drawing, Venkata Reddy, B.S.Publishers.

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SCHOOL OF MECHANICAL ENGINEERING

I B.Tech (ME)

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(A0591121) COMPUTER PROGRAMMING LAB

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

Intel based desktop PC with ANSI C Compiler and Supporting Editors

COURSE OBJECTIVES:

1. To make the student to learn how to write programs in **C** language.
2. To introduce different constructs of **C** language to the students to solve various kinds of problems.
3. To make the students to implement different kinds of sorting algorithms like selection sort, bubble sort, insertion sort, quick sort and merge sort etc.
4. To make the students to implement different kinds of searching algorithms like linear search and binary search etc.

OUTCOMES:

By the end of this course, students should be able

1. To understand about the fundamentals of Computer programming**.**
2. To understand the fundamental concepts of C language like data types, keywords, operators, Input/Output functions and control statements.
3. To understand how to develop C programs to solve various kinds of problems by using different C programming concepts like arrays, functions, pointers and structures.
4. To develop programs by performing I/O operations through Files.
5. To implement various searching and sorting techniques.

Exercise l:

a) Write a C program to find the roots of a quadratic equation.

b) Write a C program to calculate the following Sum:
Sum=$1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$

Exercise 2:

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

b) The total distance travelled by vehicle in'**t'** seconds is given by distance $S = ut+1/2at^2$ where '**u**' and '**a**' are the initial velocity (m/sec.) and acceleration (m/sec^2) respectively. Write C program to find the distance travelled at regular intervals of time given the values of **'u**' and '**a**'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of **'u'** and '**a**'.

Exercise 3:

a) Write a C program to find the sum of individual digits of a positive integer.

b) Write a C program to generate the first 'n' terms of the Fibonacci sequence.
Note: A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.

c) Write a C program to generate all the prime numbers between 1 and n, where 'n' value is given by the user.
Note: Develop each of the above programs by using different loop constructs supported by C language. (i.e., while, do while and for Loops).

Exercise 4:

a) Write a C Program to mask the most significant digit of the given number.

b) Given an integer number, write a C program, that displays the number as follows:

First line: all digits
Second line : all except first digit
Third line : all except first two digits
------ ---- ----------
Last line : last digit

For ex:
1234
234
34
4

Exercise 5:

a) Write a C program to generate Pascal's triangle.
b) Write a C program to construct a pyramid of numbers.

Exercise 6:

a) Write a C program to find all the even numbers in the given one dimensional array.
b) Write a C program to print the elements of an array in reverse order.
c) Write a C program to perform the following operations:
   i) Addition of Two Matrices ii) Multiplication of Two Matrices

[Note: Use functions to implement the above specified operations]

Exercise 7:

a) Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To reverse a given positive integer.

Exercise 8:

a) Write a C Program to solve the Towers of Hanoi problem by using recursive function.
b) Writea C Program to demonstrate the various storage classes, which are supported by the C language. [i.e., automatic, external, static and register]

Exercise 9:

a) Write a C Program to demonstrate that, how to pass an entire array as an argument to a function with a suitable example.
b) Write a C Program to perform various operations on given two strings using string handling functions.

Exercise 10:

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
   i) call-by-value ii) call-by-reference

Exercise 11:

a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to a given main string from the specified position.
   ii) To delete '**n**' Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not.

Exercise 12:

a) Write a C program that displays the position or index in the string 'S' where the string 'T' begins, or – 1 if 'S' doesn't contain 'T'.
b) Write a C program to count the lines, words and characters in a given text.

Exercise 13:

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
b) Write a C program to convert the given Roman numeral to its decimal equivalent value.

Exercise 14:

Write a C program that uses functions to perform the following operations:
   i) Reading a complex number ii) Writing a complex number
   iii) Addition of two complex numbers iv) Multiplication of two complex numbers

(**Note:** Represent the complex number using a structure.)

Exercise 15:

a) Write a C program which copies contents of one file to another file.
b) Write a C program to reverse the first 'n' characters in a file.

(Note: The **file name** and **n** are specified on the command line.)

Exercise 16:

a) Write a C program to display the contents of a file using command line arguments.
b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by the contents of the second file are put in the third file)

(Note: The **file name** and **n** are specified on the command line.)

Exercise 17:

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order.
i) Bubble sort ii) Selection sort iii) Insertion sort

Exercise 18:

Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

Exercise 19:

Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

Exercise 20:

Write C program to implement linear search method to search an element in a given list of integers. [**Note:** Use both recursive and non recursive functions]

Exercise 21:

Write C program to implement Binary search method to search an element in a given list of integers. [**Note:** Use both recursive and non recursive functions]

REFERENCE BOOKS

1. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
2. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
3. Computer Basics and C Programming, V. Raja Raman, PHI Publications.

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I B.Tech (ME) P C
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(A0391121) ENGINEERING AND IT WORKSHOP

(Common to all Branches)
For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

OBJECTIVES:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

OUTCOMES:

At the end of the Engineering Work Shop: A Student involved in acquiring manufacturing skills must have balanced knowledge of theory as well as practice. The First students of all engineering branches should know the basic knowledge of various tools and their use in different sections of manufacturing such as fitting, carpentry, smithy, tin smithy, foundry, welding etc. and basic engineering practices such as plumbing, electrical wiring, electronic circuits, machine shop practice.

1. **TRADES FOR EXERCISES:**
   a) **Carpentry shop** – Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock.
   b) **Fitting Shop**– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock.
   c) **Sheet Metal Shop**– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 gauge G.I. sheet.
   d) **House Wiring** – Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for two lamps controlled by one switch in series.
   e) **Welding** – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.
   f) **Soldering–** Test procedure for soldering & Series and parallel connection.
   g) **Black smithy –** Two Jobs (exercises)To make square cross section bar from a given round bar & To make an eye bolt from a given square bar.

2. **TRADES FOR DEMONSTRATION:**
   a) Plumbing
   b) Machine Shop
   c) Metal Cutting

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

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IT WORKSHOP

OBJECTIVES:

- The IT Workshop for engineers is a training lab course. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

OUTCOMES:

At the end of the course, students should be able

- To work with few of the Microsoft office tools like word, excel etc.
- Should identify the fundamental ports of the computer.
- Should be able to Assemble and dissemble the computer (Desktop system).
- Gain knowledge about Web browsers, search engines & about basic network settings.

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

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace for usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. (**It is recommended to use Microsoft office 2007in place of MS Office 2003)**

PC Hardware

Exercise 1 - Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Exercise 2 - Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.

Exercise 3 - Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Exercise 4 - Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Exercise 5 - Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

Exercise 6 - Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

OFFICE TOOLS

LaTeX and Word

Exercise 7 - Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 1: Using LaTeX and Word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Excel

Exercise 8 - Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

LaTeX and MS/equivalent (FOSS) tool Power Point

Exercise 9 - Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Exercise 10 - Task 2: Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Internet & World Wide Web **2 Exercises**

Exercise 11 - Task 1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Exercise 12 - Task 2: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of instructors.

Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.

REFERENCES:

1) Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2) LaTeX Companion – Leslie Lamport, PHI/Pearson.
3) Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4) Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5) Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
6) IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

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I B.Tech (ME) P C
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(A0091121) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB

(Common to all Branches)

For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E.

OBJECTIVES:

1. Providing an opportunity to develop and hone experimental skills, particularly as they pertain to scientific and technical knowledge
2. Providing a solid grounding in the methods of scientific and research inquiry,
3. Apply the scientific method to experiments in the laboratory.
4. To create curiosity in research methods by the experiments Hall effect, four pobe conductivity, laser diffraction etc.

OUTCOMES:

1. Develop procedures and observational skills as data is taken and gain a fundamental understanding of simple and complex apparatus used in the experiment.
2. Apply analytical techniques, statistical analysis, graphical analysis, spread sheet data/recording to the experiments.
3. Verify the theoretical ideas and concepts covered in lecture by completing a host of experiments.
4. Take the time to discuss the procedure, the data, and the results of the experiment with the lab partner.

Any TEN of the following experiments are to be performed during the Academic year.

1. Determination of wavelength of given source – spectrometer – normal incidence method.
2. Dispersive power of the prism – Spectrometer.
3. Determination of wavelength of a laser source - Diffraction Grating.
4. Determination of particle size by using a laser source.
5. Determination of thickness of a thin wire using parallel fringes.
6. Newton's Rings.
7. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
8. Numerical aperture of an optical fiber.
9. Hall Effect.
10. B – H Curve.
11. Energy gap of a Semiconducting Material
12. Determination of rigidity modulus of a wire material – Torsional pendulum
13. Determination of dielectric constant.
14. Verification of laws of stretched string – Sonometer.
15. Study of bending loss in optical fiber

Equipment required:

Spectrometer, Grating, Prism, Mercury vapour lamp, Sodium vapour lamp, Travelling Microscope, Wedge arrangement, Newton rings setup, Stewart-Gee's apparatus, He-Ne laser source, Optical fiber, Hall effect kit, B-H loop kit, Energy gap kit (four probe method), Torsional pendulum, Dielectric constant kit, Sonometer, Melde's apparatus.

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ENGINEERING CHEMISTRY LAB

OBJECTIVES:

Chemistry is one subject which gives adequate knowledge about the applications involved in the aerospace, mechanical, environmental and other engineering fields. Knowledge of chemistry plays a vital role in engineering profession enabling the potential engineers to understand and to perform successfully while working on multidisciplinary tasks.

The main objective of the department is to develop the necessary theoretical and practical aspects required for understanding intricacies of the subject and also give adequate exposure to the applied chemistry aspects in different disciplines of engineering. To educate the engineering students with all necessary concepts and to develop a scientific attitude by means of distinguishing, analyzing and solving various engineering problems. It develops their experimental skills and important practical knowledge in engineering by providing necessary facilities in chemistry laboratory.

Experiments:

1) Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron.
2) Preparation of Standard EDTA solution and Estimation of Hardness of Water.
3) Preparation of Standard EDTA and Estimation of Copper.
4) Verification of Beer-Lambert's Law.
5) Determination of strength of the given Hydrochloric acid against standard sodium hydroxide solution by Conducto metric titration.
6) Determination of strength of the given Acetic acid against standard sodium hydroxide solution by Conducto metric titration.
7) Determination of viscosity of the oils through Redwood viscometer.
8) Determination of calorific value of fuel using Bomb calorimeter.
9) Estimation of dissolved oxygen.
10) Preparation of Phenol-formaldehyde Resin.
11) Preparation of Ester.

BOOKS:

1) Chemistry-lab manual by Dr K.N.Jayaveera and K.B. Chandra Sekhar, S.M. Enterprizes Ltd.
2) Vogel's Book of Quantitative Inorganic Analysis, ELBS Edition.

Equipment Required:

Glass ware: Pipettes, Burettes, Volumetric Flasks, Beakers, Standard flasks, Measuring jars, Boiling Test tubes, reagent bottles, (Borosil)

1) Analytical balance (keroy) (15 Nos)
2) Calorimeter
3) Bomb Calorimeter
4) Redwood viscometer No.1& No.2
5) Conductometer/ Conductivity bridge
6) Wash bottles, test tube stands, burette stands
7) Gas cylinders with Bunsen burners
8) Chemicals: Hydrochloric acid, sodiumhydroxide, EDTA, EBT indicator, fast sulfon black-f, urea, benzoic acid, methanol, Mohr's salt, copper sulphate, magnesium sulphate, ammonia, ammonium sulphate, calcium sulphate etc.,

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(A0092121) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common to all Branches)
For Branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E

OBJECTIVES:

The Language Lab focuses on the production and practice of sounds of language and equips students with the use of English in everyday situations and contexts.

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm
- To initiate them into greater use of the computer in writing, format-making etc.
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required ability to face computer-based competitive exams such GRE, TOEFL, GMAT etc.

OUTCOMES:

- Be able to improve social interactive skills.
- Be able to acquire standard pronunciation.
- Be able to develop language skills – LSRW Skills.
- Be able to enhance communication skills.

Syllabus

Part 1 – **Language Development** through Four Skills from Multimedia

Part II - **Phonetics & Pronunciation Strategies**: Vowels, Diphthongs, Consonants, Word Accent and Intonation

Part III – a. **Communication & Social Interactive Skills**:

- Ice Breaking Activities
- JAM
- Describing Objects
- Situational Dialogues & Role-Play (Group Task)
- Story Narration (Group Task)
- Information Transfer
- Debate (Group Task)

b. Writing Tasks

- Personal Experiences
- Current Affairs
- Technology Trends
- Book Reviews

c. Project / Creative Task (Team Task)

Evaluation:

English Language Laboratory Practical Paper:

- The Practical Examinations for the English Language Laboratory shall be conducted as per the norms prescribed for the core engineering practical sessions.
- For the language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 marks for External Examination. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting internal lab test(s). The year-end examination shall be conducted by the teacher and External Examiner from other Institution.

Software Prescribed:

- Alania Series for Four Skills
- Cambridge Advanced Learners' English Dictionary with CD (Accent)
- The Rosetta Stone English Library (Four Skills)
- EL-Client (Phonetics)
- CL-Client (Communication skills)
- Department Built-In Software/Data

Suggested Reading:

- Longman Dictionary of Contemporary English for Advanced Learners, Pearson
- Education Ltd.
- Better English Pronunciation (Second Edition) by D. O' Connor,Cambridge University Press 1967, 1980
- Communication Skills for Engineers(Second Edition) by C. Muralikrishna & Sunita Mishra Pearson Education Ltd, 2011
- Better English pronunciation by Thakur K B P Sinha , Vijay Nicole, 2005
- Practical English Usage (New Edition) by Michael Swan, Oxford University Press.

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II B.Tech, I-Sem (ME)

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(A0006123) MATHEMATICS-II

(Common to ME & CE)

COURSE OBJECTIVES:

- The course objective is to impact analytical skills to the students in the areas of boundary value problems and transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.
- An engineering student needs to have some basic mathematical tools and techniques which emphasize the development of rigorous logical thinking and analytical skills. Based on this the course aims at giving adequate exposure to the theory and applications of Fourier series, Fourier Transforms, PDE, and BVP

COURSE OUTCOMES:

- An ability to apply knowledge of engineering, information technology, mathematics, and science
- An ability to identify, formulate and solve engineering problems

UNIT-I

Matrices: Elementary row transformation-Rank-Normal form-Echelon form-Consistency-Solution of system of simultaneous linear homogeneous and nonhomogeneous equations.

Eigen values, Eigenvectors-properties-Cayley –Hamilton Theorem-Inverse and powers of a matrix by Cayley – Hamilton Theorem.

UNIT-II

Real matrices: Symmetric, Skew-symmetric, Orthogonal Complex matrices: Hermitian ,Skew-Hermitian and Unitary Matrices and their properties- Quadratic forms-Reduction of quadratic form to canonical form- Rank-Positive, negative definite-semi definite-index-signature.

UNIT-III

Fourier series: Determination of Fourier coefficients-Fourier series-Even and odd functions- Fourier in an arbitrary interval- Even and Odd periodic continuation-Half–range Fourier sine and cosine expansions.

Fourier integral theorem (only statement)-Fourier sine and cosine integrals. Fourier transform-Fourier sine and cosine transforms- properties-Inverse transforms.

UNIT-IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions-Method of separation of variables- Solution of one Dimensional wave equation, heat equation under two dimensional Laplace's equation under initial and boundary conditions.

UNIT – V

Solution of Algebraic and Transcendental Equations: Introduction – The Method of False Position Method – Newton Raphson Method.

Interpolation: Introduction – Finite differences – Forward difference – Back ward differences – Newton's forward and back ward difference formulae for interpolation formula – Lagrange's Interpolation formula.

UNIT-VI

Curve fitting:Fitting a straight line-Second degree curve-Exponential curve-Power curve by method of least squares.

Numerical Differentiation and Integration- Trapezoidalrule-Simpson's 1/3 rule-Simpson's 3/8 rule.

Numerical solutions of Ordinary Differential Equations: Solution by Taylor's series-Picard's Method of Successive Approximations-Euler's Method-Runge-Kutta Methods.

TEXT BOOKS:

1) Mathematical Methods by Dr. T.K.V. Iyengar, B. Krishna Gandhi and others, S.Chand and company.
2) Mathematical Methods by Dr. K.V. Suryanarayana Rao – SCITECH Publicarions.
3) A Text book of Engineering Mathematics – 1, by B.V. Ramana, Tata McGraw Hill .

REFERENCES:

1) Advanced Engineering Mathematics by Erwin Kreyszig - Wiley Publications.
2) Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
3) A text book of Engineering Mathematics by N.P.Bali, Iyengar – Lakshmi Publications (Pvt ltd).

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II B.Tech, I-Sem (ME)

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(A0304123) ENGINEERING THERMODYNAMICS

(Use of Standard Steam Tables, Mollier Diagram are Permitted in End Examination**)**

COURSE OBJECTIVES:

The students completing this course are expected:

- Modern industry requires Mechanical Engineers, who are capable of design & implementing thermal engineering specific tasks. To do this engineer must exercise creative ability, sound judgment and technical knowledge.
- The student should understand the nature and role of the thermodynamics, heat and work transfer.
- The student should recognize and understand the different forms of energy and restrictions imposed by the First Law of Thermodynamics on conversion from one form to the other.
- The student should understand implications of the Second Law of Thermodynamics and limitations placed by the Second Law on the performance of thermodynamic systems.
- The student should be able to know the behavior of Ideal, real and mixture of perfect gasses.
- The student should be able to know the behavior of pure substances in thermal systems.

COURSE OUTCOMES:

- The Learning Outcomes are assessed through graded home work, quizzes, mid-semester, final, GATE and IES exams.
- At the end of the course the students are capable of solving the problems in:
  - Engineering thermodynamics, systems and properties.
  - Zeroth law and first law of thermodynamics.
  - Second law of thermodynamics.
  - Entropy and availability
  - Behaviour of Ideal, real and mixture of perfect gasses.
  - Behaviour of pure substances in thermal systems

UNIT–I

BASIC CONCEPTS AND DEFINITIONS: Macroscopic & Microscopic approaches, Thermodynamic system, state, properties, processes and cycle, Thermodynamic Equilibrium, quasi-static process, Zeroth Law of Thermodynamics.

Work and Heat Transfer: path and point functions – Non flow (PdV) or displacement work in various processes, Heat Transfer, comparison of work and heat Transfer.

UNIT–II

FIRSTLAWOFTHERMODYNAMICS: First law for a closed system undergo in GA cycle and for a process, Joules experiment –specific heat at constant volume and constant pressure, enthalpy, PMM-I.

First Law Applied to Flow Systems: Control volume, steady flow process, applications of steady flow energy equation. Simple problems on steady flow energy equation.

UNIT–III

SECOND LAW OF THE RMODYNAMICS: Heat engine, Kelvin-Plank statement, Clausius statement, refrigerator and heat pump, equivalence of Kelvin plankandclausiusstatements,reversibilityandirreversibility,Carnot Cycle, Carnot's Theorem, corollary of Carnot's theorem, thermodynamic temperature scale, efficiency of a reversible heatengine, PMM-II - simple problems.

UNIT–IV

ENTROPY: Clausius' theorem, Clausius inequality –Definition of entropy, principle of entropy increase, T-S plot, change in entropy in various reversible processes.

Availability: Available energy, maximum work in a reversible process, availability in non flow and flow processes.

UNIT–V

IDEAL AND REAL GASES:

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states.

Real gases - Deviations from perfect Gas Model – Vander Waals Equation of State.

Mixtures of perfect Gases – Mole Fraction, Mass friction 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, specific Heats and Entropy of Mixture of perfect Gases and Vapour.

