RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

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

MECHANICAL ENGINEERING

ESTD: 1995

Applicable for students admitted into B.Tech (Regular) from 2010-11
&
B.Tech (Lateral Entry Scheme) from 2011-12

REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

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

AUTONOMOUS

MECHANICAL ENGINEERING

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

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

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABUS

B.Tech (Regular) from 2010-11 and B.Tech (Lateral Entry Scheme) from 2011-12

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 2010-11 onwards. Any reference to "Institute" or "College" in these rules and regulations stands for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified here after 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 A.P. 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 are to be obtained.
ii) 10% of the sanctioned strength in each programme of study (of RGMCET) shall be filled by the Convener, ECET as lateral entry.

List of Programmes offered

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

1. Academic Regulations for 2010 B.Tech (Regular)

(Effective for the students admitted into the I year from the Academic Year 2010-2011)

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

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1.0 Award of B.Tech. Degree

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

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

1.2) Registered for 240 credits and secured 232 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.	All audit courses/soft skills/open electives
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	04	30	70	04	04	30	70
	03	05	30	70				
	03+1*	05						
	03+1*	06						
Practical	03	03	25	50	03	02	25	50
Practical / Drawing	03+1*	02			06	04		
	06	06	30	70			30	70
Open Electives/Audit courses /Soft skills courses	03					02**	100	
Mini Project						02		50
Seminar						02	50	
Comprehensive Viva-voce						04		50
Project	-	-				12	50	100

[*Tutorial,

****Open Electives/Audit courses/Soft skills course 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. The duration of internal test will be for 2 hrs. First test to be conducted in 1 – 3 units and second test to be conducted in 4 - 6 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.**	**3 Units**	**First Internal test.**
3 Units	**Second Internal test.**	**3 Units**	**Second Internal test.**
3 Units	**Third 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 open electives/Audit courses and soft skills subjects two Internal examinations shall be conducted one in the middle of the semester and the other at 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 assignments.

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 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

5.8 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.

5.9 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.

5.10 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 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 committee consists of head of the Department or his nominee, senior faculty member and the supervisor of project.

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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 (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 two assignments 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 are awarded based on the performance of the student which includes attendance and regularity
7	Open electives/ Audit courses/ softskills	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 <u>NO</u> 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

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 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 40 out of 80 credits from one regular and one supplementary examinations of I year, and one regular examinations of II year I 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 the following examinations, whether the candidate takes the examinations or not.

a) Two regular and two supplementary examinations of I year.
b) Two regular and one supplementary examinations of II year I semester.
c) One regular and one supplementary examinations of II year II semester.
d) One regular examination of III year I semester.

7.4 The student shall register and put up minimum attendance in all 240 credits and earn the 232 credits. Marks obtained in the best 220 credits (excluding the credits obtained in audit courses/soft skills and open electives) shall be considered for the calculation of percentage of marks.

7.5 Students who fail to earn 232 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.

Table 5: Promotion rules

Promotion from	Total credits to register	Total credits to be earned for promotion
II year to III year	80	40
III year to IV year	144	72

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.

Table: 6 Course pattern

Year	Semester	No.of Subjects	No.of Audit subjects	Number of Labs	Total credits	
First year		O7 {ENG-4,EP-5,EC-5,M1-5, MM/EM-5,CDS-6,ED-6}	00	04	1X4=04 4X5=20 2X6=12 4X3=12	48
Second year	First	06	01	03	6X4=24 1X2=02 3x2=06	32
	Second	06	01	03	6X4=24 1X2=02 3x2=06	32
Third year	First	06	01	03	6X4=24 1X2=02 3x2=06	32
	Second	06	01	03	6X4=24 1X2=02 3x2=06	32
Fourth year	First	06	01	02 Mini project	6X4=24 1X2=02 3x2=06	32
	Second	03	01	Seminar Comprehensive Viva Project Viva	3x4 =12 1X2=02 1X2=02 1X4=04 1X12=12	32
					GRAND TOTAL	**240**

9.0 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	From the aggregate marks secured for the best 220 Credits excluding audit courses/ open elective/soft skills credits.
First Class with Distinction	70% and above	
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)

10.0 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.

11.0 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.

11.0 ***Rules of Discipline:***

11.2 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.

11.3 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.

11.4 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).

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

13.0 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.

14.0 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.

15.0 Transfers

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

16.0 General:

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

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

16.4 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.

16.5 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 2011-2012 on wards)

1.0 The Students have to acquire 184 credits out of 192 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 48 out of 96 credits from the examinations.

a) Two regular and one supplementary examinations of II year I semester.
b) One regular and one supplementary examinations of II year II semester.
c) One regular examination of III year I 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 172 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	From the aggregate marks secured for best 172 Credits. (i.e. II year to IV year) excluding audit/open electives/soft skills
First Class with Distinction	70% and above	
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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COURSE STRUCTURE

(Common to Branches: ECE, EEE, EIE, CSE & IT)

I B.Tech

Code	Subject	Scheme of instruction periods/week		Credits	Scheme of Examination		
		Theory	Practical		Internal Marks	External Marks	Total Marks
Theory							
A0001101	English	3+1*	-	4	30	70	100
A0002101	Engineering Physics	3+1*	-	5	30	70	100
A0003101	Engineering Chemistry	3+1*	-	5	30	70	100
A0004101	Mathematics – I	3+1*	-	5	30	70	100
A0302101	Engineering Mechanics	3+1*	-	5	30	70	100
A0501101	C Programming and Data Structures	3+1*	-	6	30	70	100
A0301101	Engineering Drawing	3+1*	-	6	30	70	100
Practical							
A0591101	C Programming and Data Structures Lab	-	3	3	25	50	75
A0391101	Engineering and IT Workshop	-	3	3	25	50	75
A0091101	Engineering Physics Lab and Engineering Chemistry Lab	-	3	3	25	50	75
A0092101	English Language Communication Skills Lab	-	3	3	25	50	75
	Total	**28**	**12**	**48**	**310**	**690**	**1000**

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COURSE STRUCTURE

II B.TECH, I-SEMESTER

S. No	Course code	Subject	Abbreviation	Credits	Scheme of instruction periods/week			Duration of end exam in hours	Scheme of examination marks		
					Th	D*/T	P		End	Internal	Total
THEORY											
1	A0006103	Mathematics-II	M-II	4	3	1	-	3	70	30	100
2	A0304003	Engineering Thermodynamics	ETD	4	3	1	-	3	70	30	100
3	A0305103	Mechanics of Solids	MOS	4	3	1	-	3	70	30	100
4	A0201103	Electrical & Electronics Engineering	EEE	4	3	1	-	3	70	30	100
5	A0306103	Machine Drawing	MD	4	2	4*	-	3	70	30	100
6	A0307103	Material Science & Metallurgy	MSM	4	3	1	-	3	70	30	100
7	A0009103	Corporate Management Skills	CMS	2	3	0	-	-	00	100	100
PRACTICALS											
8	A0291103	Electrical & Electronics Engg. Lab	EEEL	2	-	-	3	3	50	25	75
9	A0393103	Mechanics of Solids Lab	MOSL	2	-	-	3	3	50	25	75
10	A0394103	Material Science Lab	MSL	2	-	-	3	3	50	25	75
Total				32	20	4*+5	9		570	355	925
					38						

II B.TECH, II-SEMESTER

S. No	Course Code	Subject	Abbreviation	Credits	Scheme of Instruction Periods/Week			Duration of End Exam in Hours	Scheme of Examination Marks		
					Th	D*/T	P		End	Internal	Total
THEORY											
1	A0010103	Environmental Studies	ES	4	3	1	-	3	70	30	100
2	A0011103	Probability & Statistics	PS	4	3	1	-	3	70	30	100
3	A0308104	Kinematics of Machinery	KOM	4	3	1	-	3	70	30	100
4	A0309104	Thermal Engineering-I	TE-I	4	3	1	-	3	70	30	100
5	A0303103	Fluid Mechanics & Hydraulic Machinery	FMHM	4	3	1	-	3	70	30	100
6	A0310104	Manufacturing Technology	MT	4	3	1	-	3	70	30	100
7	A0009103	Aptitude Arithmetic Reasoning & Comprehension	AARC	2	3	0	-	-	00	100	100
PRACTICALS											
8	A0395104	Manufacturing Technology Lab	MTL	2	-	-	3	3	50	25	75
9	A0392103	Fluid Mechanics & Hydraulic Machinery Lab	FMHML	2	-	-	3	3	50	25	75
10	A0396104	Thermal Engineering Lab	TEL	2	-	-	3	3	50	25	75
Total				32	21	6	9		570	355	925
					36						

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COURSE STRUCTURE
III B.TECH, I-SEMESTER

S. No	Course Code	Subject	Abbreviation	Credits	Scheme of Instruction Periods/Week			Duration of End Exam in Hours	Scheme of Examination Marks		
					Th	D*/T	P		End	Internal	Total
THEORY											
1	A0013105	Managerial Economics & Financial Accounting	MEFA	4	3	1	-	3	70	30	100
2	A0311105	Thermal Engineering - II	TE-II	4	3	1	-	3	70	30	100
3	A0312105	Design of Machine Members-I	DMM-I	4	3	1	-	3	70	30	100
4	A0313105	Dynamics of Machinery	DOM	4	3	1	-	3	70	30	100
5	A0314105	Instrumentation & Control Systems	ICS	4	3	1	-	3	70	30	100
6	A0315105	Machine Tools	MT	4	3	1	-	3	70	30	100
7	A0316105	Computer Aided Drafting	CAD	2	2	1	-	-	00	100	100
PRACTICALS											
8	A0093105	Professional Communication and Soft Skills Lab	AECSL	2	-	-	3	3	50	25	75
9	A0397105	Dynamics & Instrumentation Lab	DIL	2	-	-	3	3	50	25	75
10	A0398105	Computer Aided Drafting Lab	CADL	2	-	-	3	3	50	25	75
			Total	32	20	07	09		570	355	925
					36						

III B.TECH, II-SEMESTER

S. No	Course Code	Subject	Abbreviation	Credits	Scheme of Instruction Periods/Week			Duration of End Exam In Hours	Scheme of Examination Marks		
					Th	D*/T	P		End	Internal	Total
THEORY											
1	A0317106	Industrial Management	IM	4	3	1	-	3	70	30	100
2	A0318106	Heat Transfer	HT	4	3	1	-	3	70	30	100
3	A0319106	Engineering Metrology	EMT	4	3	1	-	3	70	30	100
4	A0320106	Design of Machine Members -II	DMM-II	4	3	1	-	3	70	30	100
5	A0321106	Tool Design	TD	4	3	1	-	3	70	30	100
6	A0322106	Operations Research	OR	4	3	1	-	3	70	30	100
7	A0323106	Parametric Modeling-I	PM-I	2	2	1	-	-	00	100	100
PRACTICALS											
8	A0399106	Metrology & Machine Tools Lab	MMTL	2	-	-	3	3	50	25	75
9	A0381106	Heat Transfer Lab	HTL	2	-	-	3	3	50	25	75
10	A0382106	Parametric Modeling-I Lab	PM-I L	2	-	-	3	3	50	25	75
			Total	32	20	7	9		570	355	925
					36						