UNIT–VI

PROPERTIES OF PURE SUBSTANCES: Pure substance, phase transformation**,** Study of P-V, T-S diagrams for pure substances - quality and dryness fraction of steam - Use H-S or Mollier Diagram & steam tables - Simple problems on quality and dryness fraction.

TEXT BOOKS:

1. P.K. Nag Engineering Thermodynamics, TMH Publishers, New Delhi
2. Thermodynamics – Yadav" Central Publishers
3. Engineering Thermodynamics, K.Rama Krishna, Anuradha Publishers.

REFERENCE BOOKS:

1. B.P Mistra, Engineering Thermodynamics
2. E. Ratha Krishna, Fundamentals ofEngineering Thermodynamics, PHI Publishers, New Delhi.
3. G.J.Van Wylen, Sonntag, Fundamentals of Thermodynamics, John Wiley & Sons Publishers, Singapore.
4. S.C.Gupta,Engineering Thermodynamics, Pearson Education, New Delhi
5. G.J.VanWylen, Sonntag, Fundamentals of Thermodynamics, John Wiley & Sons Publishers, Singapore.

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

II B.Tech, I-Sem (ME)

T	C
3+1*	3

(A0305123) MECHANICS OF SOLIDS

COURSE OBJECTIVES:

- To impart basic principles of solid mechanics and their associated laws.
- To understand the behavior of engineering materials for different types of loads
- To understand the behavior of beams under different types of loads
- To analyze the circular solid and hollow shafts under bending and torsional loads
- To understand the nature of stresses developed in material under complex loading system
- To analyze the cylindrical shells under circumferential and radial loading conditions

COURSE OUTCOMES:

- Student should gain knowledge in analysis of the materials under different loading conditions
- Developing theoretical/practical capabilities of students so that they can characterize, transform, use and apply in engineering knowledge gained in solving related engineering problems.
- The design of frames and structure is of practical importance in industry and is also useful for other advanced courses.

UNIT I: SIMPLE STRESSES & STRAINS

Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial loads.

UNIT II: SHEAR FORCE AND BENDING MOMENT

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams subjected to point loads, UDL, 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 of Bending stresses- section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections.

UNIT IV: BEAM DEFLECTION

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope: Double integration method, Macaulay Method.

Columns:

End conditions – Equivalent length of a column – Euler's equation – Slenderness ratio – Rankine formula for columns.

UNIT V: TORSION

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section–torsional stiffness.

UNIT VI: CYLINDERICAL SHELLS

Thin cylindrical shells – Derivation of formula for longitudinal and circumferential stresses –hoop, longitudinal stresses and volumetric strains.

Stresses in Two Dimensions:

Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr's circle for biaxial stresses – Maximum shear stress.

TEXT BOOKS:

1. Strength of materials by Bhavakatti, Lakshmi Publications.
2. Analysis of structures by Vazrani & Ratwani.
3. Strength of materials by Jindal, Umesh Publications
4. Popov E.P, Engineering Mechanics of Solids, Prentice-Hall of India, New Delhi, 1997.
5. Beer F. P. and Johnston R, Mechanics of Materials, McGraw-Hill Book Co, Third Edition, 2002.

REFERENCES:

1. Nash W.A, Theory and problems in Strength of Materials, Schaum Outline Series, McGraw-Hill Book Co, New York, 1995.
2. Kazimi S.M.A, Solid Mechanics, Tata McGraw-Hill Publishing Co, New Delhi, 1981
3. Ryder G.H, Strength of Materials, Macmillan India Ltd., Third Edition, 2002.
4. Ray Hulse, Keith Sherwin & Jack Cain, "Solid Mechanics", Palgrave ANE Books, 2004.
5. Singh D.K "Mechanics of Solids" Pearson Education 2002.

AUTONOMOUS

SCHOOL OF MECHANICAL ENGINEERING

II B.Tech, I-Sem (ME)

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3+1*	3

(A0201123) ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to ME & CE)

COURSE OBJECTIVES:

- This course introduces the basic concepts in electric circuits and networks
- This course also introduces the working principles of different types of AC and DC motors, Generators and Transformers.
- It also helps to study the operating principles of electrical measuring instruments and their working
- To understand the fundamental principles of basic electronic devices
- To provide theoretical prerequisites necessary to do lab work on DC machines and AC machines

COURSE OUTCOMES:

- The student will familiarize the working of DC and AC machines and their performance behaviour.
- The student will understand the basic concepts of different measuring instruments and semiconductor devices.

UNIT – I

ELECTRICAL DC CIRCUITS: Basic definitions (electrical conductor, insulator, semiconductor, electrical circuit, electric current, electric potential, EMF and electric potential difference) - Types of elements(active and passive elements)- Ohm's Law and its limitations-electric power-electrical energy- Kirchhoff's Laws- Resistances in series- Resistances in parallel- Star to delta and delta to star transformations –DC super position theorem and thevinin's theorem-simple problems.

UNIT – II DC MACHINES

DC-GENERATOR: Working Principle and construction of DC Generator– induced emf equation – types of DC Generators-simple problems regarding EMF.

DC MOTOR: Working Principle of DC Motor-types of DC Motors -back emf -torque equation –speed control of DC Shunt Motor – applications of DC machines -losses in DC machines- Swinburne's test and efficiency calculation –simple problems.

UNIT - III

TRANSFORMERS: Principle of operation of single phase transformers –Constructional features –Theory of an Ideal Transformer- EMF equation –Practical Transformer on no load and load–Equivalent circuit-Impedance Ratio-Shifting of Impedances – losses- regulation -OC & SC test- efficiency –simple problems.

UNIT - IV

ELECTRICAL INSTRUMENTS: Introduction-Types of electrical instruments –Principle of Operation of indicating instruments– Essentials of Indicating Instruments-Defecting Torque-Controlling Torque –Damping Torque-PMMC and Moving Iron Instruments (Operation and Construction only).

UNIT - V

DIODE AND ITS CHARACTERISTICS: Formation of n- type and p-type semiconductor –Construction of P-n junction diode, symbol - V-I Characteristics- Diode Applications-Rectifiers – Half wave-Full wave-mid point and bridge type-simple Problems.

UNIT - VI

TRANSISTORS and CRO: Formation of PNP and NPN transistors – CE configuration of NPN and PNP transistors- applications -Transistor as an amplifier-SCR characteristics and applications- construction and Principle of CRO(operation only)-Applications.

TEXT BOOKS:

1. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
3. Principles of Electronics by V.K.Mehta, S.Chand & Co.

REFERENCES:

1. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.
2. Electronics and Devises by salivahan, TMH Publications

II B.Tech, I-Sem (ME)

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(A0306123) MACHINE DRAWING

COURSE OBJECTIVES:

At the end of this course:

- To create awareness regarding the different conventions' used in machine drawing
- To know about different types fasteners used in different engineering applications
- To train the student on different manufacturing consideration used in manufacturing
- To train the students on the assembly of various machine elements
- To train the students on the development of process sheet for the given machine component

COURSE OUTCOMES:

- Student can identify different conventions used in industrial drawings
- Student can develop drawing for different fasteners used in engineering
- Student can able to identify and draw the different joints and couplings used in engineering
- Student can able to identify indentify various parts according to their dimensions during their assembly
- Student can learn the skills of developing process sheet for the given machine element

UNIT – I

DRAWING CONVENTIONS: Conventional representation of materials, common Machine elements and parts such as screws, nuts, bolts, keys, rears, web, ribs.

SCREWED FASTENINGS: Various thread profiles, Square and hexagonal bolts and nuts, Assembly of bolt, nut and washer, Eye bolts. Locking arrangements for nuts, Foundation bolts.

UNIT - II

Keys, Cotters and Pin Joints: Different types of keys in assembly, cotter joint with sleeve, cotter joint with socket and spigot ends, cotter joint with gib, knuckle joint. **Bearings**: Solid and bushed journal bearing, Pedestal bearing, Footstep bearing.

UNIT–III

Riveted Joints: Different types of riveted heads, Single riveted lap joint, double riveted chain and zigzag glap and butt joints.

UNIT–IV

Shaft Couplings: Muff couplings, Flanged coupling, Compression coupling, Universal coupling and Oldham coupling.

UNIT - V

Assembly Drawing: Assembly drawings of the following:

Engine Parts: Stuffing box, Steam engine Crosshead, eccentric. Petrol engine Connecting rod.

Machine Tool Parts and Accessories: Square tool post, Lathe Tail Stock and Shaper tool post.

UNIT - VI

Miscellaneous Parts: Screw Jack, Swivel bearing, Plummer block and Pipe Vice.

TEXT BOOKS:

1. K.L.Narayana, K.Venkata Reddy, Machine Drawing, NAI Publication, New Delhi.
2. N.D. Junnarkar, Machine Drawing, Pearson Publication, New Delhi.
3. N.Sidheswar, P. Kannaiah ,Machine Drawing, TMH Publishers, New Delhi

REFERENCE BOOKS:

1. K.R.Gopalakrishna, Machine Drawing, Subhash Publication, New Delhi.
2. P.S.Gill, Machine Drawing, Kataria Publication, New Delhi.

Note:

1. First angle projection to be adopted.
2. All answers should be on the drawing sheet only. Answers on the drawing sheet only will valued.
3. The End examination will be for **4 hrs** in the following format.
   - **Q.No.1** is compulsory, **04** questions are to be answered from **Q.No.2** to **Q.No.7**.
   - **Q.No.1-** Questions are from unit-I to VI of the syllabus, **07** out of **07** short answering questions to be answered with a Weightage of **02** marks each – **14 Marks.**
   - **Q.No.2** to **Q.No.5-**Questions are from **unit-**I to **IV** of the syllabus, **04** out of **03** to be answered with a weithtage of **08** Marks each **-24 Marks.**
   - **Q.No.6 to Q.No.7-**Questions are from **unit-V** to **VI** of the syllabus, **01** out of **02** to be answered with a weithtage of **32** Marks each **-32 Marks.**

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II B.Tech, I-Sem (ME)

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(A0307123) MATERIAL SCIENCE & METALLURGY

COURSE OBJECTIVES:

At the end of the course,

- The student should understand the material behavior and the selection of appropriate material for the given application.
- To instruct students on the importance of quantification and characterization of properties and phenomena.
- To train the student to determine the various mechanical properties of the engineering materials
- To know different bonds in solids, crystal structures
- To know about Phase-Diagrams and cooling curves and heat treatment techniques
- To know about processing of materials through powder metallurgical technique

COURSE OUTCOMES

This course used assigned readings, lectures, and home work to enable the students to:

- To understand basic concepts of crystallography, material properties
- To know different types of mechanical properties of the material from various tests
- To understand the concept of constructing Phase diagrams.
- To understand the Physical and chemical properties of cast-irons, steels and stainless steels
- To understand the physical properties of different Non-ferrous metals and their alloys
- Student grain knowledge in processing of materials through powder metallurgical techniques

UNIT – I

Structure of Metals: Crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size- Mechanical properties of engineering materials.

Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rothery's rules, intermediate alloy phases, and electron compounds.

UNIT-II

Testing of Engineering materials: Mechanism of plastic deformation, Slip and Twinning- Testing of materials under tension, Compression and shear loads, Hardness tests- Brinell, Vicker's and Rockwell, Impact test- Izod and Charpy tests, Fatigue and creep tests.

UNIT - III

Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, equilibrium cooling and heating of alloys, Lever rule, coring, eutectic systems, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, and Fe-Fe_3C.

UNIT -IV

Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Hadfield manganese steels-stainless steels, tool and die steels.

Non-Ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

UNIT – V

Heat Treatment of Alloys: Effect of alloying elements on Fe-Fe_3C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Harden ability, surface - hardening methods, Age hardening treatment, sub zero treatment of alloys.

UNIT - VI

Powder Metallurgy: Introduction, advantages of Powder Metallurgy, Preparation of metal powders-Mixing, Blending, Compacting, Sintering &Hot-pressing – applications of powder metallurgy, examples of typical components produced.

TEXT BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avener.
2. Material Science & Metallurgy / Dr.C.D.Yesudian & Dr.Harris Samuel/Scitech Publications.
3. Essential of Materials science and engineering/ Donald R.Askeland/Thomson.

REFERENCES:

1. Material Science and Metallurgy/kodgire.
2. Science of Engineering Materials / Agarwal
3. Materials Science and Engineering / William and Collister.
4. Elements of Material science / V. Rahghavan
5. An introduction to Material science / W.g.vinas & HL Mancini
6. Engineering Materials and Their Applications – R. A Flinn and P K Trojan / Jaico Books.
7. Engineering materials and metallurgy/R.K.Rajput/ S.Chand.

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SCHOOL OF MECHANICAL ENGINEERING

II B.Tech, I-Sem (ME) T C
3 2

(A0009123) CORPORATE MANAGEMENT SKILLS

(Skill Development Course)
(Common to all branches)

OBJECTIVES:

- To improve the communication skills of the students.
- To raise the confidence of the students with respect to the inter-personal communication.
- To make them to habituate to the Team culture and Team Work.
- To ensure the students to take up the challenges of Group Discussion and Personal Interview.
- To improve the overall personality of the students.

OUTCOMES:

- Able to improve the communication skills.
- Able to obtain the confidence of students with respect to the inter-personal communication.
- Able to cultivate the Team culture and Team Work.
- Able to take the challenges of Group Discussion and Personal Interview.

UNIT I

Concept of Communication – Significance, Scope and functions of Business Communication – Process and dimensions of communication – Essentials of good communication – Channels of communication – Formal, informal communication – Upward, Downward, Horizontal communication – Grapevine Phenomenon.

UNIT II

Types of communication: **Verbal – Oral Communication:** Advantages and limitations of oral communication, written communication – Characteristics, significance, advantages & Limitations of written communication.

UNIT III

Nonverbal Communication: Sign language – Body language – Kinesics – Proxemics – Time language and Hap tics: Touch language.

UNIT IV

Interpersonal communication – Interpersonal communication – Communication models: Exchange theory – Johari window – Transactional analysis, Communication styles.

UNIT V

Managing Motivation to Influence Interpersonal communication – Inter-personal perception – Role of emotion in inter personal communication.

UNIT VI

Barriers to communication: Types of barriers – Technological – Socio-Psychological barriers – Overcoming barriers. Listening – Types of listening – Tips for effective listening.

REFERENCES:

1. Business Communication, Meenakshi Raman, Oxford University Press.
2. Business Communication, Raymond V.Lesikar, Neeraja Pandit et al.,TMH
3. English for Business Communication, Dr.T.M Farhatulla, Prism books Pvt. Ltd.
4. Business Communications,Hudson,5/e,Jaico Publications
5. Business communication for managers, Penrose, Raspbery, Myers, Cengage
6. The Skills of Communication, Bills Scot, Gower publishing company Limited, London.
7. Effective Communication, Harward Business School, Harward Business Review No.1214.
8. Essentials of Business Communication, Rajendra Pal, JS.Korlahhi, S.Chand

II B.Tech, I-Sem (ME) P C
3 2

(A0291123) ELECTRICAL & ELECTRONICS ENGINEERING LAB
(Common to ME & CE)

COURSE OBJECTIVES:

- To experiment and verify the basic electrical and electronic principles.
- To provide practical exposure to test the performance of DC and AC machines, Transformers
- It helps to study the characteristics of basic electronics devices

COURSE OUTCOMES:

- The student will get clear understanding over the theoretical concepts through experimentation
- The student will be acquainted with the working of DC and AC machines and their performance.

Section - A

Electrical Engineering Lab: (Any five experiments)

1. Verification of super position theorem
2. Verification of thevinieon theorem
3. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method
4. Swinburne's test on D.C. Shunt machine
   (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
5. Brake test on D.C Shunt Motor
6. OC and SC tests on single phase transformer (Predetermination of efficiency at given power factors)

Section - B

Electronics Engineering Lab: (Any five experiments)

1. PN-junction diode characteristics
2. Half wave Rectifier with and without filters
3. Full wave centre tapped Rectifier with and without filters
4. Transistor CE Characteristics (Input and Output)
5. CE Amplifiers
6. Study of CRO (Voltage and time measurements)

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II B.Tech, I-Sem (ME) P C
3 2

(A0392123) MECHANICS OF SOLIDS LAB

COURSE OBJECTIVES:

- To make use of different principles and laws applied in slid mechanics.
- To determine the tensile and compressive strength of engineering materials.
- To determine the impact strength of various engineering materials.
- To determine the hardness of various engineering materials.
- To know the behavior of helical spring under axial load.

COURSE OUTCOMES:

- Student shall gain the extensive practical knowledge of the lab so that students can apply the principles of mechanics of solids in the process of determining the strength of the material.
- To developing theoretical/practical capabilities of students so that they can characterize, transform, use and apply in engineering from the knowledge gained in solving related engineering problems.

LIST OF EXPERIMENTS

1. To study the stress-strain characteristics of Mild steel rod using Universal Testing Machine (UTM).
2. Torsion test on mild steel rod.
3. Izod Impact test on metal specimen.
4. Charpy Impact test on metal specimen.
5. Hardness test on metals – using Brinnel hardness testing machine.
6. Hardness test on metals – using Rockwell hardness testing machine.
7. Hardness test on metals – using Vicker’sl hardness testing machine.
8. Deflection test on beams.
9. Compress Tension test on helical springs.
10. Tension test on helical springs.

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II B.Tech, I-Sem (ME)	P	C
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(A0393123) MATERIAL SCIENCE LAB

COURSE OBJECTIVES:

- The student should be capable of preparing the specimen for metallurgical observations.
- To distinguish the Ferrous and non-Ferrous materials based on the micro structure.
- To know the effect of heat treatment on microstructures.

COURSE OUTCOMES:

- Student gains the knowledge of preparing the sample for metallurgical observations.
- The student can able to identify the material based on its micro structure.
- Student can realize the effect of heat treatment on the mechanical properties of the material.

LIST OF EXPERIMENTS:

1. Exercise on specimen mounting on thermo setting plastic.
2. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
3. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – Carbon steels.
4. Study of the Micro Structures of Cast Irons.
5. Study of Micro Structure of Austenitic- stainless steel.
6. Study of Micro Structure of High-Speed steel.
7. Study of the Micro Structures of Non-Ferrous alloys.
8. Study of the Micro structures of Heat treated steels.
9. Hardenability of steels by Jomny End Quench Test.
10. To find out the hardness of various treated and untreated steels.
11. Magnaflux testing method.

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II B.Tech, II-Sem (ME) T C
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(A0010123) ENVIRONMENTAL STUDIES

(Common to all branches: E.C.E, E.E.E, E.I.E, C.S.E, I.T, M.E, C.E**)**

OBJECTIVES :

- To create a awareness about environment among the students.
- To develop an understanding of ecosystem and their interrelations.
- To develop an awareness about the utilization, over exploitation of natural resources.
- To recognize the need for keeping pollution under control in order to maintain the quality of life.
- To acquire skills to analyze and interpret information relating to environmental problems.
- To develop the ability to identify, analyze and reflect upon different environmental Concerns.
- To develop skills for effectively tackling problems related to the local environment.
- To adopt practices that help in promoting balance in nature by making judicious utilization of resources and materials.
- To develop love, affection, sensitivity and sense of responsibility towards all living beings.
- To appreciate and respect legal provisions for protection of animals and plants.
- To imbibe the essence of environmental values and ethics in order to live in harmony with nature.

UNIT I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: Environment -Definition, scope and importance, Segments of Environment-Importance, Productivity, Austhetical & Optional values of nature, need for public awareness.

UNIT II

HARNESSING RESOURCES

a) Sources of Energy:- Renewable and non renewable resources.
b) Natural Resources: soil, water sources-Hydro power project-problems, forest, minerals -Utilization-problems.
c) Solar Energy and its applications - Photo Voltaic Cells, Solar water heating, solar pond, Solar Cooker. Non-conventional sources of energy.
d) Chemical fertilizers and pesticides-problems. Green Revolution-white revolution- blue revolution.
e) Depletion of Resources-Over utilization and consumption, non –equitable distribution of resources, Technological and Industrial developmental activities.

UNIT III

CONCEPTS OF ECO-SYSTEM : Structure of ecosystem: Trophic structure, producers, consumers, and decomposers; Interaction between biotic and abiotic factors in an ecosystem; Energy flow and its importance; Trophic levels, food chain, Food web, Food Pyramid;

TYPES OF ECOSYSTEM: Understanding the types of ecosystem

i Terrestrial (forest, grassland and desert) and
ii Aquatic (fresh water - River, pond and salt water-Marine) with an example of each.

UNIT IV

ENVIRONMENTAL FACTORS

a) Disasters:- Natural and man-made Nuclear Disasters, major types and their causes, impact on environment and human life and remedies.
b) Impact of environment degradation on: - Natural habitats, living forms (endangered and Extinct species).
c) Pollution:- Definition, types (soil, water, air and noise), sources , impact on physical environment control and preventive measures of pollution.

UNIT V

ENVIRONMENTAL VALUES:

a) Population and Environment:- Definition of species, community, population; Population growth rate curves, Sex ratio, From unsustainable to sustainable development, Diseases-HIV, Malaria, Diaharia, Cancer.
b) Human rights, fundamental duties and value education.
c) Women and child welfare & Family welfare programs.

UNIT VI

ISSUES OF THE ENVIRONMENT

a) Resettlement and rehabilitation of people.
b) Energy Crisis – urban and rural sectors.
c) Climatic changes Greenhouse effect and global warming..
d) Acid rain& Ozone layer depletion.
e) Wild-life management - National parks, sanctuaries and bio-reserves, poaching, hunting and bio-piracy.
f) E Waste Management

REFERENCES:

1. Environmental Studies by ERACH BHARUCHA for UG courses by UGC.
2. Environmental Science by Anubha Koushik & C.P Koushik, New Age International Publishers.
3. Environmental Engineering & Management by Dr.Suresh K.Dhameja, Katson books.
4. Environmental Studies by Rajagopalan, Oxford University press.
5. Environmental Studies by Manoj Tiwari &Archana Tiwari , J.K.International Publishers.
6. Environmental Studies by Benny joseph.
7. Environmental Science & Technology by M.Anji Reddy ,BS Publications.

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II B.Tech, II-Sem (ME) T C
3+1* 3

(A0012123) PROBABILITY & STATISTICS

(Common to ME, CE, CSE & IT)

OBJECTIVES:

- Probability & Statistics is a necessary avenue to scientific knowledge which opens new vistasof mental activity.
- There was a great need for an associate knowledge on Probability & Statistics for the engineering students.
- It is accepted that a good mathematical studying is essential for all engineers; this will definitely boost the confidence of the student in writing "Competitive examinations".

OUTCOMES:

By the end of module students will be expected to demonstrate knowledge of

- Probability, Conditional Probability, Baye's theorem and its applications.
- Random variables, Discrete random variables, Continuous random variables.
- Binomial Distribution, Poisson Distribution, Normal Distribution.
- Population & Samples, Sampling Distribution of means.
- Point Estimation, interval Estimation, Bayesian Estimation.
- Tests of Hypothesis, Z – Distribution, Student t – test, F – test, Chi square test.
- Queuing theory, Basic Queuing process, Transient & Steady states, Pure birth & Death process.

UNIT – I

Probability: Sample Space and events – Probability – The axioms of Probability – Some Elementary theorems – Conditional Probability – Baye's theorem.

UNIT – II

Random Variables: Discrete and continuous - Distribution – Distribution functions – Properties – Discrete Random variables – Probability mass function – Continuous Random variables – Probability density function.

UNIT – III

Binomial, Poisson and Normal distributions – Related properties – Fitting distributions.

UNIT – IV

Sampling distribution : Population and samples – Sampling distribution of mean (known and unknown)
Estimation: Point estimation – Interval estimation – Bayesian estimation.

UNIT – V

Test of Hypothesis – Means – Proportions – Hypothesis concerning one and two means – One tail, two tail tests – Type I and Type II errors.

UNIT – VI

Tests of significance – Student's t –test, F – test, Ψ^2 test – Good ness of fit – Contigency test.

TEXT BOOKS:

1. Probability and Statistics by T.K.V. Iyengar, B. Krishna Gandhi and others, S.Chand and company.
2. A Text book of Probability and Statistics by Dr. Shahnaz Bathul.
3. Engineering Mathematics by B.V. Ramana, Tata McGraw Hill .

REFERENCES:

1. Fundamental Mathematical Statistics by S.C. Guptha and V.K. Kapoor – S. Chand Co.
2. A text book of Engineering Mathematics by N.P. Bali, Iyengar – Lakshmi Publications (Pvt ltd)
3. Engineering Mathematics – III A by Dr.M.K. Venkat araman – The National Publishing co.

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(A0308124) KINEMATICS OF MACHINERY

COURSE OBJECTIVES:

- To study about terms used in kinematics of machinery
- To learn how to analyze the motions of link mechanisms and to analyze forces in machines.
- To analyze the motions of Cam and follower assembly
- To locate the instantaneous centre for the given planer mechanism
- To determine the velocity and accelerations of the linkages in a planer mechanism
- To study about the toothed gears and related terminology

COURSE OUTCOMES:

Upon successful completion of this course, the student will be able to:

- Identify the basic relations between distance, time, velocity, and acceleration.
- Distinguish the basics of kinematics and kinetics of motion.
- Develop familiarity with application of kinematics theories to real-world machines.
- Understand analytical linkage analysis, cam profiles, and gear trains.
- Use the techniques to study the motions of machines and their components.
- The kinematic synthesis process through implementation

UNIT – I

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .

MACHINES : Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism –inversions of quadric cycle, chain – single and double slider crank chains.

UNIT - II

KINEMATICS: Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain.

Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Klein's construction.

UNIT-III

PLANE MOTION OF BODY: Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

Straight Line Motion Mechanisms: Exact and approximate copiers and generated types –Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

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. Maximum velocity and maximum acceleration during outward and return strokes in the above three cases.

UNIT – V

TOOTHED GEARING: Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact.

UNIT – VI

GEAR TRAINS: Introduction – Train value – Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains.

TEXT BOOKS:

1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers
2. Theory of Machines by Thomas Bevan/ CBS.
3. Theory of machines by jagadishlal.

REFERENCES:

1. Theory of Machines R.S Khurmi & J.K Gupta.
2. Theory of Machines / R.K Bansal
3. **T**heory of Machines Sadhu Singh Pearsons Edn
4. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
5. The theory of Machines /Shiegley/ Oxford.
6. Theory of machines – PL. Balaney/khanna publishers.

AUTONOMOUS

MECHANICAL ENGINEERING

II B.Tech, II-Sem (ME)

T	C
3+1*	3

(A0309124) INTERNAL COMBUSTION ENGINES

COURSE OBJECTIVES:

- Modern industry requires Mechanical Engineers, who are capable of design & implementing Internal Combustion Engines specific tasks. To do this engineer must exercise creative ability, sound judgment and technical knowledge.
- The student should able to know the power cycles used in Internal Combustion Engines.
- The student should able to know the different systems used in Internal Combustion Engines.
- The student should able to know the combustion processes in CI & SI Engines.
- The student should able to know the knowledge of testing & performance of Engines.

COURSE OUTCOMES:

At the end of the course work the student should have knowledge of:

- Various power cycles used in I.C engines.
- Various engines systems used in I.C engines.
- Theory of combustion in SI & CI Engines.
- Conducting the performance test and estimating the performance of an I.C Engines.

UNIT – I

Power Cycles: Carnot cycle, Air standard cycles -Description and representation of Otto cycle, Diesel cycle & Dual cycles on P–V and T-S diagram -Thermal Efficiency – Comparison of Otto, Diesel and Dual cycles. Simple problems on Otto, Diesel and Dual cycles

UNIT-II

I.C.Engines: Energy conversion– basic engine components - Working principle of two stroke and four stroke engines - comparison of two stoke and four stroke, SI and CI engines – Classification of I.C. Engines, Valve and port timing diagrams, application of I.C Engines.

UNIT – III

Engine Systems: Working principle of Magneto & Battery Ignition System - Simple Carburettor - Common rail fuel Injection System - Air & Thermostat cooling system - Petroil & Pressure Lubrication system.

SuperCharging: Introduction,typesofsuperchargers,methodsofsupercharging,advantagesandlimitationsofsupercharging.

UNIT - IV

Combustion in S.I. Engines: Homogeneous Mixture - Stages of combustion - Importance of flame speed and factors influencing the flame speed –Abnormal Combustion - Phenomenon of Knocking, Summary of Engine variables affecting the knocking, pre-ignition– Combustion Chambers, requirements, types - Rating of S.I Engine fuels.

UNIT - V

Combustion in C.I. Engines: Heterogeneous Mixture - Stages of combustion – Delay period and its importance – factors affecting the Delay Period – Phenomenon of Knock – Comparison of knock in SI & CI Engines - Combustion chambers (DI & IDI), requirements, types- Rating of C.I Engine fuels.

UNIT – VI

Testing and Performance: Engine Performance Parameters - Determination of, Brake power, friction power and indicated power – Performance test – Heat balance sheet and chart- Exhaust gas composition - Simple problems on performance and heat balance sheet.

TEXT BOOKS:

1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / R.K Rajput / Lakshmi Publications.

REFERENCES:

1. I.C Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of I.C Engines – Pulkrabek / Pearson /PHI
3. Thermal Engineering / Rudramoorthy - 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. IC Engines/ Ramalingam/ Scietech publishers
8. Thermal Engineering data book-B.Srinivasulu Reddy/JK International Pub.

II B.Tech, II-Sem (ME) T C
3+1* 3

(A0303123) FLUID MECHANICS & HYDRAULIC MACHINARY

(Common to ME & EEE)

COURSE OBJECTIVES:

At the end of this course,

- The object is to impart fundamental aspects of fluid motion, including important fluid properties, regions of flow, and pressure variations in fluids at rest and in motion, fluid kinetics.
- To discuss about the laws and equations related to the fluid mechanics.
- Emphasis is placed on understanding how flow phenomena are described mathematically. The effects of fluid friction on pressure and velocity distributions are also considered in some detail.
- The similitude, dimensional analysis and flow measurement should be able to apply to the analysis and of hydraulic machines.
- The student should able to apply the knowledge to solve more complicated problems and study the effect of problem parameters and able to describe the construction and working of different types of hydraulic machines and also plot the performance curves of hydraulic machines.
- The student should be prepared to continue the study and analyze the fluid flows and hydraulic machines to solve the complicated practical problems.

COURSE OUTCOMES:

Knowledge and understanding

- Extending the student's knowledge of hydraulic machines and learning the design of such systems.
- Cognitive skills (thinking and analysis)
- The students should link the scientific concepts they are learning with real applications by giving live examples where the subject concepts are applied.
- Communication skills (personal and academic)
- Students gain a lot of information by searching through the internet and references and from local industrial companies in order to design and solve the problems associated with this subject.

UNIT I

Fluid Statics: Dimensions and units: Physical properties of fluids-specific gravity, viscosity, surface tension-vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure –measurement of pressure- Piezometer, U-tube and differential manometers. Hydrostatic force on a plane area.

UNIT II

Fluid Kinematics: Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow.

Fluid dynamics: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT III

Closed conduit flow: Laminar and turbulent flow through pipes: Reynolds experiment significance of Reynold's number, formulae for laminar flow through circular pipes, Turbulent flow-Darcy Weisbach equation, friction factor and Mody's diagram - Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venturimeter, and orifice meter.

UNIT-IV

Boundary Layer Flow: Introduction, Definitions, Drag force on a flat plate due to Boundary layer, Turbulent Boundary layer on a flat plate, Analysis of Turbulent Boundary layer, Separation of Boundary layer.

UNIT V

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT VI

Hydraulic Turbines : Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory-functions and efficiency, Unit and specific quantities, characteristic curves.

Hydraulic Pumps: Working principle of Centrifugal and Reciprocating pump. (No-derivations and No-problems)

TEXT BOOKS

1. Fluid Mechanics and Hydraulic Machinery MODI and SETH, S.Chand & co,New Delhi
2. Fluid Mechanics and Hydraulic Machines by R. K. Rajput, Lakshmi Publications.
3. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Standard Book House, New Delhi.

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.
4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley, John Wiley & Sons Inc. (Chapter 12 – Fluid Flow Measurements).

II B.Tech, II-Sem (ME) T 3+1* C 3

(A0310124) MANUFACTURING TECHNOLOGY

COURSE OBJECTIVES:

- The student should understand the some fundamental aspects and design concepts associated in manufactures of pattern and pattern makings for casting process,
- Knowing about various sand properties and their testing strengths
- Knowing the techniques used in welding processes like arc, gas, spot, plasma and brazing processes
- To know about process involved for making a small size parts with the help of blanking, piercing operations and study of simple, compound and progressive press tools, hydraulic press with deep drawing extrusion operations
- To know about the processing of plastics like injection molding and blow molding,

COURSE OUTCOMES:

Knowledge and understanding the,

- Extending the student's knowledge of production machines and design and analyze of such systems.
- Developing theoretical/practical capabilities of students so that they can characterize, transform, use and apply in engineering from the knowledge gained in solving related engineering problems.

UNIT–I

Casting Process: Casting, casting terms, pattern materials, types of patterns, pattern allowances, color code for patterns, Molding sands, coresands,propertiesofmoldingsandanditsingredients,differenttypes of molding machines, use of chaplets, chills, riser and gating system.

UNIT–II

Special Casting Process: CO_2 molding, die casting, centrifugal casting, shell molding, investment or lost wax process; Casting defects causes and remedies. Furnaces used in foundry–cupola, pit furnace, electric arc furnaces.

UNIT- III

Fabrication Process: Fusion welding processes – Types of Gas welding – Equipments used – Flame characteristics – Filler and Flux materials - Arc welding equipments - Electrodes – Coating and specifications – Principles of Resistance welding – Spot/butt, seam welding - Gas metal arc welding – Flux cored – Submerged arc welding – Electro slag welding – TIG welding – Principle and application of special welding processes - Plasma arc welding – Thermit welding – Laser, Electron beam welding – Friction welding – Diffusion welding – Flame cutting – Weld defects – Brazing and soldering process – Filler materials and fluxes, Design Considerations in welding.

UNIT- IV

Bulk Deformation Processes: Hot working –types and cold working of metals-types – Forging processes – Open and close die forging –Types of Forging Machine – Typical forging operations –Rolling of metals – Flat strip rolling – Types of Rolling mills –Forces in rolling and power requirement-Tube piercing – Principles of Extrusion – Types of Extrusion – Hot and Cold extrusion –Principle of rod and wire drawing – Equipments used- load estimation.

UNIT-V

Sheet Metal Processes: Stamping, forming and other cold working processes: Blanking and piercing- Bending and forming- Drawing and its types- wire drawing and tube drawing- coining- Hot and cold spinning- Types of presses and press tools. Forces and power requirement in the above operations.

UNIT- VI

Processing of Plastics: Types of plastics, properties, applications and their processing methods & equipments (Blow and injection molding).

TEXT BOOK:

1. Hajra Choudhury,"Elements of Workshop Technology, Vol. I and II", Media Promoters Pvt. Ltd., Mumbai,
2. P.N. Rao,"Manufacturing Technology", Tata McGraw-Hill Publishing Limited,
3. Manufacturing Engineering and Technology/ Kalpakjain.S/ Pearson Education.
4. Production Technology by R.K Jain

REFERENCE BOOKS:

1. B.S.Magendran Parashar & R.K. Mittal,"Elements of Manufacturing Processes", Prentice Hall of India,
2. P.C. Sharma, "A text book of production technology", S.Chand and Company,
3. Begman, 'Manufacturing Process", John Wilely & Sons,
4. Serope Kalpajian, Steven R.Schmid, Manufacturing Engineering and Technology, Pearson Education, Inc. 2002(Second Indian Reprint).
5. Production Technology by K.L.Narayana, J.K. International Publications.
6. Rajput R.K, 'A text book of Manufacturing Technology', Lakshmi Publications
7. S.Gowri, P.Hariharan, and A.Suresh Babu, "Manufacturing Technology", Pearson Education

AUTONOMOUS

MECHANICAL ENGINEERING

II B.Tech, II-Sem (ME) T C
3 2

(A0007123)APTITUDE ARITHMETIC REASONING AND COMPREHENSION

(Common to All Branches)

(Skill Development Course)

OBJECTIVES:

- To make the students ready to the recruitment drives.
- To raise the confidence of the students to face the written test of any Company.
- To train the students regarding employability skills.

OUTCOMES:

- Students becomes well trained for recruitment drives.
- Student become well trained to face the written test of any company.
- Students become well trained in employability skills

UNIT I

Numbers, Number Systems Simple Equations, Ratio, Proportion, Variation Quadratic Equations, Progressions Percentages.

UNIT II

Profit, Loss, Partnerships Averages, Mixtures & Allegations, Simple Interest, Compound Interest, Time and Work-Pipes, indices, surds, inequalities ,Cisterns Time and Distance Geometry and Menstruation.

UNIT III

Permutations & Combinations and Probability Data Interpretation & Data Sufficiency.

UNIT IV

Number & Letter Series, Analogies, Coding Decoding, Odd Man Out Blood Relations.

UNIT V

Direction Sense, Symbols and Notations Deductions & Connectives Clocks, Calendars Analytical

UNIT VI

Reasoning (Distribution+ Binary Logic + Puzzles) Cubes, Venn Diagrams Analytical Puzzles (Linear + Circular +Selections + Sequencing + Routes & Networks + Comparisons) and Non Verbal Reasoning

REFERENCES:

1. R.S.Agarwal " Quantitative Techniques" S.Chand Series
2. Shankuntala Devi " Techniques of Reasoning" S.Chand Series

II B.Tech, II-Sem (ME) P C
3 2

(A0394124) MANUFACTURING TECHNOLOGY LAB

COURSE OBJECTIVES:

At the end of this lab,

- Knowing the techniques of preparing the pattern and moulds
- To determine the properties of the moulding sand
- Knowing the techniques of preparing the welded joints
- Learning the skills to prepare small plastic components using injection and blow moulding techniques
- Learning about plasma welding and brazing techniques

COURSE OUTCOMES:

Knowledge and understanding

- Imparting intensive and extensive practical knowledge of the lab so that students can understand the importance of machines
- Enriching the student's knowledge towards production of machines elements
- Developing theoretical/practical capabilities of students so that they can characterize, transform, use and apply in engineering from the knowledge gained in solving related engineering problems.

I. METAL CASTING LAB:

1. Pattern Design and Making : For one Casting
2. Sand Properties Testing : Exercise-Strength and Permeability.
3. Casting : 1 Exercise.

II. WELDING LAB

1. Arc Welding : 3 Exercises
   (Lap joint, Butt Joint & T- Joint)
2. Spot welding : 1 Exercises
3. Soldering of thin sheets : 1 Exercises
4. Plasma Welding and Brazing(Water Plasma Device) : 2 Exercises

III. MECHANICAL PRESS WORKING

1. Hydraulic Press : Deep Drawing : 1Exercise
2. Pipe Bending. : 1 Exercise

IV. PROCESSING OF PLASTICS

1. Injection Molding : 1 Exercise
2. Blow Molding : 1 Exercise

AUTONOMOUS

MECHANICAL ENGINEERING

II B.Tech, II-Sem (ME)

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(A0391123)FLUID MECHANICS & HYDRAULIC MACHINARY LAB

(Common to ME & EEE)

COURSE OBJECTIVES:

- This course "Fluid Mechanics and Hydraulic Machines" lab imparts intensive and extensive practical knowledge of the lab so that students can understand the importance of concepts of "Fluid Mechanics and Hydraulic Machines" in the field of engineering. The student should able to develop theoretical / practical capabilities so that they can characterize, transform, use and apply in engineering from the knowledge gained in solving related engineering problem.