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

AUTONOMOUS

MECHANICAL ENGINEERING

COURSE STRUCTURE

IV B.TECH, I-SEMESTER

S. No	Course Code	Subject	Abbreviation	Credits	Scheme of Instruction Periods/Week			Duration of End Exam in Hours	Scheme of Examination Marks		
					Th	D*/T	P		End	Internal	Total
THEORY											
1	A0324107	CAD/CAM	C/C	4	3	1	-	3	70	30	100
2	A0325107	Finite Element Methods	FEM	4	3	1	-	3	70	30	100
3	A0326107	Automobile Engineering	AE	4	3	1	-	3	70	30	100
4	A0327107	Refrigeration & Air Conditioning	RAC	4	3	1	-	3	70	30	100
5		Elective-I	E-I	4	3	1	-	3	70	30	100
6		Elective-II	E-II	4	3	1	-	3	70	30	100
7	A0334107	Parametric Modeling-II	PM-II	2	2	1	-	-	00	100	100
PRACTICALS											
8	A0383107	CAM Lab	CAM.L	2	-	-	3	3	50	25	75
9	A0384107	Parametric Modeling-II Lab	PM-II L	2	-	-	3	3	50	25	75
10	A0385107	Mini Project	MP	2	-	-	-	-	50	25	75
			Total	32	20	7	9		570	355	925
					36						

Elective-I:

[A0328107] Power Plant Engineering.
[A0329107] Computational Fluid Dynamics.
[A0330107] Nanotechnology

Elective-II:

[A0331107] Micro Electro Mechanical Systems
[A0332107] Non Conventional Energy Sources
[A0333107] Composite Materials

IV B.TECH, II-SEMESTER

S. No	Course Code	Subject	Abbreviation	Credits	Scheme of Instruction Periods/Week			Duration of End Exam in Hours	Scheme of Examination Marks		
					Th	D*/T	P		End	Internal	Total
THEORY											
1	A0335108	Robotics	ROBO	4	3	1	-	3	70	30	100
2		Elective-III	E-III	4	3	1	-	3	70	30	100
3		Elective-IV	E-IV	4	3	1	-	3	70	30	100
4	A0342108	Modeling & Analysis	M&A	2	2	1	-	-	00	100	100
5	A0387108	Seminar	SEM.	2	-	-	-	-	00	50	50
6	A0388108	Core Comprehensive Viva Voce	C.V.V	4	-	-	-	-	50	00	50
7	A0386108	Project Work	P.W	12	-	-	-	-	100	50	150
			Total	32	11	4	0		360	290	650
					15						

Elective-III:

[A0336108] Modern Manufacturing Methods
[A0337108] Entrepreneurship
[A0338108] Hydraulic & Pneumatic Control

Elective-IV

[A0339108] Production & Operations Management
[A0340108] Automation in Manufacturing
[A0341108] Mechanical Vibrations

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

T	C
3+1*	4

(A0001101) ENGLISH

1. INTRODUCTION :

The sweeping changes in the world have elevated English to the status of a tool of global communication and transformed it into e-English. The syllabus has been drafted to improve the competence of students in communication in general and language skills in particular. The books prescribed serve as students' handbooks.

The teacher should focus on the skills of reading, writing, listening and speaking while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two way communications in place of the one-sided lecture.

The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

2. OBJECTIVES:

a) To improve the language proficiency of the students in English with an emphasis on LSRW skills.
b) To equip the students to study academic subjects with greater facility through theoretical and practical components of the syllabus.
c) To develop study skills as well as communication skills in formal and informal situations.

3. SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and dialects.

Students should be given practice in listening and identifying the sounds of English language and to mark stress, right intonation in connected speech.

- Listening for general content.
- Intensive listening.
- Listening to fill up information.
- Listening for specific information .

Speaking Skills:

Objectives

1. To make students aware of the role of ability to speak fluent English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities (Using exercises from all units of the prescribed text)
- Just A Minute (JAM) Sessions.

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

The students shall be trained in reading skills using the prescribed text for detailed study. They shall be examined in reading and answering questions using 'unseen' passages which may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.

Writing Skills:

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AUTONOMOUS

MECHANICAL ENGINEERING

Objectives

1. To develop an awareness in the students the skill to write exact and formal writing.
2. To equip them with the components of different forms of writing.

- Writing sentences • Use of appropriate vocabulary
- Paragraph writing • Coherence and cohesiveness
- Narration / description • Note Making
- Formal and informal letter writing • Editing a passage

4. TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into **Eight Units**, are prescribed:

For Detailed study: ENJOYING EVERYDAY ENGLISH, Sangam Books (India) Pvt Ltd Hyderabad, 2009

For Non-detailed study: INSPIRING LIVES, Maruti Publications, Guntur, 2009

UNIT -I

a) Heaven's Gate from **ENJOYING EVERYDAY ENGLISH**.
b) Mokshagundam Visvesaraya from **INSPIRING LIVES**

UNIT -II

a) Sir C.V.Raman from **ENJOYING EVERYDAY ENGLISH.**
b) Mother Teresa from **INSPIRING LIVES.**

UNIT -III

a) The Connoisseur from **ENJOYING EVERYDAY ENGLISH**.
b) Dr. Amartya Kumar Sen from **INSPIRING LIVES.**

UNIT -IV

a) The Cuddalore Experience from **ENJOYING EVERYDAY ENGLISH**.
b) Gertrude Elion from **INSPIRING LIVES.**

UNIT -V

a) Bubbling Well Road from **ENJOYING EVERYDAY ENGLISH**.
b) Vishwanathan Anand from **INSPIRING LIVES.**

UNIT-VI

a) Odds against Us from **ENJOYING EVERYDAY ENGLISH**.
b) Charlie Chaplin from **INSPIRING LIVES.**

UNIT – VII

a) Exercises on Reading and Writing Skills, Reading Comprehension, Letter writing,Report writing

UNIT – VIII

Exercises on Remedial Grammar covering Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions, Active/Passive Voice, Reported speech, Tenses Vocabulary development covering Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

Evaluation: The question paper shall contain two parts, Part A containing questions from Units I- VI and Part B containing questions from units VII & VIII. The student is required to answer five full questions choosing at least one from Part B.

REFERENCES:

1. Technical Communication , Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009
2. Essential Grammar in Use, (with CD) 3rd edn, Cambridge University Press, 2009.
3. Resumes and Interviews, M.Ashraf Rizvi, Tata - Mcgraw Hill, 2009.
4. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
5. Communication Skills for Technical Students, T.M.Farhathullah, Orient Blackswan, 2008.
6. Developing Communication Skills, 2nd edn. by Krishna Mohan & Meera Banerji , Macmillan, 2009.
7. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
8. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
9. Longman Dictionary of Contemporary English with DVD, Pearson Longman.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

T	C
3+1*	5

(A0002101) ENGINEERING PHYSICS

UNIT I 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 AND X-RAY DIFFRACTION: Introduction -Space lattice - Basis - Unit cell - Lattice parameter - Bravais lattices - Crystal systems - Structure Simple cubic - Body Centered Cubic - Face Centered Cubic crystals - Miller indices of planes and directions in crystals – Separation between successive (h k l) planes - X-ray diffraction by crystal planes - Bragg's law – Laue and Powder methods.

UNIT III PRINCIPLES OF QUANTUM MECHANICS & ELECTRON THEORY:

Waves and Particles - de- Broglie's hypothesis - Heisenberg's uncertainity principle - Schroedinger's one dimensional wave equation (Time Independent) - Particle in a one dimensional potential box - Energy levels - Fermi-Dirac distribution and effect of Temperature(qualitative treatment only) - Scattering - Source of electrical resistance - Kronig-Penney model (qualitative treatment only) - energy bands - metals, semi conductors & insulators.

UNIT IV SEMICONDUCTORS:

Intrinsic and extrinsic semiconductors - Law of mass action - Continuity equation - Drift & diffusion - Einstein's relation - Hall effect - Direct & indirect band gap semiconductors- p-n junction - Band diagram of p-n junction diode - Diode Equation-LED, LCD & Photo diode.

UNIT V MAGNETIC PROPERTIES:

Introduction - Origin of magnetic moment - Classification of magnetic materials - Dia, Para , Ferro, anti-Ferro and Ferri magnetism - Hysteresis - Soft and hard magnetic materials - Magnetic bubbles memory.

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) - Ferro electricity- $BaTio_3$.

UNIT VI SUPERCONDUCTIVITY:

General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization - Josephson effects - BCS theory - Applications of superconductors.

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 in Industry, Scientific and Medical fields.

UNIT VII FIBER OPTICS:

- Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture - Types of Optical fibers and refractive index profiles - Optical fiber communication systems - Application of optical fibers.

UNIT VIII NANOMATERIALS:

Introduction - Basic principles of nano materials - Fabrication of nano materials - ball milling - plasma arching - Chemical vapour deposition method - sol-gel methods - properties of nano materials - carbon nano tubes - properties and applications of carbon nano tubes - Applications of nano materials.

TEXT BOOKS:

1. Engineering Physics by V. Rajendran & K.Thyagarajan, Tata McGraw-Hill Publishing Co. Ltd.
2. Engineering Physics by M.R.Srinivasan New Age Publications.
3. Engineering Physics by M.N.Avadhanulu, S.Chand Publications, New Delhi.

REFERENCES:

1. Physics Volume 2, by Halliday, Resnick and Krane; John Wiley India.
2. Solid State Physics by C.Kittel, Wiley India.
3. Engineering Physics by Mittal, I.K.International.
4. Introduction to Nanoscience & Nano Technology by K.K Chattopadhya A.N. Banarjee , Prentice – Hall of India Pvt. Ltd.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

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3+1*	5

(A0003101) ENGINEERING CHEMISTRY

UNIT I

Water: Sources of Water, Types of impurities in Water, Hardness of Water - Temporary and Permanent hardness, Units, Estimation of hardness by EDTA Method, Analysis of Water - Dissolved Oxygen, Disadvantages of Hard Water, Problems on hardness of water, Methods of Treatment of Water for Domestic Purpose - Sterilisation: Chlorination, Ozonisation.