COURSE OUTCOMES:

- In order to assess the students progress towards achieving the learning outcomes, lectures to enable the students to:
- Use knowledge of Fluid mechanics and hydraulic machines for practical applications.
- Understand and build their abilities for running of Fluid mechanics and hydraulic machines lab.

LIST OF EXPERIMENTS:

1. Verification of Bernoulli's Equation
2. Calibration of Mouthpiece/orifice
3. Calibration of Triangular/Rectangular Notch
4. Calibration of Venturi meter
5. Calibration of Orifice meter
6. Determination of Friction Factor for a given pipe line
7. Impact of Jet on Vanes
8. Performance Test on Pelton Wheel
9. Performance Test on Francis Turbine
10. Performance Test on Kaplan Turbine
11. Performance Test on Single Stage Centrifugal Pump
12. Performance Test on Reciprocating Pump

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MECHANICAL ENGINEERING

II B.Tech, II-Sem (ME)

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3	2

(A0395124)INTERNAL COMBUSTION ENGINES LAB

COURSE OBJECTIVES:

- Imparting intensive and extensive knowledge of the Lab so that students can understand the role of I.C Engines in the field of Engineering.
- Developing theoretical/practical capabilities of students so that they can characterize, transform and use I.C Engines in Engineering and Apply knowledge gained in solving related Engineering problems.
- The student should able to know the valve and port operating of an I.C engine.
- The student should able to know how to conduct the performance test on I.C Engines.
- The student should able to know the how to draw the HBS & HBC of an I.C engines.
- The student should able to know the how to measure the exhaust gas composition.

COURSE OUTCOMES:

At the end of the Lab work the student should have knowledge on/off:

- Applying the practical skills in designing and testing the I.C Engines.
- How the valves and ports of an I.C engine works.
- Conducting and Estimating the performance of an I.C Engine.
- Drawing the HBS & HBC of an I.C engine.
- Various exhaust gas compositions of an I.C engine.

LIST OF EXPERIMENTS:

1. Draw the Actual Valve Timing Diagrams of a four stroke Diesel Engine.
2. Draw the Actual Port Timing Diagrams of a two stroke petrol Engine.
3. Performance Test on 4 -Stroke Multi Cylinder Diesel Engine test rig.
4. Performance Test on 4 -Stroke Multi Cylinder Petrol Engine test rig (MPFI Engine).
5. Performance Test on 4-Stroke Single Cylinder Diesel Engine.
6. Performance Test on 4-Stroke Single Cylinder VCR Diesel Engine.
7. Determination of Engine friction Power by Morse test, retardation test & William's line.
8. Heat Balance Sheet & Heat Balance Chart for 4 -Stroke Single/Multi Cylinder Diesel Engine.
9. Heat Balance Sheet & Heat Balance Chart for 4 -Stroke Multi Cylinder Petrol Engine.
10. Measurement of I.C Engine Exhaust Gas composition.
11. Study of I.C Engine Parts.

III B.Tech, I-Sem (ME) T C
3+1* 3

(A0011123) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Common to all Branches)

OBJECTIVES

- To understand the principles of and techniques of managerial economics.
- To understand the business organizations.
- To understand the financial accounting and analysis.
- To understand maintain a particular product at the lowest cost while meeting the specifications of the customer

OUTCOMES:

- Students will able to analyse the demand in the present market.
- Students will able to how to precise the production cost.
- Students will able to know the price output decisions are made in markets.
- Students will able to maintain the books by using the financial accounting

UNIT I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand determinants, Law of Demand and its exceptions.

UNIT II

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT III

Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

UNIT IV

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT V

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT VI

Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.

5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.Dwivedi:Managerial Economics, 6th Ed., Vikas.

Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.

III B.Tech, I-Sem (ME)

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(A0311125) THERMAL ENGINEERING

(Note: Thermal Engineering Data Book, Steam Tables & Molier Chart are permitted in the examinations**)**

COURSE OBJECTIVE:

- Modern industry requires Mechanical Engineers, who are capable of design & implementing Thermal Engineering specific tasks. To do this engineer must exercise creative ability, sound judgment and technical knowledge.
- The student should able to know the various thermodynamic vapor cycles used in thermal power plants.
- The student should able to know the various boilers used in thermal power plants.
- The student should able to know the various turbines used in thermal power plants.
- The student should able to know the various and air compressors.
- The student should able to know the basics of Refrigeration & Air Conditioning.

COURSE OUTCOMES:

At the end of the course work the student should have knowledge on/of:

- Various vapor power cycles used in thermal power plants.
- Various types of nozzles used in thermal power plants.
- Various type of turbines used in power plants.
- Various types of condensers and compressors used in various application of thermal engineering.
- Basics of refrigeration and air conditioning.

UNIT I

Thermodynamic Vapour Cycles: Carnot Cycle with Steam as Working Substance-Rankine Cycle- Methods to improve cycle performance – Regeneration – reheating- cycles.

Boilers: Classification of boilers – Working Principle of Simple vertical, Babcock and Wilcox, Lamont & Benson boilers – Study of boiler Mountings & Accessories. Simple problems on Rankine Cycle.

UNIT II

Steam Nozzles: Introduction - types, Steam Flow through nozzles-Velocity of steam, Mass of steam through Nozzle, condition for maximum discharge (critical pressure ratio) – Diameters of throat and exit for maximum discharge, Nozzle efficiency - Simple problems.

UNIT III

Impulse Turbine (Single Stage Only): Introduction- advantages of steam turbines over reciprocation steam engines- classification of stream turbines-impulse turbine –De Laval impulse turbine-Pressure and velocity of steam -Velocity triangle for moving blade - Condition for maximum efficiency - Simple problems.

UNIT IV

Reaction Turbine (Single Stage Only):introduction-Parson's reaction turbine-Pressure and velocity in a reaction turbine –comparison between impulse and reaction turbine-velocity triangles for moving blades - degree of reaction- Condition for maximum efficiency - Simple problems.

UNIT V

Steam Condensers: Requirements of steam condensing plant– Classification of condensers – working principle of different types.

Air Compressors: Reciprocating – Single, multi stage with intercooling – work done - power required - simple problems. Rotary compressors- types, working principle.

UNIT VI

Gas Turbines: introduction-comparison of gas turbines and steam turbines-comparison of gas turbines and IC engines-classification-closed cycle with intercooling and reheating-open cycle gas turbines-simple problems.

Introduction to Refrigeration & Air Conditioning:

Brayton and Rankine cycles – Performance Evaluation – Vapour Compression Cycle - performance Evaluation-Psychometric terms & processes – summer & winter air conditioning systems.

TEXT BOOKS:

1. Thermal Engineering, R.K. Rajput, 7/e, Lakshmi Publications,2009
2. Thermal Engineering, R.S Khurmi & JS Gupta, S.Chand.

REFERENCES:

1. Gas Turbines, V. Ganesan, TMH.
2. Thermodynamics and Heat Engines, R.Yadav, Central Book Depot.
3. Gas Turbines and Propulsive Systems, P.Khajuria & S.P.Dubey, Dhanpatrai.
4. Thermal Engineering-M.L.Mathur & Mehta, Jain bros.
5. Thermal Engineering Data Book, B.S. Reddy and K.H. Reddy, I.K. International.

III B.Tech, I-Sem (ME) T C
3+1* 3

(A0312125) DESIGN OF MACHINE ELEMENTS- I

COURSE OBJECTIVE:

- Modern industry requires mechanical engineers, who are capable of designing machinery to perform specific tasks. To do this engineer must exercise creative ability, sound judgment and technical knowledge.
- The student should learn the procedure of designing the machine element.
- The student can able to differentiate different types of loading for designing the machine parts
- The student should learn various theories related the design of machine elements for different loading conditions
- The student should be able to apply these principles to the solution of variety of practical problems and be able to apply their knowledge to solve more complicated problems and study the affect of problem parameters.
- The students should be prepared to continue the study of designing various power transmission elements.

COURSE OUTCOMES:

This course assigned readings, lectures and home works to enable the student to

- Use engineering design principles to solve simple and complex machine elements subjected to study and dynamic loading.
- Understand and apply factor of safety, stress concentration factor and fatigue concentration factors.
- Understand and apply various failure theories to the machine elements.
- Solve more complicated problems and to study the effect of system parameters.

UNIT-I

INTRODUCTION: The art and science of machine design- Types of design methods - stages in machine design- selection of engineering materials based on mechanical properties-Types of loads, Factor of safety.

STRESSES IN MACHINE MEMBERS: Simple stresses - Combined stresses – Torsional and bending Stresses – impact stresses– Various theories of failure – Design for strength and rigidity, eccentric loading.

UNIT-II

STRENGTH OF MACHINE ELEMENTS: Stress concentration–notch sensitivity, Fatigue stress concentration factor – Design for fluctuating stresses – Endurance limit, S-N Curve – Estimation of Endurance strength – Goodman's criteria – Soderberg's criteria.

UNIT-III

RIVETED JOINTS: Types of riveted joints - modes of failure-strength and efficiency of riveted joints, pitch of the rivets, design stresses - boiler joints, - Riveted joints under eccentric loading.

WELDEDJOINTS: Typesofweldedjoints,strengthofwelds,Designofsimpleweldedjoints.

UNIT-IV

BOLTED JOINTS – Forms of Screw threads. Stresses in Screw fasteners. Design of bolts with pre-stresses – Design of joints under eccentric loading– Bolts of uniform strength.

Keys, Cotters and Knuckle Joints: Types of Keys, stresses in Keys, design of rectangular and square Keys. Design of Cotter joints: spigot and socket, sleeve and cotter, jib and cotter joints- Knuckle joints.

UNIT-V

DESIGN OF SHAFTS AND COUPLINGS- Design of solid and hollow shafts for strength and rigidity – Design of shafts for combined bending and axial loads. Design of Rigid couplings: Muff, Split muff and Flange couplings.

UNIT-VI

MECHANICAL SPRINGS: Classification of springs-Stress and deflections of helical Springs-Springs for fatigue loading -Energy storage capacity- Leaf springs-Coaxial springs.

TEXT BOOKS:

1. Machine design, R.S Khurmi and JK Gupta.S.Chand & Chand
2. V.B.Bhandari, Design of Machine Elements,TMH Publishers, New Delhi.
3. Machine Design, Kannaiah, Scietech.
4. Machine Design by S.Md. Jalaluddin, Anardha Publishers, Chennai.

REFERENCES:

1. Machine design, J.E. Shigley.
2. Design of Machine Elements, M.F. Spotts, PHI.
3. Schaum's series Machine Design, TMH Publishers, New Delhi.

III B.Tech, I-Sem (ME)

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(A0313125) DYNAMICS OF MACHINERY

COURSE OBJECTIVE:

- The study of dynamics of machinery is an applied field of mechanical engineering that is concerned with understanding the relationship between the power and motions of the machine parts.
- The overall objective of this course is to learn how to analyze the motions of mechanisms, design mechanisms to have given motions, and analyze forces in machines.
- The student can able to analyze clutches, governors, brakes and dynamometers
- The student can understand the concepts of static and dynamic mass balancing and flywheel
- The student can understand about the vibrations and its modes and the analyses of spring-mass system of single degree freedom systems

COURSE OUTCOMES:

This course used assigned readings, lectures and home works to enable the student to

- The student can apply basic principles and knowledge for the analysis and design of a system

UNIT – I

Precession: Gyroscopes, effect of precession motion on the stability of aero planes and ships, moving vehicles such as motor car, motor cycle.

Friction: Introduction, Friction of screw and nuts, screw jack, torque required to lift the load and to lower the load by using screw jack, efficiency of screw jack, over locking and self-locking screw, friction of V-threads, friction of pivot and collar bearings, uniform pressure, uniform wear, Friction circle.

UNIT – II

Clutches: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.

Brakes: Introduction, type of brakes, Simple block brakes, internal expanding brake, band and block brake, braking of vehicle.

UNIT – III

Force analysis and fly wheel: Static force analysis of a slider crank mechanism, Inertia force and inertia torque, D-Alembert's Principle, Dynamic analysis of slider crank mechanism. Introduction to flywheel, Turning moment diagrams for steam engine, I.C. Engine and multi cylinder engine. Fluctuation of energy, Coefficient of Fluctuation of energy, coefficient of Fluctuation of speed. Energy stored in fly wheels and their design.

UNIT-IV

Governors: Introduction, type of governors, Centrifugal governor, Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting. Effort and power of a governor.

UNIT – V

Balancing: Introduction, Static balancing, dynamic balancing, balancing of several masses rotating in the same plane, balancing of several masses rotating indifferent planes. Balancing of reciprocating masses, partial balancing of loco motives, effects of partial balancing in loco motives, secondary balancing, balancing of in line engines.

UNIT – VI

Vibrations: Type of vibrations, Undamped Free vibrations of a single degree freedom (Spring-mass system)-Derivation of differential equation, Solution of differential equation. Damped Free vibrations of single degree freedom system, Different types of dampings- Over damped system, Critically-damped system, Under-damped system, Logarithmic decrement. Forced vibrations of single degree with harmonic excitation, Vibration isolation, Critical or whirling speed of a shaft.

Torsional vibrations: Natural frequency of free torsional vibrations, free torsional vibrations of a single rotor system, free torsional vibrations of a two rotor system. Torsionally equivalent shaft.

TEXT BOOKS:

1. Theory of Machines, S.S Ratan, MGH,
2. Theory of Machines, R.S Khurmi & Gupta, S.Chand publ.
3. Mechanical Vibrations by G.K. Grover

REFERENCES:

1. Mechanism and Machine Theory, JS Rao and RV Dukkipati, New Age Publ.
2. Theory of Machinery, Ballaney, Dhanpat Ray
3. Theory of Machines, Thomas Bevan, CBS Publishers
4. Theory of Machines, Jagadish Lal & J.M.Shah, Metropolitan.

III B.Tech, I-Sem (ME) T C
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(A0314125)MECHANICAL MEASUREMENTS

COURSE OBJECTIVES:

- The student should able to apply the knowledge to obtain quantitative measurement at various areas like temperature effect on change in physical state, change in chemical state, altered physical dimensions, change in electrical properties
- Student should able to understand applications of transducers in measuring pressure, temperature, fluid flow, level, speed, acceleration etc. Students get the knowledge about closed loop control systems and open loop control system.

COURSE OUTCOMES:

- Enriching the student's knowledge in mechanical measurements
- Cognitive skills (thinking and analysis) can be improved
- The students should link the scientific concepts they are learning with real applications by giving live examples where the subject concepts are applied.
- The student shall know the uses of transducers and sensors and their practical importance in industry and its importance in advanced courses

UNIT-I

Definition –Introduction, basic principles of measurement - Measurement systems, generalized configuration and functional descriptions of measuring instruments - examples. Dynamic performance characteristics sources of error, Classification and elimination of error.

Transducers: Introduction, Theory and construction of various transducers to measure displacement - Inductive, capacitance, Piezo electric, resistance, ionization and Photo electric transducers.

UNIT-II

Measurement of temperature: Introduction, Classification - Ranges - Various Principles of measurement – Liquid filled thermometers, Filled system thermometers, Solid Expansion, Electrical Resistance thermometers, Thermistor, Thermocouple, Radiation and optical Pyrometers.

Measurement of pressure: Introduction, Classification - different principles used- Bourdon pressure gauges, Bellows – Diaphragm gauges. Low pressure measurement - Thermal conductivity gauges - ionization pressure gauges, Mcleod pressure gauge.

UNIT - III

Measurement of level: Introduction, Direct method, float type, indirect methods – electrical, capacitative, magnetic, gamma ray liquid level indicators - Bubler level indicators.

Flow measurement: Introduction, types of flow measuring instruments, Rota meter, magnetic, Ultrasonic, Turbine flow meter, Hot - wire anemometer Laser Doppler Anemometer (LDA).

Measurement of speed: Introduction, Mechanical Tachometers - Electrical tachometers - Stroboscope, Noncontact type of tachometer .

UNIT -IV

Measurement of Acceleration and Vibration: Introduction, Different instruments - Principles of Seismic instruments - Vibrometer and accelerometer.

Measurement of humidity –Introduction, Moisture content in the gases, sling psychrometer, Absorption psychrometer, Dew point meter.

UNIT - V

Stress & strain measurements: Introduction, Various types - electrical strain gauge - gauge factor - method of usage of resistance strain gauge for bending, compressive and tensile strains - usage for measuring torque.

Measurement of force, torque and power- Elastic force meters, load cells, Torsion meters, Dynamometers.

UNIT - VI

Elements of control systems: Introduction, Importance - Classification - Open and closed systems- Examples with block diagrams – Servomechanisms - Temperature, speed & position control systems- Examples with block diagrams

TEXT BOOKS:

1. Mechanical Measurements, Beckwith, Thomos (Rearson education Asia).
2. Mechanical Measurements, D.S Kumar.

REFERENCES:

1. Instrumentation, Measurement & Analysis, B.C.Nakra & K.KChoudhary, TMH.
2. Instrumentation and Control Systems, S.Bhaskar, Anuradha Agencies.
3. Mechanical and Industrial Measurements, R.K. Jain, Khanna Publishers.
4. Industrial Instrumentation, Ragasudha Gurajala, Spectrum Hyd.

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(A0315125) MACHINE TOOLS

COURSE OBJECTIVE:

- The student should understand the some fundamental aspects of an overview of machine tools & metal cutting theory, including Components of the Engine lathe, Turret and capstan lathes, Grinding machine, Drilling and Boring Machines, Milling machine, shaping slotting and planning machines.
- The student should able to apply the knowledge to solve more complicated problems and study the effect of process parameters and able to describe the construction and working of different types machine tools.

COURSE OUTCOMES:

- The students should link the scientific concepts they are learning with real applications by giving live examples where the subject concepts are applied.
- Communication skills (personal and academic) Students gain a lot of information by searching through the internet and references and from local industrial companies in order to design and solve the problems associated with this subject.

UNIT – I

Geometry of single point cutting tools and angles-Mechanism of chip formation in machining ductile and brittle materials- and types of chips –Built-up-Edge (BUE) formation and its effects, Use of Chip breaker in machining-principles and methods of chip breaking. Mechanics of Orthogonal cutting –Merchant's Force diagram, cutting forces – cutting speeds, feed, depth of cut, tool life and wear, economics of machining-coolants-methods of applications of cutting fluids, mach inability –Tool materials.

UNIT – II

Engine lathe – Principle of working, specification of lathe – types of lathes – work holders, tool holders – Box Tools, Taper turning, thread turning and attachments for Lathes. Turret and capstan lathes – collet chucks – other work holders – tool holding devices – box and tool layout.

Principal features of automatic lathes – classification – Single spindle and multi-spindle automatic lathes– tool layout.

UNIT – III

Shaping, Slotting and planning machines – their Principles of working – Principal parts – specification, classification, Operations performed-Machining time calculations.

Shaper size, shaper mechanism, Crank and slotted link mechanism, Whit worth quick return mechanism, Hydraulic shaper mechanism,

UNIT – IV

Drilling and Boring Machines – Principles of working, specifications, types, operations performed – tool holding devices – twist drill – Boring machines – Fine boring machines – Jig Boring machine-deep hole drilling machine.