Water for Industrial purpose: Water for Steam Making, Boiler Troubles - Carry Over (Priming and Foaming), Boiler Corrosion, Scales and Sludges, Caustic Embrittlement, Water Treatment - Internal Treatment - Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminates Conditioning of Water. External Treatment - Ion- Exchange Process; Demineralization of Brakish Water - Reverse Osmosis.

UNIT II

Science of Corrosion: Definition, Types of corrosion: Dry Corrosion, (Direct Chemical attack), Wet Corrosion, Theories of Corrosion and Mechanism, Electro Chemical Theory of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Oxygen absorption type, Factors Influencing Corrosion, Control of Corrosion - Cathodic Protection - Sacrificial anode and Impressed Current, Uses of Inhibitors, Electro Plating and Electro less plating (copper and nickel).

UNIT III

Polymers: Polymerization Reactions - Basic concepts, Types of Polymerization - Addition and Condensation Polymerization, Plastics - Thermosetting and Thermoplastics, Composition, Properties and Engineering Uses of the Following: Teflon, Bakelite, Nylon, Rubber - Processing of Natural Rubber and Compounding, Elastomers - Buna S, Buna N, Polyurethane Rubber; Silicone Rubber, Conducting Polymers, Synthesis and applications of Polyacetylene and Poly aniline Liquid Crystals definition, properties, suitable examples and Engineering Applications.

UNIT IV

Chemistry of nano materials: Nano materials definition, properties and applications.

Explosives and Propellants: Explosives, Classification, precautions during storage, blasting fuses, important explosives, Rocket propellants, classification of propellants**.**

Lubricants : Principles and function of lubricants - Classification and properties of lubricants - Viscosity, flash and fire points, cloud and pour points, aniline point, Neutralization Number and Mechanical Strength.

UNIT V

Electro Chemistry: Conductance - Equivalent Conductance - Molecular Conductance, Conductometric Titrations - Applications of Conductivity Measurements.

Electrochemical Cells: Measurement of EMF, Standard electrode potential, concentration cells, batteries (Ni–Cd cell), Lithium batteries, Fuel cell: hydrogen oxygen fuel cell and methanol fuel cell

Insulators – Definition, Properties and Characteristics of Insulating Materials, Engineering Applications.

UNIT VI:

Phase rule: Definition, Terms involved in Phase Rule and Phase rule equation. Phase diagrams - one component system (water system), two component system (lead- silver system) Eutectics, heat treatment based on iron-carbon phase diagram, hardening, annealing.

UNIT VII:

Fuels and Combustion: Definition and Classification of fuels, Solid, liquid & gaseous fuels, Characteristics of a good fuel, Metallurgical Coke - Characteristics & Manufacture (Otto-Halfmann),

Petroleum - Refining - Synthetic Petrol, Calorific Value & its determination (Bomb Calorimeter - Junker's Gas Calorimeter). Combustion: Flue gas analysis by Orsat's apparatus.

UNIT VIII:

Building Materials:

Cement: composition of Portland cement, analysis, setting & hardening of cement (reactions).

Refractories: Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material.

TEXT BOOKS

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

REFERENCE

1. Engineering Chemistry Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications (India) Pvt. Limited, Hyderabad. 2009.
2. Fuel Cells principles and applications by B.Viswanath, M.Aulice Scibioh - Universities press.
3. Chemistry of Engineering Materials by C.V. Agarwal, Tara Publication, Varanasi.2008.
4. Physical Chemistry - Glasston & Lewis.
5. Engineering Chemistry (Vol.1&2) by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004).
6. Applied Chemistry: A Text Book for chemistry for Engineers & Technologists, G.D. Gesser, Springer, 2000

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

T	C
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(A0004101) MATHEMATICS – I

UNIT I

Differential equations of first order and first degree - Exact, linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, 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.

UNIT IV

Raidus of Curvature - Curve tracing - Cartesian, polar and parametric curves. Applications of integration to lengths, volume and surface area of solids of revolution in Cartesian and polar coordinates

UNIT V

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

UNIT VI

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 VII

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

UNIT VIII

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.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to Branches: (ME & CE)

T	C
3+1*	5

(A0302101) ENGINEERING MECHANICS

UNIT I

BASIC CONCEPTS - System of forces– Moment of forces and its Application – Couples and Resultant of Force System

EQUILIBRIUM OF SYSTEM OF FORCES: Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT II

ANALYSIS OF PERFECT FRAMES: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, Tension Coefficient method and methods of sections for vertical loads, horizontal loads and inclined loads.

UNIT III

FRICTION: Types of friction– laws of Friction–Limiting friction–Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and differential Screw jack.

UNIT IV

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Centre of Gravity of Composite figures.
(Simple problems only).

UNIT V

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

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses.(Simple problems only)

UNIT VI

KINEMATICS: Rectilinear and Curve linear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

UNIT VII

KINETICS : Analysis as particles and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work – Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion.

UNIT VIII

MECHANICAL VIBRATIONS: Definitions, Concepts. Simple harmonic motion. Free vibrations. Simple, Compound and Torsional pendulums- Numerical problems

TEXT BOOKS:

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

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. Bhathacharya- 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.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

T	C
3+1*	6

(A0501101) C PROGRAMMING AND DATA STRUCTURES

UNIT I

Overview of Computers and Programming - Electronic Computers then and Now, Computer Hardware, Computer Software, Algorithm, Flowcharts, Software Development Method, Applying the Software Development Method.

UNIT II

Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Expressions, Precedence and Associativity, Expression Evaluation, Operators and Expressions, Type Conversions, Decision Statements - If and Switch Statements, Loop Control Statements - while, for, do-while Statements, Nested for Loops, Other Related Statements -break, continue, goto.

UNIT III

Functions - Library Functions, Top-Down Design and Structure Charts, Functions with and without Arguments, Communications Among Functions, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands.

Arrays - Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Arrays Arguments, Multidimensional Arrays.

UNIT IV

Pointers - Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations With Pointers, Pointers and Arrays, Pointers and Two-Dimensional Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Programming Applications, Pointer to Functions, Command- Line Arguments.

Strings - String Basics, String Library Functions, Longer Strings, String Comparison, Arrays of Pointers, Character operations, String-To-Number and Number-To- String Conversions, Pointers and Strings.

UNIT V

Structure and Union – Introduction, Features of Structures. Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

UNIT VI

Files - Introduction, Streams and File Types, Steps for File Operations, File I/O Structures, Read and Write, Other File function, Searching Errors in Reading/Writing of Files, Low Level Disk I/O, Command Line Arguments, Application of Command Line Arguments, File Status functions (error handling).

UNIT VII

Data Structures - Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operation on a Stack, Implementation of a Stack, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Recursion, Queues - Various Positions of Queue, Representation of Queue, Insertion, Deletion, Searching Operations.

Linked List - Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

UNIT VIII

Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort. Searching- Linear and Binary Search Methods.

TEXT BOOKS :

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education
2. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

REFERENCES :

1. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press.
3. C and Data Structures, a snapshot oriented treatise with live engineering examples, Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
4. C and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill.
5. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI, Eighth Edition.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

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(A0301101) ENGINEERING DRAWING

UNIT – I

INTRODUCTION TO ENGINEERING DRAWING: Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Curves used in Engineering Practice:

a) Conic Sections including the Rectangular Hyperbola – General method only.

b) Cycloid, Epicycloids and Hypocycloid

c) Involutes.

d) Helices

UNIT – II

PROJECTION OF POINTS AND LINES: Principles of Orthographic Projection – Conventions – First and Third Angle Projections. Projections of Points, Lines inclined to one or both planes, Problems on projections, Finding True lengths & traces only.

UNIT – III

PROJECTIONS OF PLANES: Projections of regular Plane surfaces, Projection of lines and planes using auxiliary planes.

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to one or both planes – Auxiliary Views.

UNIT – V

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

Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectional parts.

UNIT – VI

ISOMETRIC & ORTHOGRAPHIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids - Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

Conversion of Isometric Views to Orthographic Views - Conventions.

UNIT – VII

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

UNIT – VIII

PERSPECTIVE PROJECTIONS: Perspective View: Plane Figures and Simple Solids,Vanishing Point Methods (General Method only).

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering Drawing, Johle /Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e Pearson education

REFERENCES:

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Guptha, J.K. Publishesrs
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Pub
4. Engineering Drawing, Venkata Reddy, B.S.Publishers.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

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(A0591101) C PROGRAMMING AND DATA STRUCTURES LAB

Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise l

a) Write a C program to find the sum of individual digits of a positive integer.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 2

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

Exercise 3

Write C programs that use both recursive and non-recursive functions

i) Find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.
iii) To solve Towers of Hanoi problem.

Exercise 4

a) The total distance travelled by vehicle in 't' seconds is given by distance $S = ut+1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2) 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'.
b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 5

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
i) Addition of Two Matrices
ii) Multiplication of Two Matrices

Exercise 6

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

Exercise 7

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

Exercise 8

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

Exercise 9
Write a C program to read in two numbers, x and n, and then compute the sum of the geometric progression:
$1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$
For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
Print x, n, the sum
Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Find if any values of x are also illegal? If so, test for them too.

Exercise 10
1) 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.
2) Write a C program to convert a Roman numeral to its decimal equivalent.

Exercise 11
Write a C program that uses functions to perform the following operations:
i) Reading a complex number
ii) Writing a complex number
iii) Addition of two complex numbers
iv) Multiplication of two complex numbers
(Note: represent complex number using a structure.)

Exercise 12
a) Write a C program which copies one file to another.
b) Write a C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line.)

Exercise 13
a) Write a C programme to display the contents of a file.
b) Write a C programme to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Exercise 14
Write a C program that uses functions to perform the following operations on singly linked list.:
i) Creation
ii) Insertion
iii) Deletion
iv) Traversal

Exercise 15
Write C programs that implement stack (its operations) using
i) Arrays
ii) Pointers

Exercise 16
Write C programs that implement Queue (its operations) using
i) Arrays
ii) Pointers

Exercise 17
Write a C program that uses Stack operations to perform the following:
i) Converting infix expression into postfix expression
ii) Evaluating the postfix expression

Exercise 18
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

Exercise 19
Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:

i) Linear search
ii) Binary search

Exercise 20
Write C program that implements the Quick sort method to sort a given list of integers in ascending order.

Exercise 21
Write C program that implement the Merge sort method to sort a given list of integers in ascending order.

Exercise 22
Write C programs to implement the Lagrange interpolation and Newton - Gregory forward interpolation.

Exercise 23
Write C programs to implement the linear regression and polynomial regression algorithms.

Exercise 24
Write C programs to implement Trapezoidal and Simpson methods.

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. Rajaraman, PHI Publications.
4. Programming in C and Data Structures, J.R.Hanly, Ashok.N.K.Kamthane and A.Ananda Rao, Pearson Education.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

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(A0391101) ENGINEERING AND IT WORKSHOP

ENGINEERING WORKSHOP

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 labour 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.

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 guage 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 a water pump with single phase starter.
e) Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
f) Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

2. TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop
c) Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

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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MECHANICAL ENGINEERING

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.

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 2007 in 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.

Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.

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
7) Ken Quamme. – CISCO Press, Pearson Education.

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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

(Common to all Branches)

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

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(A0091101) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB

ENGINEERING PHYSICS LAB

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

S.No	Name of the Experiment
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 material of p-n junction
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.	Melde's experiment – Transverse & Longitudinal modes

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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MECHANICAL ENGINEERING

ENGINEERING CHEMISTRY LAB

S.No	Name of the Experiment
1)	Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron
2)	Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry
3)	Preparation of Standard EDTA solution and Estimation of Hardness of Water
4)	Preparation of Standard EDTA and Estimation of Copper
5)	Determination of Manganese in Steel and Iron in Cement
6)	Determination of strength of the given Hydrochloric 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)	Determination of Eutectic Temperature of binary system (Urea – Benzoic Acid)

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)
- ♣ Analytical balance (keroy) (15 Nos)
- ♣ Calorimeter
- ♣ Bomb Calorimeter
- ♣ Redwood viscometer No.1& No.2
- ♣ Conductometer/ Conductivity bridge
- ♣ Wash bottles, test tube stands, burette stands
- ♣ Gas cylinders with Bunsen burners
- ♣ 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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AUTONOMOUS

MECHANICAL ENGINEERING

I B.TECH. (REGULAR, 2010-11)

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(A0092101) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

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.

Objectives:

1. 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
2. To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm
4. To initiate them into greater use of the computer in resume preparation, report- writing, format-making etc.
5. 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.

SYLLABUS:

The following course content is prescribed for the **English Language Laboratory** sessions:

- ♣ Introduction to the Sounds of English - Vowels, Diphthongs & Consonants.
- ♣ Introduction to Stress and Intonation.
- ♣ Situational Dialogues (giving directions etc.)
- ♣ Speaking on the mobiles and telephone conversation.
- ♣ Role Play.
- ♣ Oral Presentations- Prepared and Extempore.
- ♣ 'Just A Minute' Sessions (JAM).
- ♣ Describing Objects / Situations / People.
- ♣ Information Transfer.
- ♣ Debate

Minimum Requirement:

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

- ♣ P – IV Processor
- ♣ Speed – 2.8 GHZ
- ♣ RAM – 512 MB Minimum
- ♣ Hard Disk – 80 GB
- ♣ Headphones of High quality

PRESCRIBED SOFTWARE: GLOBARENA

Suggested Software:

- ♣ Cambridge Advanced Learners' English Dictionary with CD.
- ♣ The Rosetta Stone English Library
- ♣ Clarity Pronunciation Power – Part I
- ♣ Mastering English in Vocabulary, Grammar, Spellings, Composition
- ♣ Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- ♣ Language in Use, Foundation Books Pvt Ltd with CD
- ♣ Learning to Speak English - 4 CDs
- ♣ Microsoft Encarta with CD
- ♣ Murphy's English Grammar, Cambridge with CD
- ♣ English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

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

1. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
2. Spoken English- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
3. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
4. A Practical Course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
5. Body Language , Your Success Mantra , Dr Shalini Verma, S.Chand & Co, 2008
6. English Dictionary for Advanced Learners, (with CD) International edn. Macmillan 2009
7. A Handbook for Englsih language Laboratories, E.Sureshkumar, P.Sreehari, Foundation Books, 2009
8. DELTA's key to the Next Generation TOEFL Test, 6 audio CDS, New Age International Publishers, 2007

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Paper:

- ♣ The practical examinations for the English Language Laboratory shall be conducted as per the University 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 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **T C**

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(A0006103) MATHEMATICS-II

Course Objectives:

- Students should understand the different modules like matricies, differential equations and Fourier series.
- The obtained knowledge is useful for the analysis of engineering systems.

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, Eigen vectors-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-Finite Fourier transforms.

UNIT-IV

PARTIAL DIFFERENTIAL EQUATIONS :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 Bisection Method – The Method of False Position Method – The Iteration 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- Trapezoidal rule-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- Predictor-Corrector Method-Milne's Method.

TEXT BOOKS:

1) Mathematical Methods by Dr. T.K.V. Iyengar, Dr.B.Krishna Gandhi and others, S.Chand and company.
2) Mathematical Methods by Dr. K.V. Suryanarayana Rao – SCITECH Publications.
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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AUTONOMOUS

MECHANICAL ENGINEERING

B.TECH, I SEM (M.E) **T C**

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(A0304003) ENGINEERING THERMODYNAMICS

(Use of standard Steam tables, Mollier diagram, Psychrometric chart and Refrigerant property tables are permitted**)**

Course Objectives:

The students completing this course are expected:

- To understand the nature and role of the thermodynamic properties of matter, internal energy, enthalpy, entropy, temperature, pressure and specific volume.
- They will be able to access thermodynamic property data from appropriate sources.
- They are expected to understand temperature-entropy or pressure-volume diagrams.
- They will 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.
- They will understand implications of the Second Law of Thermodynamics and limitations placed by the Second Law on the performance of thermodynamic systems.
- They will be able to use isentropic processes to represent the behavior of a system.
- They are expected to be able to quantify the behavior of power plants based on the Rankine cycle, including the effect of enhancements such as superheat, reheat and regeneration.
- They are expected to quantify the performance of power generation based on the Otto cycle, Diesel cycle and Brayton cycle.
- They will be able to quantify the performance of refrigeration and heat pump systems.

Course Outcomes:

- The Learning Outcomes are assessed through graded homework, quizzes, mid-semester and a final exam. Since the course is a prerequisite for other courses in the curriculum, there are additional opportunities to evaluate the extent to which course objectives are achieved from the feedback of the faculty teaching professional courses. The feedback is particularly meaningful from the faculty members who teach the process-design related courses that have increased emphasis on application of basic principles, including control mass and volumes.

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: Work transfer, path and point functions, displacement work in various processes, shaft work, flow work, Heat transfer, comparison of work and heat transfer.

Unit – II

First Law of Thermodynamics: First law for a closed system undergoing a cycle and for a process, energy, different forms of stored energy, specific heat at constant volume and constant pressure, enthalpy, PMM-I.

First Law Applied to Flow Systems: Control volume, steady flow process, mass and energy balance, applications of steady flow processes.

Unit – III

Second Law of Thermodynamics : Heat engine, Kelvin-Plank statement, Clausius statement, refrigerator and heat pump, equivalence of Kelvin-plank and clausius statements, reversibility and irreversibility, Carnot Cycle, Carnot's Theorem, corollary of Carnot's theorem, thermodynamic temperature scale, efficiency of a reversible heat engine, PMM-II.

Unit – IV

Entropy: Clausius' theorem, the property of entropy, T-S plot, Clausius inequality, principle of entropy increase, applications of entropy principle.

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

Unit – V

Ideal and Real Gases

Perfect Gas Laws – Equation of State, specific and Universal Gas constants – various Non-flow processes, properties, end states – Throttling and Free Expansion Processes – Flow processes – Deviations from perfect Gas Model – Vander Waals Equation of State.

Mixtures of gases – Dalton's law of partial pressures, specific heats, internal energy and enthalpy of gas mixtures.

Unit – VI

Properties of Pure Substances: P-V, P-T and T-S diagrams for pure substances, H-S or Mollier Diagram, quality and dryness fraction, steam tables, charts for thermodynamic properties.

Thermodynamic Relations

Thermodynamic relations, exact differentials, Maxwell's relations, Joule Thomson coefficient, Clausius-clapeyron equation.

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.
4) Thermal Engineering. - R.S.Khurmi.

Reference Books:

1) Joel Rayner, Basic Engineering Thermodynamics, Addison- Wesley Publication, Masachusettes.
2) E. RathaKrishna, Fundamentals of Engineering 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

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **T C**

3+1 4

(A0305103) MECHANICS OF SOLIDS

Course Objectives:

At the end of this lab:-

- The student should understand the some fundamental aspects and failures occurs on the materials, with the applications of sudden and gradually applied loads with the help of direct tension, impact test machines and also The student should be able to find out the strength and harnesses of the various materials with the help of Brinells, Rockwell hardness test

Course Outcomes:

Knowledge and understanding:

- Importing intensive and extensive practical knowledge of the lab so that students can understand the importance of various parts.
- Extending the student's knowledge and analyze of failures of the materials.
- 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.
- Practical and subject specific skills (Transferable Skills)
- The design of frames and structure is of practical importance in industry and is of importance also 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 subjectd to point loads, UDL, Uniformly varying loads and combination of these loads- Point of Contra flexture- 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.

Helical springs:

Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl'sstress Factor – Deflection of helical coil springs under axial loads – stresses in helical coil springs.

UNIT VI CYLINDERICAL SHELLS

Thin cylindrical shells – Derivation of formula for longitudinal and circumferential stresses –hoop, longitudinal and volumetric strains- Thick cylinders – lame's equation- cylinders subjected to inside and outside pressure.

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.

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MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **T C**

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(A0201103) ELECTRICAL AND ELECTRONICS ENGINEERING

Course Objectives:

- At the completion of this course student should able to know about the connection of various electrical components and capable to analyze the performance of DC machines, transformers and ac machines in practically.
- Further, in this course student should able to understand the working of semiconductor devices, amplifiers and rectifiers in practically.
- Further, in this course student should able to know how to use the CRO to measure quantities and observe different wave forms

Course Outcomes:

- In order to assess the students progress towards achieving the learning outcomes, assigned readings and lecturers to enable the students to understand the concept and importance of the Electrical & Electronics Engineering lab.
- Moreover students gain lot of information from references, technical magazine which are available in college library & from surfing the internet regarding the detail construction & working of electrical machines, measuring instruments & power semi conductor 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 – IIDC 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

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MECHANICAL ENGINEERING

II B.TECH, I SEM [ME]

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(A0306103) MACHINE DRAWING

Course Objectives:

At the end of this course

- The student should understand the some fundamental aspects and design concepts and manufacturing of parts of the production machines, including conventional representation of materials, parts-screw joints, welded joints, gears, nuts, bolts, keys, webs, ribs etc. Surface roughness and its indication of mechanical components, symbols used on drawings, detailed/part drawings-Drawing of parts from assembly drawings with indications of size, tolerances, roughness.

Course Outcomes:

Knowledge and understanding,

- Importing intensive and extensive knowledge on this subject students can understand the importance of machine drawings of various parts.
- Extending the student's knowledge of machines and design and analyze of such systems.
- Practical and subject specific skills (Transferable Skills)
- The design of production machines is of practical importance in industry and is of importance also for other advanced courses.