UNIT – V

Milling machine – Principles of working – specifications – classifications and principle features of milling machines – machining operations, Types and geometry of milling cutters– methods of indexing –Director Rapid indexing, Plainorsimple indexing, Compound indexing, Differential indexing and angular indexing.

UNIT –VI

Introduction to grinding, lapping, honing and broaching machines-classification- comparison of grinding, lapping and honing- Lapping, Honing and Broaching machines- Grinding wheel: Different types of abrasives – bonds, specification and selection of a grinding wheel.

TEXT BOOKS:

1. Elements of Workshop Technology: Vol: II machine tools; By Choudhury, S. K. Hajara, Choudhury, A. K. Hajara & Roy, Nirjhar.
2. Workshop Technology – Vol II, B.S. Raghuvamshi.
3. Metal cutting by Bhattacharya

REFERENCE BOOKS

1. Manufacturing science by Amitab Ghosh and Ashok Kumr Mallik, Tata-McGraw-Hill Publications

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MECHANICAL ENGINEERING

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(A0316125) COMPUTER AIDED DRAFTING

(Skill Development Course)

COURSE OBJECTIVE:

- To create the awareness among the students of making use of computers for drafting purpose.
- To train the student to make use of AutoCAD software package.
- To improve the quality of the engineering drawing.

COURSE OUTCOMES:

- 2D drawings and 3D drawings can be drawn using AutoCAD Software package.
- Able to create 3D drawings.
- Useful to increase the productivity of an industry

UNIT – I:

Introduction to Auto CAD: The Auto CAD screen - the X-Y co-ordinate system - angular measurement - entering points in Auto CAD - functional keys.

UNIT – II:

Introduction to drawing & modeling – commands – Accurate Input – O snaps – learn about line, circle, offset, und, erase, print – drawing lines to exact points.

UNIT – III:

Object Properties & selection sets – and dimensioning – know about crossing selection – window selection – crossing polygon – crossing window – fence – quick select – changing the object Properties – colour – line type – line weight.

UNIT – IV:

Inquiry tools & layers – isometric views – measure distances – mass properties – area & information of selected objects – how to lock, hide and freeze the layers.

UNIT – V:

Advanced drawing and modifying commands – isometric views and dimensioning: rectangle – trim – extend – offset – scale – text etc.

UNIT: VI

Modeling and editing of solids – extrude – revolve – sweep – copy faces – offset – loft – imprint etc.,

TEXT BOOKS:

1. Working Auto-CAD, Singh, TMH
2. Introduction to Auto-CAD 2D & 3D Design, Alf Yarwood

III B.Tech, I-Sem (ME) P C
3 2

(A0396125) THERMAL ENGINEERING LAB

COURSE OBJECTIVES:

- Imparting intensive and extensive knowledge of the Lab so that students can understand the role of THERMAL ENGINEERING in the field of Engineering.
- Developing theoretical/practical capabilities of students so that they can characterize, transform and use THERMAL ENGINEERING in Engineering and Apply knowledge gained in solving related Engineering problems.
- The student should able to know the use of various air compressors.
- The student should able to know use of boilers.
- The student should able to know the use of refrigeration systems.
- The student should able to know the use of air conditioning systems.

COURSE OUTCOMES:

At the end of the Lab work the student should have knowledge on/off:

- Applying the practical skills in designing and testing the thermal engineering related equipment.
- How to estimate the performance of a boiler.
- How to estimate the performance of an air compressor.
- Conducting and Estimating the performance of a refrigerator and air conditioning systems.
- Conducting and Estimating the performance of a Gas/Steam Turbine.

LIST OF EXERCISES:

1. Determination of Volumetric Efficiency of Multi Stage Reciprocating Air Compressor Test Rig.
2. Determination of Isothermal Efficiency of Multi Stage Reciprocating Air Compressor Test Rig.
3. Determination of COP of a Vapour Compression Refrigeration Test Rig.
4. Determination of psychometric properties of an Atmospheric Air.
5. Determination of COP of a Summer Air Conditioning Test Rig.
6. Determination of COP of a Winter Air Conditioning Test Rig.
7. Determination of Efficiency of a Steam Boiler Test Rig.
8. Determination of efficiency of a Gas/Steam Turbine Test Rig.

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(A0397125) DYNAMICS &INSTRUMENTATION LAB

COURSE OBJECTIVE:

- A student can realize the working principles of Gyroscope, different modes of vibrations etc,.
- To demonstrate the principles of strain gauges, pressure gauges.
- To demonstrate the working principle of LVDT.

COURSE OUTCOMES:

- Obtained knowledge is useful to apply the principles in the real engineering applications like in Aeronautical Engg, Automobile Engg etc,.
- The obtained knowledge is useful to devise certain engineering measuring instruments.

SECTION-A
DYNAMICS LAB:

1. Longitudinal vibrations of a spring-mass system.
2. Determination of Mass moment of inertia using compound pendulum.
3. Determination of Mass moment of inertia using Bi-filer suspension.
4. Determination of Torsional natural frequency of single and two rotor system.
5. Static and Dynamic balancing of rotary masses.
6. Motorized Gyroscope- study of Gyroscopic effect and couple.
7. Critical speed or whirling speed of a shaft.
8. Experiments on Governors- Determination of range sensitivity, effort etc., (Watt, Porter, Proell and Hartnel Governors)
9. Cam Jump Analysis Cam profile drawing and study of jump phenomenon.
10. Determination of holding Toque of an epi-cyclic gear train.

SECTION-B
INSTRUMENTATION LAB:

1. Study and calibration of LVDT transducer for displacement measurement.
2. Calibration of Pressure Gauges
3. Calibration of thermistor for temperature measurement.
4. Calibration of strain gauge for strain measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of load cell for load measurement.
10. Study and calibration of McLeod gauge for low pressure.

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MECHANICAL ENGINEERING

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3 2

(A0398125) COMPUTER AIDED DRAFTING LAB

COURSE OBJECTIVE:

- To create the awareness among the students about the use of computers for drafting purpose.
- To train the student to make use of AutoCAD software package.
- To improve the quality of the engineering drawing.

COURSE OUTCOMES:

- Various drawing entities can be drawn using computers.
- 2D drawings and 3D drawings can be drawn using AutoCAD Software package.
- Useful to increase the productivity of an industry.

LIST OF EXERCISES:

1. Draw a simple entity using absolute co-ordinate method.
2. Draw a simple entity using relative co-ordinate method.
3. Draw a simple entity using direct distance method.
4. Using offset command &draw the given sketch.
5. By using Array command compute the drawing.
6. Draw simple machine element using fillet and chamfer command.
7. Exercise on mirror command.
8. Compute the drawing and specify dimensions.
9. Using copy commands compute the isometric views.
10. Exercise on isometric views.
11. Using revolve command complete the model.
12. Using extrude, sweep & loft command complete the model.

SOFTWARE PACKAGES REQUIRED:

- Auto-CAD Package.

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MECHANICAL ENGINEERING

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(A0317126) INDUSTRIAL MANAGEMENT

COURSE OBJECTIVE:

- This course provides techniques of applying management principles to professional positions held by Engineers and Engineering Technologists.
- The management functions, especially suited to scientist & Professionals in technical and industrial environment are part of the curriculum.
- Students are exposed to the theory and practices of modern management approaches, tools and techniques in complex industrial & Competitive economic environment.

COURSE OUTCOMES:

- Use knowledge and comprehension in management tools to apply in technical organizations.
- Understand and build their analytical abilities in the use of Industrial Management.
- Use management techniques to direct the organizations/industries for goal achievement.
- Solve problems associated with the operations management and scheduling of resources in efficiently and effectively.
- The students may be asked use knowledge of management techniques and write a computer program to address and solve more complicated problems and to study the effect of various parameters on the management/organization.

UNIT-I

Introduction: Concepts of Management and Organization – Functions of Management – Evolution of Management Thought : Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs – Systems Approach to Management.

UNIT-II

Plant Location & Layout: Plant location, definition, factors affecting the plant location, comparison of rural and urban sites- methods for selection of plant- Matrix approach. Plant Layout – definition, objectives and types of plant layout.

UNIT-III

Work Study: Principles of Management- Management Tools – time and motion study, work simplification-process charts and flow diagrams, Production Planning, Specification of Production requirements.

Production Planning & Control: Introduction, functions of PPC , Scheduling.

UNIT-IV

Materials Management: Objectives, Inventory – functions, types, associated costs, inventory control techniques-ABC and VED analysis. Stores Management and Stores Records. Purchase management, duties of purchase of manager, associated forms.

Introduction to MRP- Inputs to MRP, benefits, MRP-II

UNIT-V

Quality control: Meaning, process control, SQC control charts, single, double and sequential sampling, Introduction to TQM.

UNIT-VI

Job Evaluation and merit rating: introduction-Job evaluation-objectives, benefits and limitations of job evaluation-methods of job evaluation: simple ranking system, grade description method, factor comparison method, point method-merit rating-objectives of job evaluation-methods of merit rating: Ranking method, paired comparison method, checklist method, graphic rating method, rating by result-requirements for success of merit rating system.

TEXT BOOKS:

1. Khanna O.P.: Industrial Engineering
2. T.R. Banga : Industrial Engineering and Management
3. DR. Ravi Shankar: Industrial Engineering and management/Galgotia publications pvt. Ltd.

REFERENCE BOOKS:

1. Sharma B.R: Environmental and Pollution Awareness.
2. Industrial engineering and operations management by S.K. Sharma and Savita Sharma.

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MECHANICAL ENGINEERING

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(A0318126) HEAT TRANSFER

(Note: The use of Heat transfer data book along with steam tables is permitted in the examinations**)**

COURSE OBJECTIVE:

- Modern industry requires Mechanical Engineers, who are capable of design & implementing Heat Transfer specific tasks. To do this engineer must exercise on creative ability, sound judgment and technical knowledge.

The student is able to know the:

- Different modes of heat transfer.
- The knowledge of heat conduction in various solids.
- The knowledge of heat convection in various mediums.
- The knowledge of boiling and condensation processes.
- The knowledge of heat conduction in various solids
- The knowledge of various heat exchangers.
- The knowledge of radiation heat transfer.

COURSE OUTCOMES:

At the end of the course work the student should have the knowledge on/off:

- Various modes of heat transfer.
- How the conduction takes place in various solids.
- How the convection takes place in various mediums.
- How the boiling and condensation takes place.
- How to estimate the performance of heat exchangers.
- How the radiation takes place.

UNIT – I

Introduction: Modes of heat transfer – Basic laws of heat transfer – General applications of heat transfer. **Conduction Heat Transfer:** Fourier rate equation – General heat conduction equation in Cartesian, Cylindrical coordinates - Heat conduction through plane walls and composite walls - hollow and composite cylinders - hollow and composite spheres - critical thickness of insulation - heat conduction with internal heat generation for wall and cylinder – Problems.

UNIT II

Heat flow through extended surfaces - infinite long fin – fin insulated at the tip- fin losing heat at the tip - Efficiency and effectiveness of the fin.

One Dimensional Transient Heat Conduction: Heat conduction in solids having infinite thermal conductivity (negligible internal resistance) — Significance of Biot and Fourier Numbers - Chart solutions - Problems.

UNIT – III

Convective Heat Transfer: Non-dimensional numbers - Significance of non-dimensional numbers - correlations for convective heat transfer.

Forced convection: Introduction to hydrodynamic boundary layer - Concepts and definitions- thermal boundary layer - correlations for forced convection – flow over flat plates and walls - flow inside pipes - turbulent flow over flat plate, cylinders - Problems.

UNIT IV

Free Convection: Bulk mean temperature and mean film temperature - local and average heat transfer coefficients - correlations for free convection – horizontal plates, cylinders – problems.

Heat Transfer with Phase Change: Boiling – Regimes (Theory only),

Condensation: Film wise and drop wise condensation (Theory only).

UNIT: V

Heat Exchangers: Classification of heat exchangers – overall heat transfer Coefficient and fouling factor – Concepts of LMTD and NTU methods – effectiveness - Problems using LMTD and NTU methods.

UNIT VI

Radiation Heat Transfer:

Introduction - surface emission properties - absorptivity, reflectivity, and transmissivity - concept of black body & grey body - Stefan Boltzmann law - Kirchhoff, Wein & Lambert's cosine law - shape factor and silent features of shape factor.

TEXT BOOKS:

1. Heat and Mass Transfer, R.K.Rajput, S.Chand & Company Ltd.
2. Heat and Mass Transfer, D.S.Kumar.SK Kataria & Sons.

REFERENCE BOOKS:

1. Fundamentals of Engg. Heat and Mass Transfer, R.C.Sachdeva, 3/e, New Age International.
2. Heat Transfer, P.K.Nag, 2/e, TMH, 2010.
3. Heat Transfer, Holman.J.P, 9/e, TMH, 2010.
4. Fundamentals of Heat and Mass Transfer, Kondandaraman, C.P., 3/e, New Age Publ.
5. Fundamentals of Heat Transfer, Incropera, 5/e, Wiley India.
6. Heat Transfer, Ghoshdastidar, Oxford Univ. Press, 2004.
7. Thermal Engineering Data Book, B.S.Reddy and K.H.Reddy Rev/e, I.K. International.
8. Fundamentals of Heat and Mass Transfer, M.Thirumaleswar, Pearson Edu.

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(A0319126) ENGINEERING METROLOGY

COURSE OBJECTIVE:

- The student should understand the some fundamental aspects of system of limits and fits, measurement of linear, angular dimensions, including limit gauges.
- Emphasis is placed on understanding of surface roughness & described mathematically. The screw thread, gear measurement methods are also considered in some detail..
- The student should able to apply the knowledge to solve more complicated problems and study the effect of problem parameters and able to describe the construction and working of different types of metrology machines and also plot the performance curves.
- The student should be prepared to continue the study and analyse the metrology and surface engineering to solve the complicated practical problems.

COURSE OUTCOMES:

- Enriching the student's knowledge of metrology and learning the design of such systems.
- Improves cognitive skills (thinking and analysis)
- Practical and subject specific skills (Transferable Skills) can be improved
- The Science of metrology & surface engineering is of practical importance in industry and is of importance also for other advanced courses

UNIT – I

LIMITS, FITS, TOLERANCES AND GAUGES : Introduction, Limits, tolerance, tolerance build-up, compound tolerances, terminology for limits and fits, system of writing tolerance, Unilateral, Bi-lateral systems; Relation between tolerance and cost; types of fits, hole and shaft basis systems, standard limit systems-Indian standard system, interchange ability and selective assembly. Taylor's principle – Design of go and No go gauges, plug, ring, snap, gap, taper, profile and position gauges.

UNIT – II

STANDARDS OF MEASUREMENTS: Line standards, End standards and Wavelength standards.

LINEAR AND ANGULAR MEASUREMENT: Vernier caliper, vernier height gauge, micrometers, telescopic gauge, dial bore gauge, slip gauges, Dial indicators, vernier and optical bevel protractor, optical dividing head, sine principle and sine bars, angle gauges, sprit level, clinometers, rollers and spheres used to determine the tapers.

UNIT –III

COMPARATORS: Introduction; Need of comparator; Basic Principles of Operation, uses, essential characteristics; classification of comparators; Mechanical, optical, mechanical optical, Electrical and Electronic Comparators, pneumatic comparators, fluid displacement comparators, multicheck comparators, Eden-Rolt-Millionrh comparator and their uses in mass production.

UNIT – IV

SCREW THREAD MEASUREMENT: Screw thread terminology, errors in threads; pitch errors; measurement of various elements of thread; measurement of major, minor and effective diameter; Tool maker's microscope and its uses, optical projector.

GEAR METROLOGY: Terminology of gear tooth, measurement of tooth thickness - chordal thickness method-constant chord method- base tangent method- measurement over pins or balls Parkins on gear tester.

UNIT – V

SURFACE TEXTURE: Introduction, factors affecting the surface roughness, reasons for controlling surface texture, orders of geometrical irregularities, Elements of surface texture, methods of measuring surface finish, analysis of surface traces.

UNIT – VI

ACCEPTANCE TESTS FOR MACHINE TOOLS: Introduction**;** alignment tests on lathe, milling, drilling shaping, slotting, surface grinder; performance tests, preparation of acceptance charts.

TEXT BOOKS:

1. Engineering Metrology / R.K. Jain / Khanna Publishers.
2. A text book of Metrology / M. Mahajan. / Danpath Ray & Co.

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MECHANICAL ENGINEERING

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(A0320126) DESIGN OF MACHINE ELEMENTS- II

(Note: The use of Design Data Book is permitted in the End Examinations**)**

COURSE OBJECTIVE:

- The student should is expected to analyse mechanical systems and select the proper machine elements (bearings, gears, pulley, belts,) from commercial catalogues for a required application.
- The student should be able to execute original designs of machine elements.
- The student will be able to implement design procedures to perform complete design projects individually or in a team.
- The student is expected to communicate design ideas by performing production CAD drawings, writing technical reports and making oral presentations.

COURSE OUTCOMES:

- To assess the student's progress towards achieving the Learning Outcomes, a number of homework problems may be given, graded and handed back to the students.
- Work within realistic constraints (such as economical, environmental, social, political, manufacturability, health and safety, ethical, and sustainability) in realizing systems.
- Participate in the development and selection of ideas, and interact with industry.
- Students may be asked to use solid modelling for engineering applications.
- Students may be asked to analyse engineering problems using computing tools.
- Students may be asked to analyse engineering problems using computing tools.

UNIT – I

BEARINGS: Types of Journal bearings – Lubrication – Bearing Modulus–bearing materials – journal bearing design – Ball and roller bearings – Static loading of ball & roller bearings, bearing life.

UNIT – II

DESIGNOFI.CENGINEPARTS: Design of connecting rod-stress due to whipping action on Connecting rod – design of trunk type piston for I.C engine, design of crank and crank shafts.

UNIT – III

DESIGN OF CURVED BEAMS: Introduction, stresses in curved beams, Expression for radius of neutral axis for rectangular, circular, trapezoidal and T-Section. Design of crane hooks, C –clamps**.**

UNIT – IV

POWER TRANSMISSIONS SYSTEMS: Design of Flat belt drives, V-belt drives & rope drives. Selection of wire ropes, design procedure for chain drives.

UNIT-V

SPUR & HELICAL GEARS: Classification of gears, design of spur gears, Lewis equation –bending strength, dynamic load and fatigue of gear tooth- Design of Helical gears.

UNIT-VI

POWER SCREWS: Design of screw, Square ACME, Buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

TEXT BOOKS

1. V.B.Bhandari, Design of Machine Elements,TMH Publishers, New Delhi.
2. Machine Design, Kannaiah/ Scietech
3. Machine Design, S MD Jalaludin, Anuradha Publishers
4. T.V. Sundararajamoorthy and N. Shanmugam, Anuradha Publishers

REFERENCES:

1. Sadhu Singh[2000], Machine Design, Khanna Publishers, New Delhi.
2. Joseph E.Shigely Mechanical Engineering Design, TMH Publishers, New Delhi.
3. M.F.Spotts, Design of Machine Elements, PHI Publishers, New Delhi.
4. Pandya and Shah Machine Design, Charotar Publishers, Anand.

DESIGN DATAHANDBOOK:

1. Mahadevan and Balaveera Reddy [1996], Machine Design Data Hand Book, CBS Publishers, New Delhi.

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MECHANICAL ENGINEERING

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(A0321126) TOOL DESIGN

COURSE OBJECTIVE:

- Able to understand various manufacturing methods and different tools used therein.
- To inculcate basic knowledge of tool design and the student should design cutting tools for various machining processes
- The student should gain the Knowledge of designing jigs and fixtures.