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 zig zag lap 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 Cross head, 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 weightage 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 weightage of 32 Marks each - 32 Marks.

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MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **T C**

3+1 4

(A0307103) 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.
- Understanding different bonds in solids, crystal structures, Understanding Phase-Diagrams, cooling curves, Heat treatment. Knowledge about ceramics and composite materials

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 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.
- Knowledge about ceramic, Abrasive &composite materials.

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

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 -III

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 – IV

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

UNIT - V

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.

UNIT - VI

Composite Materials: Classification of composites, various manufacturing methods of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal –matrix composites and C – C composites.

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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MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **T C**

3 2

(A0009103) CORPORATE MANAGEMENT SKILLS

[AUDIT COURSE]

Course Objectives:

After taking this course, the student should be able to:

- Describe the Windows event-driven programming model
- Build simple JAVA applications according to the model
- Write fluent JAVA code for creating classes
- Use JAVA variables, data, expressions and arrays
- Design and create forms, menus and controls
- Write clear, elementary Java programs (applets and applications)
- Use a Java-enabled browser and/or the applet viewer to execute Java applets
- Use the Java interpreter to run Java applications
- Design and construct effective graphic user interfaces for application software

Course Outcomes:

- Understand the syntax and concepts of JAVA
- Write JAVA programs for processing data
- Write JAVA programs to interface with windows.
- Write JAVA programs that use data from flat files and databases.
- Develop programs with GUI features such as dialog boxes, menus etc.
- Write JAVA programs that form the GUI front-end for database applications.
- Write applications using distributed objects.
- A passing student shall demonstrate knowledge of GUI-based event-driven programming in a working.
- Program assignment utilizing Java GUI components, event listeners and event-handlers.

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

Non verbal 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..

Text & 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

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MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **P C**

3 2

(A0291103) ELECTRICAL & ELECTRONICS ENGINEERING LAB

Course Objectives:

- At the completion of this course student should able to know about the connection of various electrical components and capable to analyze the performance of DC machines, transformers and ac machines in practically.
- Further, in this course student should able to understand the working of semiconductor devices, amplifiers and rectifiers in practically.
- Further, in this course student should able to know how to use the CRO to measure quantities and observe different wave forms.
- **Course Outcomes:**
- In order to assess the students progress towards achieving the learning outcomes, assigned readings and lecturers to enable the students to understand the concept and importance of the Electrical & Electronics Engineering lab.
- Moreover students gain lot of information from references, technical magazine which are available in college library & from surfing the internet regarding the detail construction & working of electrical machines, measuring instruments & power semi conductor devices.

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 center 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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MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **P C**

3 2

(A0393103) MECHANICS OF SOLIDS LAB

Course Objectives:

At the end of this lab,

- The student should understand the some fundamental aspects and failures occurs on the materials, with the applications of sudden and gradually applied loads with the help of direct tension, impact test machines and also The student should be able to find out the strength and hardneses of the various materials with the help of Brinells, Rockwell hardness test.

Course Outcomes:

- Knowledge and understanding
- Importing intensive and extensive practical knowledge of the lab so that students can understand the importance of various parts.
- Extending the student's knowledge and analyze of failures of the materials.
- 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.
- Practical and subject specific skills (Transferable Skills)
- The design of frames and structure is of practical importance in industry and is of importance also for other advanced courses.

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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MECHANICAL ENGINEERING

II B.TECH, I SEM (M.E) **P C**

3 2

(A0394103) MATERIAL SCIENCE LAB

Course Objectives:

- The student should be capable of mount the specimen and able to identify the given metal by observing the micro structure
- Distinguish the Ferrous and non-Ferrous structures
- Effect of heat treatment on microstructures

Course Outcomes:

- At the end of the semester the student should be In a position to explain the suitable heat treatment methods to get the required mechanical property.
- Should explain the properties of Ferrous and non-Ferrous metals.
- Find the hardness of the given metal

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. Hardeneability 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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MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **T C**

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(A0010103) ENVIRONMENTAL STUDIES

Course Objectives:

- To create the awareness about the environment and surroundings.
- Creating awareness about abundantly available renewable enery like solar, wind, tidal and geo-thermal energy.

Course outcomes:

- Knowing about the actual concepts of environment
- Conservation of biodiversity, Sustainability of utilization of resources
- Practical approach of view by self observation and practice
- Applications of solar radiation and non-conversional sources of energy and environmental degradation due construction of hydro electric power projects
- Significance of echo systems and ecological success can be utilized in protection of natural ecosystems
- Knowing about the values of biodiversity and importance of conservation of biodiversity and threatening factors for loss of biodiversity.
- Protecting of our natural environment from pollution and methods for preventing of pollution
- The methods of disposal of solid wastages and precautions to be taken in the period of natural colomities
- Effect of economy of the nation due to population explosion and some of the diseases and preventions can be known from human population and environment
- Urbanization, energy crisis, social issues like women and children welfare and environmental protection laws will give us an idea towers protection of environment
- A proper way of field work to visit a natural echo system, a polluted area creates awareness among the students for protection of environment.

UNIT-I

Introduction of Environmental Studies-Natural Resources: Definition, the Global environment and its segments; Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere Scope and Importance of Environmental Studies – Need for Public Awareness.
Renewable and non-renewable resources – Natural resources and associated problems – Forest resources: Introduction –deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources :Introduction– Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Introduction, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT – II

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:
a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT – III

Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. India as a mega diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. - Endangered and endamic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – IV

Environmental Pollution: Definition, Cause, effects and control measures of:

a). Air pollution b). Water pollution c) Soil pollution d). Marine pollution e) Noise pollution f). Thermal pollution g). Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT–V

Social Issues and the Environment: From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. –Consumerism and waste products. –Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT–VI

Human Population and the Environment: Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS., Infectious deseases,-Tuberchlosis, cancer, Water Borne Deseases-Malaria, Diheria -Women and Child Welfare. - Role of information Technology in Environment and human health. -Case Studies.

TEXT BOOK:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. A Basic Course in environmental Studies by S.Deswal and A.Deswal, Dhanpat Rai & Co

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MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **T C**

3+1 4

(A0011103) PROBABILITY & STATISTICS

Course Objectives:

- Probability & Statistics is a necessary avenue to scientific knowledge which opens new vistas of 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".

Course Outcomes:

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

- Probability, Conditional Probability, Baye's theorem and its application
- 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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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **T C**

3+1 4

(A0308104) KINEMATICS OF MACHINERY

Course Objectives:

At the end of the course,

- The study of kinematics of machinery is an applied field of mechanical engineering that is concerned with understanding the relationship between the geometry and the motions of the parts of a machine and the forces that produce this motion.
- 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.
- This includes relative motion analysis and design of gears, gear trains, cams, and linkages, simultaneous graphical and analytical analysis of position, velocity, and acceleration, considering static and inertial forces.

On completing the course, the student will be able to:

1. Understand the fundamentals of the theory of kinematics of machinery.
2. Understand techniques for studying motion of machines and machine components.
3. Use computer software packages in modern design of machinery.

Course Outcomes:

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

- Identify the basic relations between distance, time, velocity, and acceleration.
- Apply vector mechanics as a tool for problem solving techniques.
- 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.
- Use the techniques, skills, and modern engineering tools necessary for engineering.
- Use references that provide tabulated physical data that are useful to mechanical engineers.
- And have gained experience with and/or exposure to:
- The kinematic synthesis process through implementation
- Application of mechanisms and machines, and new fields of research in motion control

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 ofslider – Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

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.

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **T C**

3+1 4

(A0309104) THERMAL ENGINEERING-I

Course Objectives:

At the end of the course,

- The Student should understand some fundamentals of Actual thermodynamic Cycles and their analysis.
- The Principles and working of I.C Engines and their systems
- The Combustion analysis of S.I and C.I Engines
- The performance and testing of S.I and C.I Engines
- The study and working Principles of Air Compressors
- Different types of air compressors and their analysis and performance.

Course Outcomes:

- Should know the applications of various types of boilers, components.
- Should be able to calculate the efficiency of the boiler for the given operating load conditions.
- Should be able to do the flue gas analysis. Able to design the chimney for the given boiler specifications
- Design the nozzles, turbines, condensers for the given flow rate of steam.

UNIT – I

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

UNIT-II

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

UNIT – III

Engine Systems: Magneto & Battary Ignition System - Solex Carburettor - Common rail fuel Injection System - Air Box Method - Air & Thermostat cooling system - Petroil & Pressure Lubrication system.

Super Charging: Introduction, types of superchargers, methods of supercharging, advantages and limitations of super charging.

UNIT - IV

Combustion in S.I. Engines: Homogeneous Mixture ,Heterogeneous 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– anti knock additives – Combustion Chambers – requirements, types- Rating of S.I Engine fuels.

UNIT - V

Combustion in C.I. Engines: Stages of combustion – Delay period and its importance – factors affecting the Delay Period & Effect of Engine variables on 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 - measurement of cylinder pressure, fuel consumption, air consumption, exhaust gas composition- Determination of Brake power , friction power and indicated power – Performance test – Heat balance sheet and chart.

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.

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **T C**

3+1 4

(A0303103) FLUID MECHANICS & HYDRAULIC MACHINARY

Course Objectives:

At the end of this course,

- The student should understand the some fundamental aspects of fluid motion, including important fluid properties, regimes of flow, and pressure variations in fluids at rest and in motion, fluid kinetics.
- 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.
- Practical and subject specific skills (Transferable Skills)
- The design of hydraulic machines is of practical importance in industry and is of importance also for other advanced courses

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

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 V

Hydraulic Turbines : Introduction to hydroelectric power station-heads and efficiencies-Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory-functions and efficiency.

Performance of Hydraulic Turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, cavitation, selection of type of turbine.

UNIT VI:

Centrifugal Pumps: Classification, working, Work done and efficiency, loss of head; specific speed, minimum starting speed and characteristic curves for centrifugal pumps. Pumps in series and parallel, NPSH.

Reciprocating Pumps: Working, Discharge, slip, indicator diagrams, Characteristic curves.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by R. K. Rajput.
3. Fluid Mechanics and Hydraulic Machines by R.K. Bansal

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).

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **T C**

3+1 4

(A0310104) MANUFACTURING TECHNOLOGY

Course Objectives:

At the end of this course:

- The student should understand the some fundamental aspects and design concepts and manufactures of pattern and pattern makings for casting process, sand properties testing in making a molding cavity, strengths and permeability of a sand materials and moisture percentages of green sand, melting and casting procedures, techniques used in welding processes like arc, gas, spot, plasma and brazing processes, process involving 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, bending and processing of plastics like injection molding and blow molding, The student should be prepared to continue the study and analysis of the production machine parts.

Course Outcomes:

Knowledge and understanding the,

- Importing intensive and extensive practical knowledge of the lab so that students can understand the importance of various parts.
- 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.
- Practical and subject specific skills (Transferable Skills)
- The design of production machines is of practical importance in industry and is of importance also for other advanced courses

UNIT – I

Casting Process: Casting, casting terms, pattern materials, types of patterns, pattern allowances, color code for patterns, Molding sands, core sands, properties of molding sand and its ingredients, different types 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.

UNIT- IV

Bulk Deformation Processes: Hot working -typesand 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.

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

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **T C**

3 2

(A0009103) APTITUDE ARITHMETIC REASONING & COMPREHENSION

Course Objectives:

- To train the students to face any type of competitive examinations of sate as well as central recruitment agencies.

Course Outcomes:

- A student will have a strong foundation in arithmetic and reasoning abilities.

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.

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **P C**

3 2

(A0395104) MANUFACTURING TECHNOLOGY LAB

Course Objectives:

At the end of this lab,

- The student should understand the some fundamental aspects and design concepts and manufactures of pattern and pattern makings for casting process, sand properties testing in making a molding cavity, strengths and permeability of a sand materials and moisture percentages of green sand, melting and casting procedures, techniques used in welding processes like arc, gas, spot, plasma and brazing processes, process involving 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, bending and processing of plastics like injection moulding and blow moulding, The student should be prepared to continue the study and analysis of the production machine parts.
- The design of production machines is of practical importance in industry and is of importance also for other advanced courses

Course Outcomes:

Knowledge and understanding

- Importing intensive and extensive practical knowledge of the lab so that students can understand the importance of various parts.
- 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.
- Practical and subject specific skills (Transferable Skills)

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 : 2 Exercises
   (Water Plasma Device)

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

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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **P C**

3 2

(A0392103) FLUID MECHANICS & HYDRAULIC MACHINARY LAB

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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AUTONOMOUS

MECHANICAL ENGINEERING

II B.TECH, II SEM (M.E) **P C**

3 2

(A0396104) THERMAL ENGINEERING LAB

Course Objectives:

- Imparting intensive and extensive knowledge of the Lab so that students can understand the role of I.C ENGINES, AIR COMPRESSORS, BOILERS, REFRIGERATION, & AIR CONDITIONING in the field of Engineering.
- Developing theoretical/practical capabilities of students so that they can characterize, transform and use I.C ENGINES, AIR COMPRESSORS, BOILERS, REFRIGERATION, AND AIR CONDITIONING in Engineering and Apply knowledge gained in solving related Engineering problems.

Course Outcomes:

At the end of the lab,

1. The student should be in a position to apply the skills in designing and testing the I.C Engines
2. The student should be in opposition to analyze the Engineering compressors.
3. To analyze operation and working boilers and its accessories.
4. To know the working and assembly and disassembly of I.C Engine Parts.

List of Experiments:

1. I.C. Engines Actual Valve / Port Timing Diagrams.
2. I.C. Engines Performance Test (4 -Stroke Multi Cylinder Diesel & Petrol Engines)
3. I.C. Engines Performance Test on 4-Stroke Single Cylinder Petrol Engine.
4. Evaluation of Engine friction Power by Morse test, retardation test & William's line.
5. I.C. Engines Heat Balance Sheet & Heat Balance Chart.
6. Performance test on Multi Stage Reciprocating Air compressor Unit.
7. Performance test on Refrigeration Test Rig.
8. Performance test on Air Conditioning System.
9. Dis-assembly & Assembly of Engine.
10. Exhaust Gas Analysis.

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MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **T C**

3+1 4

(A0013105) MANAGERIAL ECONOMICS & FINANCIAL ACCOUNTING

Note: Net Present Value Tables are permitted in the examinations

Course Objective:

- Collect some information regarding economic growth & the basic principles of MEFA and current business environment underlying in business decision making.

Course Outcomes:

- It is to occupy managerial positions in future to develop their versatile and dynamic personality and understanding of business and industry.
- It requires that they should have cost effective and utility oriented approach in the real situations of the work.
- It will enable them to produce maximum quantity of the required product at minimum cost.
- Knowledge of accountancy will help them in effective supervision; financial analysis will assist them in assessing their managerial worth in terms of profitability, operational efficiency, financial soundness and deciding effective future line of action.

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), ActivityRatios (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.
11. Dwivedi: Managerial Economics, 6th Ed., Vikas.

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AUTONOMOUS

MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **T C**

3+1 4

(A0311105)THERMAL ENGINEERING – II

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

Course Objective:

- Rankin cycle, methods of improving the cycle performance, combustion of fuels and flue gas analysis.
- Should know the working principle of boilers (low and high pressure), mountings and accessories, solve the problems on boiler horse power, efficiency and heat balance sheet,
- Draught and draught calculations, height of chimney, condition for maximum discharge, types of draughts, & efficiency of the chimney should know about the various types of Nozzles, flow through the nozzle, velocity triangles condition for maximum discharge, critical pressure ratio.
- Should know about the steam turbines (impulse & reaction), velocity triangles, and compounding of turbines.
- Knowledge of steam condensers, vacuum efficiency and condenser efficiency. Gas turbines, classification, advantages, disadvantages, components of gas turbine plat.
- Jet propulsion and working principle, propulsive efficiency, turbojet, rockets, working principle solid and liquid propellant rocket engines

UNIT – I

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

Boilers: Classification based on Working principles & Pressures of operation -L.P & H.P.Boilers – Mountings and Accessories – equivalent evaporation, efficiency.

UNIT – II

Draught: Introduction, types, Artificial draught-induced and forced draught, chimny height.

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.

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 in an impulse turbine-Velocity triangles for moving blade of an impulse turbine - Different efficiencies- Condition for maximum efficiency-Methods to reduce rotor speed-Velocity compounding , pressure compounding, Velocity and Pressure compounding-Governing of impulse turbine.

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- Governing of reaction turbine

UNIT V

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

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

UNIT – VI

Gas Turbines: introduction-comparision of gas turbines and steam turbines-comparision of gas urbines and IC engines-classification-closed cycle with intercooling and reheating-open cycle gas turbines-simple problems. Constant Pressure & Constant Volume Gas Turbines.

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.
6. Basic and Applied Thermodynamics, P.K. Nag, TMH.

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AUTONOMOUS

MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **T C**

3+1 4

[A0312105] DESIGN OF MACHINE MEMBERS- 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.
- Machine design is a challenging task sometimes very exciting, sometimes frustrating and always requiring a lot of hard work.
- At the end of the course, the student should understand the basic principles of designing various machine elements.
- The student should b able to apply these principles to the solution of variety of practical problems and be able to employ 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 used 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.

UNIT-II

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-III

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 line – Soderberg's line.

UNIT-IV

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.

WELDED JOINTS: Types of welded joints, strength of welds, Design of simple welded joints.

UNIT-V

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-VI

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.

TEXT BOOKS:

1. Machine design, R.S Khurmi and Jk Gupta.
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.

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AUTONOMOUS

MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **T C**

3+1 4

[A0313105] DYNAMICS OF MACHINERY

Course Objective:

- The student should understand the basic concepts of Mechanical devices are characterized by the fact that they have mobility and must move to function.
- 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.
- This includes relative motion analysis and design of clutches, governors, brakes and dynamometers, to teach students concepts of static and dynamic mass balancing and flywheels, to teach students concepts of linear vibration analyses of one and two degree-of freedom rigid body systems:
- On completing the course, the student will be able to:
- Understand the fundamentals of the theory of dynamics of machinery.
- Understand techniques for studying motion of machines and machine components.
- Use computer software packages in modern design of machinery.

Course Outcomes:

- This course used 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

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 and dynamometers: Introduction, type of brakes, Simple block brakes, internal expanding brake, band and block brake, braking of vehicle. Dynamometers – absorption and transmission types. General description and methods of Operation.

UNIT – III

Turning moment diagram and fly wheel: Introduction, 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 in different planes. Balancing of reciprocating masses, partial balancing of locomotives, effects of partial balancing in locomotives, secondary balancing, balancing of inline engines, balancing of V-engines.

UNIT – VI

Longitudinal and Transverse vibrations: Type of free vibrations, natural frequency of free longitudinal vibrations, natural frequency of free transverse vibration, natural frequency of free transverse vibrations due to point load over a simply supported shaft, natural frequency of free transverse vibrations due to uniformly distributed load over a simply supported shaft, natural frequency of free transverse vibrations of a shaft fixed at both ends and carrying a uniformly distributed load, critical and 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, free torsional vibrations of a three rotor system, torsionally equivalent shaft.

TEXT BOOKS:

1. Theory of Machines, S.S Ratan, MGH.
2. Theory of Machines, Khurmi, S.Chand.

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.

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AUTONOMOUS

MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **T C**

3+1 4

[A0314105] INSTRUMENTATION AND CONTROL SYSTEMS

Course Objective:

- 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:

- Knowledge and understanding
- Extending the student's knowledge of an Instrumentation and control 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.
- Practical and subject specific skills (Transferable Skills)
- The design of transducers and sensors is of practical importance in industry and is of importance also for other 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, Piston 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, Rotameter, 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, Strain gauge Rosettes.

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 Servomechanisms-Examples with block diagrams-Temperature, speed & position control systems.

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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MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **T C**

3+1 4

[A0315105] 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 Principles of design of Jigs and fixtures, Classification of Jigs & Fixtures, Lapping, honing and broaching machines 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 machine tools
- The student should be prepared to continue the study and analyze the machine tools to solve the complicated practical problems.

Course Outcomes:

- Extending the student's knowledge of machine tools 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.
- Practical and subject specific skills (Transferable Skills)
- The design of machine tools is of practical importance in industry and is of importance also for other advanced courses

UNIT – I

Geometry of single point turning 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, economics-coolants-methods of applications of cutting fluids, machinability –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 -Direct or Rapid indexing, Plain or simple 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.

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MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **T C**

2+1 2

[A0316105]COMPUTER AIDED DRAFTING

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, undo, 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

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AUTONOMOUS

MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **P C**

3 2

[A0093105] PROFESSIONAL COMMUNICATION AND SOFT SKILLS LAB

Course Objective:

- The objective of this Course is to understand the communication concepts and to develop the students' competence in communication at an advanced level.
- Assuming that the students are fairly proficient in the basic communication skills of listening, speaking, reading and writing in English the course aims to train them in communicating efficiently in the workplace and professional contexts.

Course Outcomes:

- Students will be able to interact professionally.
- It will enable the student to perform the task related to professional communication with ease.
- The lab exposure will make the student to stand in the global market.