COURSE OUTCOMES:

- Designing and assessment of tools for quality improvement.
- Student can be able to design and develop single point and multi point cutting tools.
- Student can be able to design and development of jigs and fixtures for a particular application.

UNIT -I

Design of single point cutting tools: Single point, cutting tools-various systems of specifications, geometry and their inter relation, theories of formation of chip and their effect, design of broach.

UNIT - II

Design ofmultipoint cutting tools: Drill geometry, Design of Drills, Rake & Relief angles of twist drill, speed, feed and depth of cut, machining time, forces, Milling cutters, cutting speeds and feed-machining times-design-form cutters, combination tools, reamers etc.

UNIT -III

Design of jigs and fixtures: Basic principles of location and clamping, locating, methods and devices, jigs, definitions, types, general consideration in the design of jigs, drills bushing, methods of construction, fixtures-vice fixtures milling, boring, and lathe grinding fixtures.

UNIT-IV

Design of sheet metal blanking and piercing: Fundamentals of die cutting operating, power press types, General press information, Material handling equipment, cutting action in punch and die operation. Die clearance, and types of Die construction. Die design fundamentals-blanking and piercing die construction, pilots, striper and pressure pads presswork material, strip layout, short run tooling for piercing.

UNIT-V

Design of sheet metal bending, forming and drawings die: Bending dies, drawing dies, forming dies, drawing operations, variables that effect metal flow during drawing. Determination of blank size, drawing force, single and double action draw dies.

UNIT -VI

Tool life and tool wear: theories of tool wear-adhesion, abrasive and diffusion wear mechanisms forms of wear, tool life criteria and Mach inability index, tool wear criterion, measurement of tool wear.
Introduction to Plastic tooling-commonly used plastic tooling materials.

TEXT BOOKS:

1. Tool Design, Donaldson, Lecain and Goold, TMH.
2. Principles of Metal cutting, A Bhattacharya, New Central Book Agency, Calcutta

REFERENCES:

1. Production Engineering Design (Tool Design), Surendra Kenav and Umesh Chandra, Satyaprakashan, New Delhi 1994.
2. Design of Cutting Tools. Use of Metal Cutting Theory, Amitabh Bhattacharya and Inyong Ham, ASTME publication Michigan USA, 1969.
3. Fundamentals of Machining and Machine Tools, RK Singal and Others, I.K. International, 2008.
4. Metal Cutting Principles, Shaw, Oxford Univ. Press.

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3+1* 3

(A0322126) FINITE ELEMENT METHODS

COURSE OBJECTIVE:

- To awareness among the student to solve complicated problems with different techniques
- To understand the general steps in finite element method
- To understand the basic element formulation technique
- To create the awareness about the use of this science in various fields of engineering
- Able derive equations in finite element method for 1D, 2D, 3D problems
- To study various types of finite elements

COURSE OUTCOMES:

- Be able to formulate and solve basic problems in heat transfer, solid mechanics
- Be able to write computer program based on finite element methods.
- Be able to use Consol, commercial software, to solve basic engineering problems in heat transfer, solid mechanics and fluid mechanics.
- Beams can be analyzed with easy.

UNIT-I

Fundamental concepts in finite element methods, advantages and applications of FEM, steps followed in FEM- Stress and Equilibrium. Strain - Displacement relations. Stress - strain relations. Plane stress, plane strain conditions.

UNIT-II

Finite element technique: Finite element modeling coordinates and shapes functions- Principle of minimum Potential Energy- Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

UNIT-III

Analysis of Bar And Truss Structures: One-dimensional Bar element- derivation of element stiffness matrix, simple problems on bar element, Thermal stresses in 1-D bar element- Two-dimensional truss element, stiffness matrix for two-dimensional truss, simple problems on two-dimensional truss structures.

UNIT-IV

Analysis of Beam Structures: Beam elements, stiffness matrix for beam element, simple problems on beam structures – stresses and deflection of beams – cantilever and simply supported beams.

UNIT-V

Two Dimensional Stress Analyses: Finite element modeling for two-dimensional stress analysis, element stiffness matrix for constant strain triangle (CST) and treatment of boundary conditions.

UNIT-VI

Steady State Heat Transfer Analysis: Derivation of basic differential equation, One-dimensional heat transfer through a fin and composite wall.

TEXT BOOKS

1. Tirupati Chandrapatla and Bellagundu Introduction to Finite Element in Engineering, Pearson Education, New Delhi.
2. S.Md. Jalaluddin Introduction of finite element Analysis, Anuradha Publishers, Chennai.
3. David V. Hutton Fundamentals of Finite Element Analysis, TMH Publishers, New Delhi.

REFERENCES

1. C.S. Krishna Moorthy, Finite Element Analysis, TMH Publishers, New Delhi.
2. S.S.Rao Finite Element Methods, Pergamom Press, New York
3. Reddy J.N. - A Introduction to Finite Element Method, McGraw Hill, International Edition,
4. Desai and Abel, Introduction to the Finite Element Methods, CBS Publishers, New Delhi.

AUTONOMOUS

MECHANICAL ENGINEERING

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3 2

(A0013125) PROFESSIONAL ETHICS AND SOFT SKILLS

(Soft Skill Development Course)
(Common to all branches)

OBJECTIVES

The recent past decades have witnessed a dilemma of performance on ethical grounds. A professional be able to carry out tasks and achieve success at societal level. The syllabus has been designed keeping in view of the needs and goals of the generation next undergraduates. It comprises essentials of professional ethics embedded with soft skills which in turn mould students as dynamic professionals. The course of **Professional Ethics and Soft Skills** has been designed with the following objectives.

- To ignite the spark of professionalism among students with the purpose to acquire success at societal level.
- To enable them to accomplish tasks balancing hard skills and soft skills.
- To develop critical thinking skills and emotions of students through recent research theories.
- The greatest contribution of this course shall be to shape human skills of students at the global level.

OUTCOMES

- Be able to acquire professional ethics & Job Etiquettes
- Be able to balance hard skills and soft skills.
- Considerable improvement in communicative ability.
- Increase in motivational level and Professional attitudes.
- Be able to possess wide range of relevant knowledge.

UNIT I

NATURE AND SCOPE OF ENGINEERING ETHICS: Definition, Nature, Scope – Moral Dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory, the characteristic traits of real professional, Moral Reasoning and Ethical theories – Theories of Right Action, Self – interest- Use of ethical Theories- case study.

UNIT II

PROFESSIONAL ETIQUETTES: Professional Etiquettes **–** Mobile Etiquettes – Email Etiquettes -Kinesics – Proxemics - Chronemics – Chromatics – Olfacts - Haptics – Case Study.

UNIT III

CORPORATE COMMUNICATION: Communication models- Types of Communication – downward and upward communication Business Deliberations – Meetings – Negotiation Skills - Case Study.

UNIT IV

SOFT SKILLS: Interpersonal Communication – Johari Window – Interpersonal conflict resolutions- Daniel Goleman's Emotional Intelligence.

UNIT V

GLOBAL ISSUES: Multinational corporations – cross-cultural communication-Environmental ethics – Computer – ethics –Terrel Ward Bynum's concept of computer ethics - Weapons developments- case study.

UNIT VI

INTRODUCTION TO INTELLECTUAL PROPERTY: Meaning and Types of Intellectual Property – recent developments of the copy right act – plagiarism – trademark protection – patent law.

TEXT BOOKS:

1. Charles D.Fleddermann [1999], *Engineering Ethics*, Prentice Hall Publishers, New Mexico.
2. Business Communication , P.D. Chaturvedi, Mukesh Chaturvedi

REFERENCES :

1. The ACE of Soft Skills(Attitude, Communication and Etiquette for success) by – Gopalaswamy Ramesh & Mahadevan Ramesh, Pearson 2010.
2. Essentials of Business Communication, Rajendra Pal, JS.Korlahhi, S.Chand
3. Intellectual Property Right , Deborah E. BouchouxS, Cengage, 2005
4. Business Ethics and Professional Values, A.B. Rao, Excel,2009
5. M.P. Raghavan [2006], Professional Ethics And Human Values, Scitech Publications, Chennai.

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(A0399126) METROLOGY & MACHINE TOOLS LAB

COURSE OBJECTIVE:

- This course "metrology and machine tools" lab imparts intensive and extensive practical knowledge of the lab so that students can understand the importance of concepts of "metrology and machine tools" in the field of engineering.
- The student should able to develop theoretical / practical capabilities so that they can characterize, transform, use and apply in engineering from the knowledge gained in solving related engineering problem.

COURSE OUTCOMES:

- Use knowledge of metrology and machine tools for practical applications.
- Understand and build their abilities for running of metrology and machine tools lab.

LIST OF EXPERIMENTS:

1. Measurements of length, height, depth, diameters by vernier calipers, vernier height gauge and micrometers.
2. Measurement of bores by dial bore gauge.
3. Use of gear teeth vernier caliper and checking the chordal addendum and chordal height of spur gear.
4. Machine tool alignment tests on lathe.
5. Measurement of angle by sine bar and bevel protractor.
6. Measurement of threaded parameters.
7. Step turning and taper turning on lathe machine.
8. Thread cutting and knurling on lathe machine.
9. Prepare a model using Drilling and tapping operation.
10. Prepare a model using Shaping machine.
11. Prepare a model using slotting machine.
12. Prepare a model using Milling machine.

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(A0381126) HEAT TRANSFER LAB

(Note: Heat Transfer Data Books are Permitted in the Examinations)

COURSE OBJECTIVE:

- The student should able to find thermal conductivity of the given metal rod, composite wall, insulating powder, lagged pipe.
- Heat transfer in drop wise and film wise condensation processes
- Find the critical heat flux of the given wire
- Find the heat transfer through the fin by forced and natural convection processes
- Heat transfer through parallel and counter flow heat exchangers
- Find the value of Stefan Boltzmann constant and emissivity of the plate.

COURSE OUTCOMES:

- Gain the knowledge in drop wise and film wise condensation processes, heat exchangers and able to identify the heat exchanger for the given application.
- Variation of resistance and heat transfer with temperature for various metals
- Identify the type of fin, thickness and no. of fins required for the given quantity of heat dissipation.

LIST OF EXPERIMENTS:

1. Thermal conductivity of insulating powder material through Concentric Sphere apparatus.
2. Thermal conductivity of insulating material through lagged pipe apparatus.
3. Overall heat transfer co-efficient through Composite Slab Apparatus.
4. Thermal Conductivity of Metal Rod (conductor).
5. Effectiveness of Pin-Fin by Natural Convection Process.
6. Effectiveness of Pin-Fin by forced convection.
7. Heat transfer coefficient in natural convection.
8. Experiment on Parallel and counter flow heat exchanger.
9. Emissivity of a given test plate by Emissivity apparatus.
10. Experiment on Stefan Boltzmann Apparatus.
11. Heat transfer in drop and film wise condensation.
12. Experiment on Critical Heat flux apparatus.
13. Study of heat pipe and its demonstration.
14. Heat transfer through a Helical Heat Exchanger.

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(A0382126) PARAMETRIC MODELLING-I LAB

COURSE OBJECTIVE:

- To train the student to make use of Pro-E software package
- To improve the quality of the Engineering Drawing.

COURSE OUTCOMES:

- 2D drawings and 3D drawings can be drawn using Pro-E Software package.
- Able to create 3D assemble drawings.
- Useful to increase the productivity of an industry.

UNIT – I:

Introduction to Pro/E & sketching: What is parametric modeling – setting up working directory – different file extensions in Pro/E – sketch tools – create and edit dimensions – constraints.

UNIT – II:

Part Modeling: Feature creations – protrusion & cut – solid and thin features – shell – dress up features – pattern chamfer – fillet.

UNIT – III:

Assembly: Introduction to top-down & bottom-up assembly – assembly constraints – Skelton model – exploded views.

UNIT – IV:

Surface modeling: Datum curves – points – plans – co-ordinate systems – sketch based features – extrude – trim – offset – merge.

UNIT – V:

Drafting: Introduction to drafting with / without templates – placing views – placing dimensions – bill of materials.

UNIT – VI:

Sheet metal – flat walls – extrude walls – creating walls – punelus – notches – forms – dies – bending the sheet.

TEXT BOOKS:

1. Parametric Modelling, Randy H Shih.
2. Pro/Engineer Wildfire,Dr. Zuomin Dong**,** Department of Mechanical Engineering, University of Victoria.

LIST OF EXERCISES:

1. Draw the sketch with given dimensions.
2. Draw the sketcher and specify dimensions.
3. Create a part using extrude and revolve commands.
4. Create a part using chamfer and fillets.
5. Create a part using sweep, blend tools & pattern.
6. Complete the part using revolve and rib tools.
7. Modify the dimensions and regenerate the existing part.
8. Draw the simple parts and assemble.
9. Draw all parts of machine component and complete the assembly.
10. Generate views for specified part.
11. Create views, dimensions and bill of materials for specified assembly modeling.
12. Draw the surface and convert it into solid.

Soft Ware Package Required: Pro-Engineer

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MECHANICAL ENGINEERING

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(A0323127) CAD/CAM

COURSE OBJECTIVE:

- The student should understand the current advances in Computer-aided design/Computer-aided manufacturing (CAD/CAM) and also about Numerical control machines and the process planning.
- Next generation manufacturers require both systems to maintain or gain a competitive advantage, reduce risks and improve productivity and viability by using group technology techniques and process plans.
- In addition, recent attention to the implementation of CAD/CAM systems highlights their important role in automating complex design and next generation manufacturing processes. In the next millennium more manufacturers are likely to implement CAD/CAM and NC systems.
- In this student should be understand the problems of integration of CAD/CAM systems. To Study how the severity of these problems relates to CAD/CAM integration success.

COURSE OUTCOMES:

- Extending the student's knowledge of production machines and learning the design of such systems.
- Cognitive skills (thinking and analysis)
- The students should link the scientific concepts they are learning with real applications by giving live examples where the subject concepts are applied.
- Students gain a lot of information by searching through the internet and references and from local industrial companies in order to design and solve the problems associated with this subject.
- The design of production machines is of practical importance in industry and is of importance also for other advanced courses.

UNIT – I

Product cycle, steps involved in Designing a CAD, CAD tools, CAM tools, CPU, input devices, output devices, Memory types, Application of computers for design, benefits of CAD, storage devices.

UNIT – II

Computer Graphics & Drafting: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, Geometric commands, layers, display control commands, editing, dimensioning.

UNIT – III

Geometric modeling: Wire frame models, Wire frame entities, curve representation, parametric representation of synthetic curves, curve manipulations.

UNIT –IV

Numerical control:

Basic components of an NC, Classifications- CNC, DNC, classification of several output devices used in NC systems, feedback devices, NC coordinate systems, NC motion control systems, application of NC, Machining center, turning center, NC Part Programming, A.P.T- language.

UNIT – V

Group Tech: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT – VI

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contact inspection methods, non-contact inspection methods-optical non-contact inspection methods-non-optical computer aided testing, integration of CAQC with CAD/CAM.

TEXT BOOKS:

1. CAD/CAM, A Zimmers & P.Groover, PE, PHI.
2. CAD/CAM-Principles and applications, P.N. Rao, TMH.

REFERENCES:

1. Automation, Production systems & Computer integrated Manufacturing, Groover, P.E.
2. CAD/CAM/CIM, Radhakrishnan and Subramaniah, New Age.
3. Principles of Computer Aided Design and Manufacturing , Farid Amirouche, Pearson
4. CAD/CAM Theory and Practice, R. Sivasubramaniam, TMH
5. Computer Aided Design and Manufacturing, Lalit Narayan, PHI.
6. Computer Aided Manufacturing, T.C. Chang, Pearson.
7. A text book of CAD/CAM, CSP Rao, Hitech Publ.

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(A0324127) OPERATIONS RESEARCH

COURSE OBJECTIVE:

Upon completion of this course, the student should be able to,

- Formulate a real-world problem as a mathematical programming model,
- Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand,
- Understand the relationship between a linear program and its dual, including strong duality and complementary slackness,
- Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change,
- Solve specialized linear programming problems like the transportation and assignment problems,
- Solve network models like the shortest path and scheduling, replacement and queuing problems
- The students should play an effective role in providing model-based support to managers to help them make better decisions at an operational/technical level.

COURSE OUTCOMES:

- In order to assess the students progress towards achieving the learning outcomes, assigned readings, lectures and homework to enable the students to:
- Use some of the techniques, methodologies and models used in Operations Research for practical problems.
- Use techniques in the field of Applied Mathematics that uses mathematical methods and computers to make rational decisions in solving a variety of optimization problems.
- To solve large, complex problems in industry, business, science and technology, management, decision support and other areas and discipline with the use of computer software.

UNIT – I

Linear Programming: Introduction-structure of linear programming model- Formulation–Graphical solution – Simplex method, Big-M method, Two phase method (maximization case and minimization case), Special cases-Duality, dual simplex method.

UNIT-II

Transportation: Introduction-methods of finding initial solution-optimal solution-variations in transportation problem-maximization.

Assignment problems: Hungarian method of Assignment problem- variations of the assignment problem-Travelling salesman problem.

UNIT-III

Replacement and maintenance models: Introduction-types of failure-replacement of items whose efficiency deteriorates with time- replacement of items that fail completely-staffing problem.

UNIT-IV

Queuing theory: introduction-characteristics of queuing system-probability distributions in queuing system-single server queuing models-multi server queuing models.

Job sequencing: n jobs - two machines, n jobs - three machines, two jobs - n machines.

UNIT-V

Inventory: introduction-functional role of inventory-reasons for carrying inventory-inventory control models without shortages and with shortages-EOQ models with quantity discounts-instantaneous probabilistic demand without set-up cost,P-system and Q-system.

UNIT-VI

Introduction to PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times estimation-programme evaluation review techniques- Critical Path-probability of completing the project, deterministic model, critical path method (CPM)-critical path calculation-crashing of simple of networks.

Network Flow Models: maximal flow, minimal flow.

TEXT BOOKS:

1. Operations Research- theory and applications, second edition, J.K. Sharma/MacMillian publications.
2. Introduction to operations research, Hamdy A. Taha/PHI publications.
3. Production & operation management , Panner selvam,

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(A0325127) AUTOMOBILE ENGINEERING

COURSE OBJECTIVE:

- The student should get the knowledge about components of automobile fuel supply system cooling systems ignition system and power transmission systems
- The student should understand the some fundamental aspects of an internal combustion engines, including important mechanisms used in automobile braking systems, steering system and also clutch mechanism. Emphasis is placed on understanding how the combustion take place inside the engine cylinder. Supply of air fuel mixture to the engine considered in some detail.
- The student should able to apply the knowledge to solve the trouble shootings at various areas like steering mechanisms, fuel supply pumps and lubricating oil supply pumps etc.

COURSE OUTCOMES:

- Enriching the student's knowledge in the subject of automobile engineering.
- Develops cognitive skills (thinking and analysis)
- The students should link the scientific concepts they are learning with real applications by giving live examples where the subject concepts are applied.
- Develops communication skills (personal and academic)
- Students gain a lot of information by searching through the internet and references and from local industrial companies

UNIT – I

Introduction : Components of an automobile – chassis and body – power unit – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, oil filters, oil pumps – crank case ventilation-Fuel gauge – oil pressure gauge, Engine température indicator.

UNIT – II

Fuel Supply Systems:

S.I. Engine: Types of Fuel Supply system, Mechanical and electrical fuel pump – filters– Carburetors (Simple & Zenith) – air filters – petrol injection systems-types, Mechanical, MPFI and electronic injection system.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, CRDE, fuel pumps, testing of fuel pumps.