Introduction

The **Professional Communication and Soft Skills Lab** has been introduced at the III B. Tech level to navigate the students towards the appropriate career orientation. At this stage it is imperative for the student to prepare for the ever growing competition in the job market. In this scenario, the student needs to improve his/her Communication and soft skills in an effective manner to cope up the global trends.

Objective

Keeping in mind the previous exposure of the student to English, this lab focuses on improving the student's proficiency in English at all levels. The lab intends to train students to use language effectively, to participate in group discussions, to help them face interviews, and sharpen public speaking skills and enhance the confidence of the student by exposing him/her to various situations and contexts which he/she would face in his/her career.

Syllabus

The following modules are prescribed for the Professional Communication and Soft Skills Lab.

Week –I Professional Spirit

- Motivation & Self Esteem - Questionnaire on self analysis
- Activity- G.D on Personal goals and career objectives
- Case Study – Profile of a successful person

Week –II Concept of Communication -I

- Principles – barriers - Strategies -Analysis through video clipping
- Activity- Elevator pitch (Tell me about yourself)
- Reading Comprehension- 1
- Case study : news reviews

Week –III Concept of Communication -II

- Non verbal communication – kinesics – paralinguistic elements - Analysis through video clipping
- Activity- Elevator pitch (Tell me about yourself)
- Vocabulary: idioms & phrases

Week –IV Concept of Communication -III

- Listening Skills – ROAR Technique – Chinese Pictograph
- Activity- Debate with analysis on Non verbal cues, Gestures & postures
- Reading Comprehension-2
- Case study : TV Interviews/ Movie

Week –V Professional Communication -I

- Group Discussion- Modalities, Process and evaluation
- Activity- Group Discussion
- Vocabulary – Foreign –Derived words

Week –VI Professional Communication -II

- Writing Skills –Letters, Emails & Resume Writing
- Activity- Letter writing and Resume Writing practice
- Reading Comprehension-3
- Analysis of Sample Letters / Memos/ Resume s

Week –VII Job Skills I

- HR Interview Strategies, Questions with analysis - Analysis through video clippings(Typical HR interviews)
- Vocabulary: Technical Jargon
- Activity- Group Discussion / Debate

Week –VIII Job Skills II

- Telephone Interview Strategies - On line interview Tips -Activity- Mock Interview
- Reading Comprehension-4

Week –IX Job Skills III

- Technical Presentation skills
- Activity- Group Discussion Practice

Week –X Soft skills I

- Reading Skills – SQR3 technique – Bloom's Taxonomy
- Technical Presentation Practice - PPTs

Week –XI Soft skills II

- Job Etiquettes
- Communication Project Reviews
- Activity- Group Discussion Practice

Week –XII Soft skills III

- Team communication
- Mock CAT/ GRE Test
- Activity -Mock Interview

Minimum Requirements

The English Language Lab shall have two parts:

The Computer aided Language lab for 60 students with 60 systems, one master console. LAN facility and English Language Skills Lab with movable Chairs and audio aids with a P.A system, a TV, A digital stereo-audio and video system, Camcorder etc.

Prescribed software: Department in-built data, K-Van Solutions and Globarena Ltd.

Books Prescribed:

1. Cornerstone: Developing Soft Skills by Robert M. Sherfield, Rhonda J. Montgomery and Patricia G. Moody, published by Pearson Education.
2. Resume's and Interviews by M.Ashraf Rizvi, Tata Mc Graw- Hill, 2008

Books suggested for Reference:

1. The ACE of Soft Skills by Gopal Ramesh and Mahadevan REamesh, Pearson Education, 2010
2. How to Do Well in GDs and Interviews by Dorling Kindersdley (India) Pvt. Ltd., Licencees of Pearson Education in South Asia.
3. Technical Writing by Sharon J.Gerson and Steven M.Gerson , published by Pearson Education
4. Professional Presentations by Malcolm Goodale, published by Cambridge University Press.

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MECHANICAL ENGINEERING

III B.TECH, I SEM (M.E) **P C**

3 2

[A0397105] 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

III B.TECH, I SEM (M.E) **P C**

3 2

[A0398105]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 pockage.

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MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **T C**

3+1 4

[A0317106] 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: Concept, Development, application and scope of Industrial Management. 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-II

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

UNIT-III

Materials Management:

Objectives, Inventory – functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory Control Systems-Continuous review system-periodical review system. Stores Management and Stores Records. Purchase management, duties of purchase of manager, associated forms.

UNIT-IV

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

UNIT-V

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.

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

III B.TECH, II SEM (M.E) **T C**

3+1 4

[A0318106] HEAT TRANSFER

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

Course Objective:

- To demonstrate basic knowledge of heat transfer by understanding differences between conduction, convection and radiation, differential equation of heat transfer, thermal conductivity of materials, conduction through plane walls and composite walls, critical thickness of insulation, heat transfer in fins, overall heat transfer coefficient, log mean temperature difference, transient heat conduction, heat transfer through fins, forced and natural convection correlations, Biot, Nusselt, Reynolds Grashoff, Rayleigh and Prandtl numbers, natural heat transfer I flat vertical plates, cylinders ;Forced convection heat transfer in horizontal plates and tubes, knowledge on drop wise and film wise condensation process, calculation of film thickness, boiling process, various regimes of boiling process: calculation of emissivity of black plate emissive power etc. Gain the knowledge about heat exchanger, types, LMTD, effectiveness and efficiency.

Course Outcomes:

- The student should able to clearly differentiate the modes of heat transfer like conduction, convection, radiation.
- Should be able to design a composite wall for the given inside temperature for a furnace and a refrigerator.
- Should design the fins for maximum heat transfer at the given conditions. And able to apply the knowledge of heat transfer to the metallurgical heat treatment problems.
- Capable of design the heat exchanger and solve the problems o heat transfer by using ANSYS.

UNIT – I

Introduction: Modes and mechanisms 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 and Spherical coordinates (Equation only - No derivation for Spherical coordinates).

One Dimensional Steady State Heat Conduction: Through plane and composite walls – hollow & composite cylinders and spheres – overall heat transfer coefficient – electrical analogy – Critical radius/thickness of insulation –Variable Thermal conductivity –internal heat generation (plane wall and cylinder with uniform heat generation)

UNIT II

Heat transfer from extended surfaces (fins): Heat Transfer in – Long Fin, Fin with insulated tip and heat loosing at the tip.

One Dimensional Transient Heat Conduction: Introduction-heat conduction in solids having infinite thermal conductivity(negligible internal resistance) – Heat conduction in solids with finite conduction and convective resistances – Significance of Biot and Fourier Numbers - Chart solutions of transient conduction systems-Problems.

UNIT – III

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

Forced convection: Concepts of hydrodynamic and thermal boundary layer and use of empirical correlations for convective heat transfer for flow over – Flat plates, Cylinders and spheres- Internal and external flow.

UNIT IV

Free Convection: Development of Hydrodynamic and thermal boundary layer along a vertical plate – Use of empirical relations for convective heat transfer on plates and cylinders in horizontal and vertical orientation.

Heat Transfer with Phase Change: Boiling: Pool 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:

Emission characteristics and laws of black-body radiation – Irradiation – total and monochromatic quantities– laws of Planck, Wien, Kirchoff, Lambert, Stefan and Boltzmann– heat exchange between two black bodies – concepts of shape factor – Emissivity – heat exchange between gray bodies.

TEXT BOOKS:

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

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. Fundamentals of Heat and Mass Transfer, M.Thirumaleswar, Pearson Edu.
8. Thermal Engineering Data Book, B.S.Reddy and K.H.Reddy Rev/e, I.K. International.

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AUTONOMOUS

MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **T C**

3+1 4

[A0319106] 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 analyze the metrology and surface engineering to solve the complicated practical problems.

Course Outcomes:

- Extending the student's knowledge of metrology 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.
- Practical and subject specific skills (Transferable Skills)
- The design 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, interchangeability 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 Wave length 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 Parkinson 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 Rai & Co.

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MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **T C**

3+1 4

[A0320106] DESIGN OF MACHINE MEMBERS- II

(Note: The use of Design Data book is permitted in the examinations**)**

Course Objective:

- The student should is expected to analyze mechanical systems and select the proper machine elements (bearings, gears, pulley, belts,) from commercial catalogs 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 modeling for engineering applications.
- Students may be asked to analyze engineering problems using software 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

DESIGN OF I.C ENGINE PARTS: 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 crankshafts.

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

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. 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 Data Hand Book:

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

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III B.TECH, II SEM (M.E) **T C**

3+1 4

[A0321106] TOOL DESIGN

Course Objective:

- Able to understand various manufacturing methods.
- To inculcate basic knowledge of tool design.
- Knowledge of tool, jig fixture designs.

Course Outcomes:

- Designing and assessment of tools for quality improvement.
- Can be able to design and develop single point and multi point cutting tools.
- 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 of multipoint 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-commmonly used plastic tooling materilas.

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 Battacharya 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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MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **T C**

3+1 4

[A0322106] 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,
- Solve loading 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.
- Develop a rigorous academic understanding of advanced analytical methods that are used to provide structured and analytical approaches to decision-making. By the end of the course the student should be able to develop the skills and apply the operations research techniques to the solution of real-world problems.

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

History of operations research-features of operations research-scientific method in Operations research-types of models-general methods for solving operations research models-Applications of Operations research.

Linear Programming: Introduction-structure of linear programming model- Formulation–Graphical solution – Simplex algorithm (maximization case and minimization case), Special cases-Duality.

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-Traveling salesman problem.

Sequencing: processing n-jobs through two machines- processing n-jobs through three machines- processing n-jobs through m- machines- Two jobs through m- machines.

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

Theory of games: Introduction-two person zero-sum games-pure strategies-mixed strategies-principles of dominance- solution methods of games without saddle point: Algebraic method- arithmetic method-graphical method-Linear programming method.

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

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.

UNIT-VI

Dynamic programming: introduction-Bellman's principle of optimality-dynamic programming under certainty- linear programming problem.

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.

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MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **T C**

2+1 2

[A0323106] PARAMETRIC MODELLING - I

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

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MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **P C**

3 2

[A0399106] 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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MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **P C**

3 2

[A0381106] 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 Boltzman 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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MECHANICAL ENGINEERING

III B.TECH, II SEM (M.E) **P C**

3 2

[A0382106] PARAMETRIC MODELLING - I LAB

Course Objective:

- Use of computers for drafting purpose.
- 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.

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

IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0324107] 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:

- Knowledge and understanding
- 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.
- 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.
- Practical and subject specific skills (Transferable Skills)
- The design of production machines is of practical importance in industry and is of importance also for other advanced courses.

UNIT – I

Product cycle, speps 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, NC systems, classification of several output devices used in NC systems, feed back devices, NC co ordinate systems, NC motion control systems, application of NC, Machining center, turning center, NC Part Programming languages-A.P.T

UNIT – V

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

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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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MECHANICAL ENGINEERING

IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0325107]FINITE ELEMENT METHODS

Course Objective:

- To solve complicated problems with an accuracy acceptable to an engineer.
- To create the awareness about the use of the science in various fields of engineering
- To study various types of finite elements

Course Outcomes:

- Finding solution of a problem going from part to whole.
- Problems like truss, Beams can be analyzed with easy.
- FEM concept can be extended for other branches of engineering

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- Potential Energy approach (Spring Problems)- 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 truss bar element, 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. Uniform circular shaft subjected to torsion-Derivation of element stiffness matrix.

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.

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MECHANICAL ENGINEERING

IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0326107]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.
- The student should able to understanding how power will transfer from the engine to road wheels by means of various power transferring elements and working of different types of clutches, gear boxes steering mechanisms, steering gears used in automobiles.

Course Outcomes:

- Extending the student's knowledge of an automobile engine.
- 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.
- The design of automobile engines is of practical importance in industry and is of importance also for other advanced courses

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– carburettors (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, nozzle spray formation, injection timing, 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

Emissions from Automobiles – Introduction, Pollution standards National and international, 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.

Charging system: Introduction, principle of generator, regulator. Starting system, Bendix drive mechanism, starting switches**.** Accessories, Horn, Speedometer, Wind screen wiper.

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MECHANICAL ENGINEERING

UNIT – V

Transmission System: Clutches- Principle- types: cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear box- types: sliding mesh, 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, center point steering. 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]
2. Automobile Engineering, T.R.Banga khanna publishers. 4] Automobile Engineering, K.K. Jain TMH.5]
3. Automobile Engineering, K.K. Ramalingam, scitech Publishers.

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IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0327107]REFRIGERATION AND AIR CONDITIONING

(Note: The use of Refrigeration and Air Conditioning Data Book along with steam tables is permitted in the examinations**)**

Course Objective:

- The student should know about the Refrigeration and Air conditioning processes.
- The student should have the knowledge on the air refrigeration cycles and its application to air craft's.
- The student should know the vapor compression cycle, its components, usage of P-h chart for solving the problems, actual vapor compression cycle, effect of suction and discharge pressure on COP and various types of vapor compression cycles, the knowledge about vapor compression cycle like compressor, condenser, evaporator and expansion valve.
- The student should also have the knowledge on vapor absorption system like NH_3 –water system, Li-Br Absorption system and three fluid systems.
- The student has the knowledge on steam jet refrigeration system, thermoelectric refrigeration system and vortex tube.
- The student should be also familiar with various psychometric properties of air and processes. Should be able to solve the problems by using psychometric chart.
- Should also gain the knowledge about the components air conditioning system and types of air conditioning systems applicable for industrial and human comfort.

Course Outcomes:

- Should solve the numerical problems on air cycles.
- Through the knowledge in vapor compression refrigeration system and estimate the COP when pressure varies. Should improve the COP of Vapor absorption refrigeration system.
- The student should be able to design a good vapor compression refrigeration system and air conditioning system for the given load.

UNIT – I

Introduction to Refrigeration: Necessity and applications – Unit of refrigeration and C.O.P. – Different refrigeration methods - Air Refrigeration: Ideal and Actual cycles, Open and Dense air systems –- problems – Refrigeration needs of Air crafts.

UNIT – II

Vapour compression refrigeration – Basic cycle – working principle and essential components of the plant – COP – Representation of cycle on T-S and P-h charts – effect of sub cooling and super heating – cycle analysis – Actual cycle- Influence of various parameters on system performance – Construction and Use of P-h charts – numerical Problems.

UNIT III

Vapor Absorption Refrigeration System – Description and working of NH_3 – water system and Li Br –water System -Calculation of max COP – Principle of operation of three Fluid absorption system.

Refrigerants – Desirable properties – classification of refrigerants used – Nomenclature – secondary refrigerants

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: Psychometric Properties & Processes – Characterization of Sensible and latent heat loads –– Need for Ventilation – Infiltrated air – Heat Load concepts: RSHF, GSHF-Problems.

Air Conditioning equipment – humidifiers – dehumidifiers – air filters, fans and blowers.

UNIT – VI

Requirements of human comfort and concept of Effective Temperature- Comfort chart –Comfort Air Conditioning – summer, winter & year round air conditioning – simple problems.

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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IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0328107]POWER PLANT ENGINEERING

(ELECTIVE-I)

Course Objective:

- To understand the working of different power plants.

Course Outcomes:

- A student can sunder stand the working of various elements in stem power plant, hydro power plant, Tidal power plants.

UNIT – I

Introduction to the Sources of Energy.

STEAM POWER PLANT: Layout of Modern Stream Power Plant, working of different circuits-selection of site-classification of fuels- coal handling -coal storage, and Ash handling systems.

UNIT II

STEAM POWER PLANT: Properties of coal – overfeed and underfeed fuel beds, traveling grate stokers, spreader stokers, retort stokers, different types of burners, pulverized fuel burning system and its components, cyclone furnace, Dust collectors, cooling towers.

UNIT – III

HYDRO ELECTRIC POWER PLANT: Hydrological cycle – Hydrographs-flow duration curve- mass curve– selection of site for hydro electric power plant-classification of dams spill ways-surge tanks

HYDRO PROJECTS AND PLANT: Classification – Typical layouts – plant auxiliaries – plant operation pumped storage plants.

UNIT IV

POWER FROM NON-CONVENTIONAL SOURCES: Utilization of Solar- Collectors- Principle of Working, Wind Energy – types – HAWT, VAWT -Tidal Energy.

DIRECT ENERGY CONVERSION: Solar energy, Fuel cells, Thermo electric and Thermo ionic, MHD generation.

UNIT – V

NUCLEAR POWER STATION: 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, Gas cooled Reactor, Radiation hazards and shielding – radioactive waste disposal.

UNIT – VI

POWER PLANT ECONOMICS AND ENVIRONMENTAL CONSIDERATIONS: Capital cost, investment of fixed charges, operating costs, general arrangement of power distribution, Load curves, and load duration curve. Definitions of connected load, Maximum demand, demand factor, average load, load factor, diversity factor – related exercises. Effluents from power plants and Impact on environment

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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IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0329107]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.

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3+1 4

[A0330107]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: Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties.

UNIT-IV

Process of synthesis of nano powders, Electro deposition, Important naon materials.

UNIT-V

Investigaing and manipulating materials in the nanoscale: Electron microscopics, scanning probe microscopics, optical microscopics for nano science and technology, X-ray diffraction.

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

UNIT-VI

Nano Medicens: Developing of Nanomedicens 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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IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0331107] 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

IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0332107]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: Role and potential of new and renewable source, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, instruments for measuring solar radiation .

UNIT-II

SOLAR ENERGY COLLECTION: Flat plate and concentrating (Parabolic) collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT - III

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-IV

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics.

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-V

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-VI

DIRECT ENERGY CONVERSION: Need for DEC, principles of DEC, Seebeck, Peltier and Joule Thomson effects, Basic Principles of Thermo-electric power generation, Basic Principles of Thermionic generator, Basic Principles of MHD power generation (open & closed cycle).

TEXT BOOKS:

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy Sources /G.D. Rai

REFERENCE BOOKS:

1. Renewable Energy Sources /Twidell & Weir
2. Solar Energy /Sukhame
3. Solar Power Engineering / B.S Magal Frank Kreith & J.F Kreith.
4. Principles of Solar Energy / Frank Krieth & John F Kreider.
5. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
6. Non-Conventional Energy Systems / K Mittal /Wheeler
7. Renewable Energy Technologies /Ramesh & Kumar /Narosa

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IV B.TECH, I SEM (M.E) **T C**

3+1 4

[A0333107]COMPOSITE MATERIALS

(ELECTIVE – II)

Course Objective:

- To create the awareness about composite materials

Course Outcomes:

- Understanding different types of resigns and fiber materials used for composite materials and methods of manufacturing.

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: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT-IV

Macro-Mechanical Analysis of a Lamina: Introduction ,Definitions: Stress, Strain ,Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, 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. Envelopes, Maximum Strain 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, Strength of Materials Approach, Semi Empirical Models ,Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina.

TEXT BOOKS:

1. Engineering Mechanics of Composite Materials- Isaac and M Daniel, Oxford Univ. Press, 1994.
2. 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- Interscience, New York.
2. Mechanics of Composite Materials, (Mechanical Engineering), Autar K. Kaw, 2/e, CRC Pubi.
3. Composite Materials Science and Engineering, Kishan K. Chawla, Springer, 2009.
4. Analysis of Laminated Composite Structures, L.R. Calcote, Van Nostrand Rainfold, New York, 1969.
5. Machanics of Composite Materials and Structures, madhujit Mukhpadhyay, New York, 1969.
6. Finite Element Analysis of Composite Materials, Ever J. Barbero, CRC Press, 2077.

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IV B.TECH, I SEM (M.E) **T C**

2+1 2

[A0334107] PARAMETRIC MODELING -II

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 (M.E) **P C**

3 2

[A0383107]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:

1. Introduction to CNC and NC Machines
2. Introduction to CNC part-programming, and Preparatory codes (G-codes) and Miscellaneous codes (M-codes)

I. Exercises on CNC lathe:

1. Plane Turning operation
2. Step Turning operation
3. Taper Turning operation
4. Thread Cutting operation

II. Exercises on CNC Mill:

1. Profile milling (2 exercises)
2. Circular pocketing.

III. Exercise on Robot:

1. 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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MECHANICAL ENGINEERING

IV B.TECH, I SEM (M.E) **P C**

3 2

[A0384107]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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MECHANICAL ENGINEERING

IV B.TECH, II SEM (M.E) **T C**

3+1 4

[A0335108]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.
- 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.
- Practical and subject specific skills (Transferable Skills)

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.
- The Differential transformation and Trajectory planning, different motions should be able to apply to the analysis of robotics..
- 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 robots.

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 Feed back 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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MECHANICAL ENGINEERING

IV B.TECH, II SEM (M.E) **T C**

3+1 4

[A0336108]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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MECHANICAL ENGINEERING

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[A0337108] 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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[A0338108]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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[A0339108]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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[A0340108]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.

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[A0341108]MECHANICAL VIBRATIONS

(Elective – IV)

Course Objective:

- To study various modes of vibrations.

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 Differntial Equation, solution of Differntial 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.

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[A0342108] MODELLING & ANALYSIS

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.