UNIT – III

Cooling System: Cooling Requirements, Air Cooling, Thermostat Liquid cooling, Radiators – Types, Cooling Fan, water pump, thermostat, antifreeze solutions.

Ignition System: Function of an ignition system, Principle of Electronic Ignition System, Distributer less Electronic Ignition System.

Unit – IV

Emission Control: Introduction, Emission Norms - Pollution standards – types of emissions-Reduction of formation of pollutants, closed crankcase ventilation, fuel tank and carburetor ventilation, redesigning the combustion chamber, changes in fuel supply system, modifications in ignition system, treating the exhaust gasses to reduce pollutants – use of alternative fuel.

Starting system: Introduction, Starting Motor, Starting drives, Bendix drive mechanism- starting motor switches - Accessories, Horn, Speedometer, Wind screen wiper.

UNIT – V

Transmission System: Clutches - Principle- types, single plate, multi plate, and centrifugal clutches – gear box – types, constant mesh, synchromesh, epi-cyclic, over drive, torque converter- Propeller shaft – Hotch Kiss drive, Torque tube drive, universal joint, differential, rear axles.

UNIT – VI

Steering System: Introduction, Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, Steering geometry – camber, castor, king pin rake, combined angle toe-in, toe-out- - Steering gears – types, steering linkages.

Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

Braking System: Introduction, Classification, Mechanical brake system, Hydraulic brake system, air and vacuum brake systems.

TEXT BOOKS:-

1. Automobile Engineering, – Vol.1 & Vol.2, Kirpal Singh.
2. Automotive Mechanics, William Crouse. Hanna Publishers.

REFERENCE BOOKS:-

1. Automobile Engineering, G.B.S.Narang khanna publishers.
2. Automobile Engineering, R.B.Gupta.
3. Automobile Engineering, T.R.Banga khanna publishers.
4. Automobile Engineering, K.K. Jain TMH
5. Automobile Engineering, K.K.Ramalingam, Scitech Publishers.

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MECHANICAL ENGINEERING

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(A0326127) COMPOSITE MATERIALS

COURSE OBJECTIVE:

- To understand the significance of composite material in different field of engineering
- To understand the different types of fibers and resigns used in the composite material
- The objective for this course is to understand the concept of micromechanical analysis of composite material
- This understanding will include concepts such as anisotropic material behavior

COURSE OUTCOMES:

- An ability to identify the properties of fiber and matrix materials used in commercial composites, as well as some common manufacturing techniques.
- An ability to predict the elastic properties of both long and short fiber composites based on the constituent properties.
- An ability to determine stress, strain and stiffness tensors using ideas from matrix algebra.
- A basic understanding of linear elasticity with emphasis on the difference between isotropic and anisotropic material behavior.

UNIT-I

Introduction to Composite Materials: Introduction, Classification: Polymer Matrix Composites. Metal Matrix Composites, Ceramic Matrix Composites, Carbon–Carbon Composites, Fiber. Reinforced Composites and nature-made composites, and applications.

UNIT-II

Reinforcements: Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and boron carbide. fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosets, Metal matrix and ceramic composites.

UNIT-III

Manufacturing methods: Hand lay-up, Spray lay-up, Vacuum bagging, Pultrusion, Resin Transfer Molding (RTM), Filament winding.

UNIT-IV

Macro-Mechanical Analysis of a Lamina: Introduction ,Definitions: Stress, Strain ,Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials – Anisotropic material, monoclinic material and orthotropic material, Hooke's Law for a Two Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina.

UNIT-V

Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina, Strength Failure theories of an angle lamina-Maximum stress Failure Theory ,Tsai–Hill Failure Theory, Tsai–Wu Failure Theory.

UNIT-VI

Micro-Mechanical Analysis of a Lamina: Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli – Longitudinal young's modulus, Transverse young's modulus, Major Poisson's ratio and In-plane shear modulus by Strength of Materials Approach, Semi Empirical Models, Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina- Longitudinal tensile strength, Transverse tensile strength, Longitudinal compressive strength, Transverse compressive strength.

TEXT BOOKS:

1. Mechanics of Composite Materials, (Mechanical Engineering), Autar K. Kaw, 2/e, CRC Pubi.
2. Engineering Mechanics of Composite Materials- Isaac and M Daniel, Oxford Univ. Press, 1994.
3. Mechanics of Composite Materials, R. M. Jones, Mc Graw Hill Company, New York, 1975.

REFERENCE BOOKS:

1. Analysis and performance of fibre Composites, B. D. Agarwal and L.J. Broutman Wiley- Inter science, New York.
2. Composite Materials Science and Engineering, Kishan K. Chawla, Springer, 2009.
3. Analysis of Laminated Composite Structures, L.R. Calcote, Van Nostrand Rainfold, New York, 1969.
4. Machanics of Composite Materials and Structures, madhujit Mukhpadhyay, New York, 1969.

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MECHANICAL ENGINEERING

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(A0327127) POWER PLANT ENGINEERING

(ELECTIVE-I)

COURSE OBJECTIVE:

The student is able to know the:

- Different sources of energy.
- Working principles of various steam power plants.
- Working principles of various Hydro power plants.
- Working principles of various gas and Nuclear power plants.
- Knowledge of various power plants economics.

COURSE OUTCOMES:

At the end of the course work the student should know the:

- Different sources of energy systems.
- Working and performance of various power plants like, steam, hydro, gas and nuclear power plants.
- Power plants economics, like various tariffs etc.

UNIT – I

Introduction to the Sources of Energy.

STEAM POWER PLANT: Layout of Modern Steam Power Plant, working of different circuits-selection of site-Coal Storage- Classification of coal handling and Ash handling systems.

UNIT II

STEAM POWER PLANT: overfeed and underfeed fuel beds, traveling grate, spreader grate and retort grate stoker firing systems - different types of burners - pulverized fuel burning system and its components - cyclone furnace-Dust collectors-Cooling Towers.

UNIT – III

HYDRO ELECTRIC POWER PLANT: Selection of Site for Hydro Electric Power Plant - Hydrological cycle – Hydrographs - flow duration curve - mass curve – classification of dams, spill ways and surge tanks.

HYDRO PROJECTS AND PLANT: Classification of Hydro Electric Power Plants – Typical layout – plant auxiliaries – plant operation - pumped storage plants.

UNIT – IV

NUCLEAR POWER PLANT: Nuclear fuel – breeding and fertile materials – Nuclear reactor –reactor operation.

TYPES OF REACTORS: Pressurized Water Reactor, Boiling Water Reactor, Sodium-Graphite Reactor, Fast Breeder Reactor, Homogeneous Reactor and Gas Cooled Reactor - Radiation hazards and shielding – radioactive waste disposal.

UNIT V

GAS TURBINE POWER PLANT: Introduction – Plant Layout – Classification – Working of Simple Gas Turbine Power Plant– Constant pressure and constant volume Gas Turbine Power Plants –Combination of Gas Turbine Cycles.

UNIT – VI

POWER PLANT ECONOMICS: Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor, utilization factor, Plant capacity factor and plant use factor - Types of loads - Load curve and load duration curve - general arrangement of power distribution –Different types of tariff for Electrical energy - Simple problems .

TEXT BOOK:

1. A Text Book of Power Plant Engineering, Rajput. R.K., 4/e, Laxmi Publ, 2007.
2. Power Plant Engineering, Nagpal,
3. A Course in Power Plant Engineering, Arora and S. Domkundwar.

REFERENCES:

1. Power Plant Engineering, P.K.Nag, 2/e, TMH.
2. Power plant Engineering, Ramalingam, Scietech Publ.
3. Power Plant Engineering, C. Elanchezian and others, I.K. International, 2010.

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MECHANICAL ENGINEERING

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(A0328127) COMPUTATIONAL FLUID DYNAMICS

(ELECTIVE-I)

COURSE OBJECTIVE:

- To study fluid flow over an object.

COURSE OUTCOMES:

- A student can apply the concepts to practical Engineering applications.

UNIT- I

Basics of computational fluid dynamics – Governing equations of fluid dynamics – Continuity, Momemtum and Energy equations – Physical boundary conditions – Time-averaged equations for Turbulent Flow – Turbulent–Kinetic Energy Equations – Mathematical behavior of PDEs on CFD.

UNIT-II

Methods of Deriving the Discretization Equations - Taylor Series formulation – Finite difference method – Control volume Formulation – Spectral method. Solution methodologies: Direct and iterative methods, Thomas algorithm, Relaxation method, Alternating Direction Implicit method.

UNIT-III

Heat conduction - Finite difference and finite volume formulation of steady/transient one-dimensional conduction equation, Source term linearization, Incorporating boundary conditions, Finite volume formulations for two and three dimensional conduction problems.

UNIT-IV

Convection and Diffusion -Finite volume formulation of steady one-dimensional convection and Diffusion problems, Central, upwind, hybrid and power-law schemes - Discretization equations for two dimensional convection and diffusion.

UNIT - V

Finite Differences, discretization, consistency, stability, and Fundamentals of fluid flow modeling: Introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT-VI

Steady flow, dimensionless form of Momentum and Energy equations, Stokes equation, conservative body force fields, stream function- Vorticity formulation, Boundary-layer theory, Buoyancy – Driven Convection and stability.

TEXT BOOK:

1. Computational fluid dynamics, Basics with applications, John. D. Anderson, Mc Graw Hill.
2. Introduction to computational fluid dynamics, P.Niyogi, S.K. Chakrabartty, M.K. laha, PEARSON Education Publications.
3. Patankar, S.V., “Numerical Heat Transfer and Fluid Flow”, McGraw-Hill,.

REFERENCE BOOKS:

1. Suhas V, Patankar Hema Numerical Heat Transfer and Fluid Flow, Shava Publishers and Mc Graw Hill, New Delhi.
2. Muralidharan Computational Fluid Flow and Heat Transfer, Nasora Publications, New Delhi
3. Tapan K. Sengupta Fundamentals of Computational Fluid Dynamics, Universities Press, New Delhi.

AUTONOMOUS

MECHANICAL ENGINEERING

IV B.Tech, I-Sem (ME)

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(A0329127) NANOTECHNOLOGY

(ELECTIVE – I)

COURSE OBJECTIVE:

- To study the use of Nano size particles in various fields of applications.

COURSE OUTCOMES:

- A student can understand the application of Nano technology to real world problems.

UNIT-I

General Introduction: Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

UNIT-II

Silicon Carbide: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, lectron microscopy sintering of nano particles.

Nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano composites.

Unit -III

Mechanical Properties: Strengthof nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties.

UNIT-IV

Process of synthesis of nano powders, Electro deposition, important nano materials.

UNIT-V

Investigating and Manipulating Materials in the Nanoscale: Electron microscopic, scanning probe microscopic, optical microscopic for nano science and technology, X-ray diffraction.

Nanobiology: Interaction between biomolecules and nanoparticle surface, Different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies, Application of nano in biology

UNIT-VI

Nano Medicines: Developing of Nanomedicines Nanosytems in use, Protocols for nanodrug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications.

TEXT BOOKS:

1. T.Pradeep [2007], Nano: The Essentials- Tata Mc Graw Hill Publishing Company Limited New Delhi.
2. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.

REFERENCE BOOKS:

1. Nano materials by J.Dutta & H.Hofman.
2. Nano structures & Nano materials by Guozhong cao, Imperial college press.
3. Micro manufacturing and Nano Technology by N.P.Mahalik.
4. Nano Technology by Mark Ratner & Danier Ratner, Prentice Hall.
5. Nano materials by A S Edelstein& R C Cammarata, Institute of physics publishing, Bristol and Philadelphia.

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(A0330127) MICRO ELECTRO MECHANICAL SYSTEMS

(ELECTIVE-II)

COURSE OBJECTIVE:

- To create awareness about the newer technology.

COURSE OUTCOMES:

- Understanding different types of Micro Electro Mechanical systems

UNIT - I

Introduction: Overview-Microsystems and microelectronics - Working principle of Microsystems -micro actuation techniques-micro sensors-types-microactuators-types-micropump-micromotors-micro-valves-microgrippers-scaling laws.

UNIT – II

Materials: Substrates and wafer-single crystal silicon wafer formation-ideal substrates-mechanical properties-silicon compounds - Sio_2, SiC, Si_3N_4 and polycrystalline silicon - Silicon piezoresistors - Gallium aresenside, Quartz-piezoelectric crystals-polymers for MEMS -conductive polymers.

UNIT – III

Fabrication Process: Photolithography - Ion implantation - Diffusion – Oxidation –CVD - Physical vapor deposition - Deposition by epitaxy - etching process.

UNIT – IV:

MICROMECHANICS: Introduction-static bending of thin plates-circular plates with edge fixed - rectangular plate with all edges fixed and square plate with all edges fixed – Mechanical vibration-resonant vibration- micro accelerometers.

UNIT – V

MICRO SYSTEM MANUFACTURING: Clean room technology-Bulk Micro manufacturing- surface micro machining –LIGA-SLIGA-Micro system packaging-materials-die level-device level-system level-packaging techniques-die preparation-surface bonding-wire bonding-sealing.

UNIT-VI

MICRO SYSTEM DESIGN: Design considerations-process design-mask layout design- mechanical design-applications of micro system in -automotive industry-bio medical –aero space-telecommunications.

TEXT BOOKS:

1. Tai-Ran Hsu, MEMS & Microsystems Design and Manufacture, Tata McGraw-Hill, 2006.

REFERENCE BOOKS:

1. Mohamed Gad-el-Hak, The MEMS Hand book, CRC press 2002.
2. Julian W.Gardner,Vijay K.Varadan,Osama O.Awadel Karim,Microsensors MEMS and Smart Devices, John Wiby & sons Ltd.,2001.
3. S.Fatikow,U.Rembold,Microsystem Technology and Microrobotics,Springer-Verlag Berlin Heidelberg,1997.
4. Francis E.H Tay and W.O Choong, Microfludics and BioMEMS Applications, Springer, 2002.

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MECHANICAL ENGINEERING

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(A0331127) NON-CONVENTIONAL SOURCES OF ENERGY

(ELECTIVE - II)

COURSE OBJECTIVE:

- To study various types of Renewable sources of energy.

COURSE OUTCOMES:

- Understanding different types of renewable energy sources and their utilization.

UNIT – I

PRINCIPLES OF SOLAR RADIATION: Introduction - solar constant - Role and potential of new and renewable source, Environmental impact of solar power, physics of the sun, extra terrestrial and terrestrial solar radiation, instruments for measuring solar radiation .

UNIT-II

SOLAR ENERGY COLLECTORS: Introduction – type - Flat plate and concentrating (Parabolic) collectors - Merits & Demerits of Flat plate and Concentrating (Parabolic) Collectors.

UNIT - III

SOLAR ENERGY STORAGE AND APPLICATIONS: Introduction - Different methods - Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion- photovoltaic Cells.

UNIT-IV

WIND ENERGY: Introduction – Potential in India - Basic Principle of wind energy conversion - Basic components **–** classification – Horizontal & Vertical Axis wind mill **–** Merit & demerits.

UNIT-V

GEOTHERMAL ENERGY: Introduction – nature of geothermal fields – geothermal sources – hybrid systems – merits and demerits- applications - potential in India

OCEAN ENERGY: Introduction – OTEC (open, closed & hybrid cycle) – Energy from Tides – components – Operating methods – Ocean waves – wave energy conversion devices.

UNIT-VI

BIO-MASS: Principles of Bio-Conversion - Anaerobic/Aerobic Digestion – Design of a community Biogas plant for a village-thermal gasification of Bio mass- classification of biomass gasifiers- up draught, down draught & cross draught gasifies.

TEXT BOOKS:

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Renewable Energy Sources /Twidell & Weir.
3. Non-Conventional Energy Sources /G.D. Rai.

REFERENCE BOOKS:

1. Solar Energy /Sukhame.
2. Solar Power Engineering / B.S Magal Frank Kreith & J.F Kreith.
3. Principles of Solar Energy / Frank Krieth & John F Kreider.
4. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
5. Non-Conventional Energy Systems / K Mittal /Wheeler
6. Renewable Energy Technologies /Ramesh & Kumar /Narosa.

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(A0332127) REFRIGERATION AND AIR CONDITIONING

(ELECTIVE - II)

(Note: The use of Refrigeration and Air Conditioning Data Book along with Steam Tables is Permitted in the Examinations**)**

UNIT – I

INTRODUCTION TO REFRIGERATION: Refrigerants– Desirable properties of idle refrigerant – classification of refrigerants – Nomenclature – secondary refrigerants.

Unit of refrigeration – COP - Air refrigerator working on reversed Carnot cycle & Bell Coleman cycle - Boot Strap Air Evaporative Cooling System – Regenerative Air Cooling System.Simple Problems.

UNIT – II

VAPOUR COMPRESSION REFRIGERATION: Introduction – advantages and limitations - Basic cycle (p-h chart) – working principle and essential components of the system – types of vapor compression cycles – effect of sub cooling and super heating – Actual cycle - effect of suction pressure and discharge pressure- Improvements in simple saturation cycle – Problems.

UNIT III

VAPOR ABSORPTION REFRIGERATION SYSTEM: Simple vapor absorption system- practical vapor absorption system - advantages and disadvantages of VAR over VCR - COP of idle VAR system – domestic Electrolux system – Lithium bromide absorption system.

UNIT IV

STEAM JET REFRIGERATION SYSTEM: Working Principle and Basic Components – Principle and operation of: (i) Thermo-Electric Refrigerator (ii) Vortex tube or Hilsch tube.

UNIT – V

INTRODUCTION TO AIR CONDITIONING: Introduction to Psychrometry – psychometric terms – psychometric chart - Daltons Law of partial pressures - psychometric Processes- Need for Ventilation – Infiltrated air – Heat Load concepts - RSHF, GSHF - Problems.

Air Conditioning equipment: Fans and blowers- types.

UNIT – VI

COMFORT AIR CONDITIONING: Requirements of human comfort and concept of Effective Temperature- Comfort chart –Comfort Air Conditioning – summer, winter & year round air conditioning – Simple Problems.

Heat Pump – Heat sources – different heat pump circuits.

TEXT BOOKS:

1. A text book of Refrigeration and Air Conditioning, R.S.Khurmi & J.K.Gupta, S.Chand & Co.
2. Refrigeration and Air Conditioning, CP Arora, 3/e, TMH, 2008
3. A Course in Refrigeration and Air conditioning, SC Arora & Domkundwar, Dhanpatrai

REFERENCES:

1. Refrigeration and Air Conditioning, Manohar Prasad, 2/e, New Age.
2. Principles of Refrigeration, Dossat, 4/e, Pearson Edu.
3. Refrigeration and Air Conditioning, P.L.Ballaney, Khanna Publ.
4. Refrigeration and Air Conditioning, R.C.Arora, PHI, 2010
5. Basic Refrigeration and Air-Conditioning – Ananthanarayanan, TMH

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MECHANICAL ENGINEERING

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(A0333127) PARAMETRICMODELLING – II

(Skill Development Course)

COURSE OBJECTIVE:

- Use of computers for drafting purpose.
- To train the student to make use of CATIA software package
- To improve the quality of the engineering drawing

COURSE OUTCOMES:

- 2D drawings and 3D drawings can be drawn using Pro-E Software package.
- Able to create 3D assemble drawings.
- Useful to increase the productivity of an industry.
- To meet the modern industry demand

UNIT – I:

Drawing the sketches in sketcher: Introduction to CATIA – understanding the sketch terms – using sketch tools – editing and modifying sketches – applying constraints and dimensions.

UNIT – II:

Modeling in CATIA: Transformation features – generating solid – combine – protrusion – creating and removing – multi section solid – creating fillets – chamfers – shell.

UNIT – III:

Working with wireframe and surface design: Need of surface modeling – creating wireframe elements – creating surfaces – cylindrical surfaces – offset surfaces – spherical surfaces – fill option – editing and modifying surfaces.

UNIT – IV:

Assembly modeling: Creating bottom-up and top-down assembly – applying constraints – moving components.

UNIT –V:

Working with drafting: Types of views – generating drawing views – exploded views – modifying the views – insertion of frame and title block – generating dimensions – applying symbols – bill of materials.

UNIT – VI:

Working with sheet metal: Setting sheet metal parameters – sheet metal walls – swept walls – creating bend – folding – unfolding sheet metal parts – different types of stampings.

TEXT BOOKS:

1. CATIA for Designers, Sham Tickoo, CAD/ CIM Technologies.

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MECHANICAL ENGINEERING

IV B.Tech, I-Sem (ME)

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(A0383127) CAM LAB

COURSE OBJECTIVE:

- To create awareness among the students about the use of computer technology in manufacturing
- Imparting programming skills to write a part program for CNC –Turn and CNC- Mill machines.

COURSE OUTCOMES:

- Improves the accuracy and quality of the product.
- Learning different G and M codes.
- Grain the knowledge of writing part program for different configurations.

LIST OF EXERCISES:

- Introduction to CNC and NC Machines
- Introduction to CNC part-programming, and Preparatory codes (G-codes) and Miscellaneous codes (M-codes)

I. Exercises on CNC lathe:

i. Plane Turning operation
ii. Step Turning operation
iii. Taper Turning operation
iv. Thread Cutting operation

II. Exercises on CNC Mill:

i. Profile milling (2 exercises)
ii. Circular pocketing.

III. Exercise on Robot:

i. Programming the Robot for pick and place operation.

IV. Developing a CNC code for a given job using- Edge CAM software.

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(A0384127) PARAMETRIC MODELING –II LAB

COURSE OBJECTIVE:

- Use of computers for drafting purpose.
- To train the student to make use of CATIA software package
- To improve the quality of the engineering drawing

COURSE OUTCOMES:

- 2D drawings and 3D drawings can be drawn using Pro-E Software package.
- Able to create 3D assemble drawings.
- Useful to increase the productivity of an industry.
- To meet the modern industry demand.

LIST OF EXERCISES:

1. Create sketch with given dimensions.
2. Draw the sketcher and specify dimensions.
3. Create a part using extrude and revolve commands.
4. Create a part using chamfer and fillets.
5. Create a part using sweep, blend tools & pattern.
6. Complete the part using revolve and rib tools.
7. Modify the dimensions and regenerate the existing part.
8. Draw the simple parts and assemble.
9. Draw all parts of machine component and complete the assembly.
10. Generate views for specified part.
11. Create views, dimensions and bill of materials for specified assembly modeling.
12. Draw the surface and convert it into solid.

Software Required: CATIA soft ware Package.

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(A0385127) MINI PROJECT

There shall be mini-Project, in collaboration with an industry (wherever possible) of their specialization, to be taken up during the vacation(data collection, components etc) after III year II Semester examination and implementation/simulation shall be carried out in IV year first semester during lab classes. Implementation or development of mini project will be treated as laboratory. However, the mini project and its report shall be evaluated in IV year I Semester. The 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 25 Internal marks for mini project which will be awarded based on the performance and involvement of the student during mini project period.

Evaluation:

Mini Project	50	End Examination (External evaluation)	This End Examination in mini project will be for a maximum of 50 marks.
	25	Internal evaluation	Day-to-day performance in executing mini project.

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(A0334128) ROBOTICS

COURSE OBJECTIVE:

- Extending the student's knowledge of Robotics and learning the design of such systems.
- Cognitive skills (thinking and analysis)
- The students should link the scientific concepts they are learning with real applications by giving live examples where the subject concepts are applied.

COURSE OUTCOMES:

- The student should understand the some fundamental aspects of an overview of robotics& automation, including Components of the Industrial Robotics, arms, architecture, end effectors, actuators& feedback components.
- Emphasis is placed on understanding motion analysis described mathematically.
- The Manipulator Kinematics, D-H notation joint coordinates and world coordinates, forward and inverse kinematics are also considered in some detail.

UNIT – I

Introduction: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT III

Robot actuators and Feedback components: Actuators: Pneumatic, Hydraulic actuators, electric &stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors. Robot Applications in Manufacturing, welding, Assembly and Inspection.

UNIT – IV

Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – V

Differential transformation and manipulators, Jacobians – problems. Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.

UNIT VI

Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCES:

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

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(A0335128) MODERN MANUFACTURING METHODS

(ELECTIVE – III)

COURSE OBJECTIVE:

- To create the awareness among the students about newer manufacturing methods.

COURSE OUTCOMES:

- A student can learn about fragile manufacturing and lean manufacturing techniques.

UNIT I

Need for non-traditional machining Processes -Classification of modern machining processes. Ultrasonic Machining– Elements of the process, mechanics of metal removal process parameters, economic considerations, applications and limitations, recent development.

UNIT II

Abrasive jet machining, Water jet machining and abrasive water jet machine: Basic principles, equipments, process variables, mechanics of metal removal, MRR, application and limitations.

UNIT – III

Electro – Chemical Processes: Fundamentals of electro chemical machining, electrochemical grinding, electro chemical honing and deburring process, metal removal rate in ECM, Tools, Surface finish and accuracy economic aspects of ECM.

UNIT – IV

Thermal Metal Removal Processes: General Principle and applications of Electric Discharge Machining, Electric Discharge Grinding and electric discharge wire cutting processes – Power circuits for EDM, Process parameters, selection of tool electrode and dielectric fluids, methods of surface finish and machining accuracy, characteristics of spark eroded surface and machine tool selection. Wire EDM, principle, applications.

UNIT – V

Electron Beam Machining: Generation and control of electron beam for machining, theory of electron beam machining, comparison of thermal and non-thermal processes.

Laser Beam Machining: General Principle and application of laser beam machining – thermal features, cutting speed and accuracy of cut.

UNIT-VI

Plasma Machining: Principle, metal removal mechanism, process parameters, accuracy and surface finish, applications.

Chemical Machining: Fundamentals of chemical machining- Principle- maskants –etchants- advantages and applications.

TEXT BOOKS:

1. Advanced Machining Processes, VK Jain, Allied publishers.

REFERENCES:

1. Modern Machining Process, Pandey, P.C. and Shah H.S., TMH.
2. New Technology, Bhattacharya A, the Institution of Engineers, India 1984.
3. Manufacturing Technology, Kalpakzian, Pearson.
4. Fundamentals of Machining & Machine Tools, D G Booth Roy & WA.

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(A0016128) ENTREPRENEURSHIP

(ELECTIVE-III)

COURSE OBJECTIVE:

- To train the students in the field of entrepreneurship.

COURSE OUTCOMES:

- A student can start his own industry.

UNIT 1:
Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur vs. Manager, Entrepreneur vs Intrapreneur. The Entrepreneurial decision process. Role of Entrepreneurship in Economic Development, Ethics and Social responsibility of Entrepreneurs. Opportunities for Entrepreneurs in India and abroad. Woman as Entrepreneur.

UNIT II: Creating and Starting the Venture, Sources of new Ideas, Methods of generating ideas, creating problem solving, product planning and development process, channels of distribution, marketing functions.

UNIT III: Financing and managing the new venture, Sources of capital, venture capital, Record keeping, recruitment, motivating and leading teams, and financial controls. Marketing and sales controls. E-commerce and Entrepreneurship, Internet advertising.

UNIT IV: small scale enterprises. Characteristics of small scale industry, role and importance of small business, problems of small business enterprises, sickness in small scale enterprises, Institutional support to entrepreneurship

UNIT V: Choosing location and layout, Issues related to Selection of layout.

UNIT VI: Labour legislation, Salient Provision under Indian Factories Act, Industrial Disputes Act, Employees State Insurance Act, Workmen's Compensation Act and payment of Bonus Act.
This course replaces the course offered in earlier years as 'Entrepreneurship& Management'

TEXT BOOKS:

1. Entrepreneurship, Robert Hisrich, & Michael Peters, 5/e TMH.
2. Entrepreneurship, Dollinger, Pearson, 4/e, 2004.

REFERENCES:

1. Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publ. House, 2004.
2. Entrepreneurship management Bolanath dutta
3. Harvard Business Review on Entrepreneurship. HBR Paper Back, 1999.
4. Entrepreneurial Management, Robert J.Calvin, TMH, 2004.
5. The Entrepreneurial Connection, Gurmeet Naroola, TMH, 2001.
6. Indian Economy, Dutt & Sundaram S. Chand, 2005.
7. Essential of Entrepreneurship and small business management, Thomas W. Zimmerer & Norman M. Scarborough, 4/e PHI, 2005.
8. Industrial Relations & Labour Laws, Srivastava, Vikas, 2005.
9. Industrial Law, ND Kapoor, Sultan Chand & Sons, 2005

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(A0336128) HYDRAULIC & PNEUMATIC CONTROL

(ELECTIVE-III)

COURSE OBJECTIVE:

- To create the awareness among the students about the application of hydraulic and Pneumatic power.

COURSE OUTCOMES:

- Hydraulic and pneumatic circuits for different applications can be designed.

UNIT-I:

BASIC PRINCIPLES: Hydraulic Principles - Hydraulic pumps - Characteristics - Pump Selection -Pumping Circuits - Hydraulic Actuators - Linear Rotary - Selection -Characteristics - Hydraulic Valves - Pressure - Flow - Direction Controls - Applications - Hydraulic Fluids-Symbols.

UNIT-II:

HYDRAULIC ACTUATORS AND MOTORS: Linear Hydraulic Actuators [cylinders], Mechanics of Hydraulic Cylinder loading, Hydraulic Rotary Actuators, Gear motors, vane motors, piston motors, Hydraulic motor theoretical torque, power and flow rate, hydraulic motor performance.

UNIT-III

HYDRAULIC CIRCUITS: Hydraulic circuits - Reciprocating - Quick return - Sequencing synchronizing - Accumulator circuits - Safety circuits - Industrial circuits - Press - Milling Machine - Planner - Fork Lift, etc.

UNIT-IV

CONTROL COMPONENTS IN HYDRAULIC SYSTEMS: Directional Control Valves – Symbolic representation, Constructional features, pressure control valves – direct and pilot operated types, flow control valves.

UNIT-V

MAINTENANCE OF HYDRAULIC SYSTEMS: Hydraulic oils; Desirable properties, general type of fluids, sealing devices, reservoir system, filters and strainers, problem caused by gases in hydraulic fluids, wear of moving parts due to solid particle contamination, temperature control, trouble shooting.

UNIT - VI

INTRODUCTION TO PNEUMATIC CONTROL: Choice of working medium, characteristics of compressed air. Structure of Pneumatic control system. Pneumatic Actuators: Linear cylinders – Types, conventional type of cylinder working, end position cushioning, seals, mounting arrangements applications. Rod–less cylinders, types, working advantages. Rotary cylinder types construction and application. Design parameters, selection.

TEXT BOOKS:

1. Industrial Hydraulics, Pippenger, Hicks, McGraw Hill, New York
2. Andrew Parr, “Hydraulics and Pnematics (HB) ", Jaico Publishing House, 1999.

REFERENCES:

1. Dudleyt, A. Pease and John J. Pippenger, “Basic Fluid Power ", Prentice Hall, 1987.
2. Fluid Power with applications**,** Anthony Esposito, Fifth edition Pearson education, Inc. 2000.
3. Pneumatics and Hydraulics**,** Andrew Parr. Jaico Publishing Co. 2000.
4. Oil Hydraulic Systems - Principles and Maintenance**,** S.R. Majumdar, Tata Mc Graw Hill publishing company Ltd. 2001.
5. Pneumatic Systems**,** S.R. Majumdar, Tata Mc Graw Hill publishing Co., 1995.
6. Anthony Esposite, “Fluid Power with Applications ", Prentice Hall, 1980.
7. J.Michael, Pinches and John G.Ashby, “Power Hydraulics ", Prentice Hall, 1989.

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(A0337128) PRODUCTION & OPERATIONS MANAGEMENT

(ELECTIVE-IV)

COURSE OBJECTIVE:

- The objective of production operation management is to produce the quality product at the right time and the right manufacturing cost.

COURSE OUTCOMES:

- Quality products can be produced with minimum coast.

UNIT – I

Introduction: Definition – Objectives of production Planning and Control – Functions of production planning and control –steps in production planning and control- Elements of production control – effectiveness of production planning and control-Types of production system-comparison of different production systems.

UNIT – II

Forecasting – Importance of forecasting – Types of forecasting, their uses – Demand patterns-methods of forecasting: qualitative methods and quantitive methods (simple moving average, weighted moving average, Exponential smoothing, adjusted exponential smoothing, linear trend line, seasonal and adjustments)-Forecast accuracy and control (mean absolute deviation, cumulative error, mean sum of squares, bias and tracking signal).

UNIT – III

Introduction to MRP- terms used in materials requirement planning-dependent and independent, continuous and lumpy demand-lead time-structure of MRP system-working principle of MRP-benefits and drawbacks of MRP-LOB (Line of Balance), JIT inventory: JIT philosophy-push pull and KANBAN systems, contrasts between MRP and JIT-Benefits and evaluation of JIT-and Japanese concepts.

UNIT – IV

Routing – Definition – Routing procedure –Route sheets – Bill of material – Factors affecting routing procedure. Schedule –definition – Difference with loading.

Scheduling: introduction- scheduling rules for ‘n’ jobs on one machine – Types of scheduling (forward and backward).

UNIT – V

Line Balancing: Introduction-terminology in line balancing-methods of line balancing (Ranked positional weight method).

Aggregate planning: concept of aggregate planning-kinds of costs involved in aggregate planning-)-strategies of aggregate planning-methods to handle aggregate planning (graphical and Linear programming method).

UNIT – VI

Dispatching – Activities of dispatcher – Dispatching procedure – folowup – definition – Reason for existence of functions – types of followup, applications of computer in production planning and control.

TEXT BOOKS:

1. Industrial Engineering and Management by DR. Ravi Shankar/Galgotia publications pvt. Ltd.
2. Production and operations management by Panner Selvam, PHI, 2004.
3. Industrial Engineering and Operations management by S.K. Sharma and Savita Sharma/ Kataria & sons.

REFERENCES:

1. Operations management by Russel/Taylar
2. Operations Management – S.N. Chary.
3. Elements of Production Planning and Control / Samuel Eilon.
4. Modern Production/ operation managements / Baffa & Rakesh Sarin
5. Production Control A Quantitative Approach / John E. Biegel.
6. Production Control / Moore.
7. Operations Management / Joseph Monks.

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(A0338128) AUTOMATION IN MANUFACTURING

(ELECTIVE-IV)

COURSE OBJECTIVE:

- Use of sophisticated machinery for manufacturing.

COURSE OUTCOMES:

- Reducing the inventory cost and delay period.

UNIT – I

Introduction Types and strategies of automation, pneumatic and hydraulic components circuits, Automation in machine tools. Mechanical feeding and too changing and machine tool control transfer the automaton.

UNIT – II

Automated flow lines: Methods or work part transport transfer Mechanical buffer storage control function, design and fabrication consideration.

UNIT – III

Assembly system and line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – IV

Automated material handling: Types of equipment, functions, analysis and design of material handling systems conveyor systems, automated guided vehicle systems.

UNIT -V

Automated storage systems, automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – VI

Adaptive control systems: Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

TEXT BOOK:

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Grover/PE/PHI.

REFERENCES:

1. Computer control of Manufacturing Systems by Yoram Coreom.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.

AUTONOMOUS

MECHANICAL ENGINEERING

IV B.Tech, II-Sem (ME)

T	C
3+1*	3

(A0339128)MECHANICAL VIBRATIONS

(Elective – IV)

COURSE OBJECTIVE:

- To study various modes of vibrations.
- To determine the natural frequency of the vibrating system.

COURSE OUTCOMES:

- A student can able to analyze single degree and multi degree freedom systems.

UNIT-I

INTRODUCTION: Importance and scope, definition and terminology, simple harmonic motion, combination of simple harmonic motions.

UNIT-II

SINGLE DEGREE FREEDOM SYSTEMS-I: Undamped free vibration: Derivation of Differential Equation, solution of Differential Equation, Torsional vibrations, Equivalent stiffness of spring combinations, energy method.

UNIT-III

SINGLE DEGREE FREEDOM SYSTEMS-II: Damped free vibration- Viscous damping, under damping, critical damping, coulomb damping.

UNIT-IV

SINGLE DEGREE FREEDOM SYSTEMS WITH FORCED VIBRATIONS: Steady state forced vibration, sources of excitation, impressed harmonic force, impressed force due to unbalance, motion excitation, transmissibility and isolation, performance of different type of isolators, power absorbed by viscous damping, General theory of seismic instruments, accelerometer and vibrometer, methods of vibration control, excitation reduction at source, system modification.

UNIT-V

TWO DEGREE FREEDOM SYSTEMS: Natural frequencies and modes of vibration by classical method of spring-mass system, Dynamic vibration absorber.

UNIT-VI

Whirling of shafts, critical speed of shafts, Dunkerley's method, critical speed of shafts with damping.

TEXT BOOK:

1. Mechanical Vibrations, G.K.Grover.
2. Mechanical Vibrations, V.P Singh, Khanna Publishers.
3. Theory and practice of mechanical Vibrations, J.S.Rao and K.Gupta.

REFERENCE BOOKS:

1. Vibration Theory and Applications, W.T.Thomson.
2. Vibration problems in Engineering, Timeshenko and Young.
3. Mechanical Vibrations, S.S. Rao, 4/e, Pearson Edu., 2010.
4. Principles of Vibrations, Tongue, 2/e, Oxford Univ. Press, 2007.

AUTONOMOUS

MECHANICAL ENGINEERING

IV B.Tech, II-Sem (ME)

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(A0340128) MODELLING& ANALYSIS

(Skill Development Course)

COURSE OBJECTIVE:

- To train the student to make use of ANSYS software package.

COURSE OUTCOMES:

- Structural, thermal, Model and Dynamic analysis can be done using ANSYS software package

UNIT – I:

FEA and ANSYS: What is FEA? Introduction about ANSYS – ANSYS basics & environment.

UNIT – II:

General analysis procedure: Overview – preprocessing – applying element type – material properties – solution – applying loads – boundary conditions.

UNIT – III:

Introduction to modeling in ANSYS: Direct generation – solid modeling – creating nodes – elements – fill between nodes – setting element attributes.

UNIT - IV:

Advanced solid modeling: Using key points – lines – splines – arcs – using areas and volumes – concepts of line fillets – and area fillets – Boolean option.

UNIT –V:

Meshing in ANSYS: Introduction to elements – 1D, 2D & 3D, quadrilateral elements – brick elements –tetrahedral elements – introduction to meshing – mapped and free mesh – control the mesh size.

UNIT – VI:

Post processing – results – graphs – deflection – deformation – animation.

TEXT BOOKS:

1. Finite Element Analysis, SDC Publications.

List of Exercises to be carried out using ANSYS software Package:

1. Uniform cross section bar subjected to axial load.
2. Variable cross section bar subjected to axial load.
3. Exercise on 2D truss – configuration 1.
4. Exercise on 2D truss – configuration 2.
5. Exercise on 2D truss – configuration 3.
6. Analysis of simply supported beam.
7. Analysis of cantilever beam.
8. One dimensional heat transfer through slab.
9. Heat transfer of hallow pipe with internal heat generation.
10. Analysis of composite wall.
11. Problems on model analysis.
12. Problems on buckling analysis.