BAPATLA ENGINEERING COLLEGE
(*Autonomous*)
BAPATLA - 522 101.

4- Year B.Tech. Degree course

(Semester System)

MECHANICAL ENGINEERING

SCHEME & SYLLABUS

w.e.f. : 2010 - 11

Academic Rules & Regulations

(Effective for students admitted into first year B.Tech. from the academic year 2010-2011).

1.0 EXTENT: All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and when a doubt arises, the interpretation of the Chairman, Academic Council, Bapatla Engineering College (Autonomous) is final. As per the requirements of the Statutory Bodies, Principal, Bapatla Engineering College (Autonomous), shall be the Chairman of the College Academic Council.

2.0 ADMISSIONS:

2.1 Admission to first year of any Four Year B.Tech Programmes of study in Engineering: Admissions into first year of B.Tech Programme of Bapatla Engineering College (Autonomous) (***Subsequently referred to as*** **B.E.C**) will be as per the norms stipulated by Acharya Nagarjuna University & Govt. of Andhra Pradesh.

2.2 Admission to the Second year of any Four year B.Tech Programme of study in Engineering: Admissions into second year of B.Tech Programme of B.E.C will be as per the norms stipulated by Acharya Nagarjuna University & Govt. of Andhra Pradesh.

2.3 Admissions with advance standing: These may arise in the following cases:

1) When a student seeks transfer from other colleges to B.E.C and desires to pursue study at B.E.C in an eligible branch of study.

2) When students of B.E.C get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.

3) When a student after long discontinuity rejoins the college to complete his Programme of study for the award of a degree.

4) When a student is not able to pursue his/her existing Programme of study but wishes to get transferred to another Programme of study.

These admissions may be permitted by the Academic Council of B.E.C as per the norms stipulated by the statutory bodies and the Govt. of Andhra Pradesh. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Programme of study at B.E.C will be governed by the transitory regulations given in ***5.3.***

3.0 DURATION OF THE PROGRAMME AND MEDIUM OF INSTRUCTION: The duration of the B.Tech. Programme is four academic years consisting of two semesters in each academic year. The medium of instruction and examination is English.

4.0 MINIMUM INSTRUCTION DAYS: Each semester shall consist of a minimum of 110 working days which includes instruction, term examinations and final examinations.

5.0 B.Tech. Programmes of study:

5.1 The Four year B.TechProgramme is offered in the following branches of study:

1) Biotechnology.
2) Chemical Engineering.
3) Civil Engineering.
4) Computer Science & Engineering.
5) Electrical & Electronics Engineering.
6) Electronics & Communication Engineering.
7) Electronics & Instrumentation Engineering.
8) Information Technology.
9) Mechanical Engineering.

5.2 Structure of the Programme:

5.2.1 Each Programme of a Discipline or branch of study shall consist of:

1) General core courses in Basic Sciences, Engineering Sciences, Humanities, Mathematics and Management.
2) Interdisciplinary courses in Engineering, to impart the fundamentals of Engineering to the student.
3) Compulsory core courses to impart broad based knowledge needed in the concerned branch of study.
4) Elective courses from either discipline or interdisciplinary areas to be taken by the student based on his/her interest and specialization preferred.
5) A Term paper and a Project approved by the Department to be submitted in the fourth year of study.

Every Programme of study shall be designed to have 45-50 theory courses and 20-25 laboratory courses and the distribution of types of courses from the above is indicated in the following table.

General Core courses	20 -35%
Interdisciplinary courses in engineering	15-25%
Compulsory Core courses in the branch of study	45-55%
Elective Courses	10-15%

Note: All components prescribed in the curriculum of any Programme of study shall be conducted and evaluated.

5.2.2 Contact hours: Depending on the complexity and volume of the course the number of contact hours per week will be determined.

5.2.3 Credits: Credits are assigned to each course as per norms mentioned in the following table.

Subject	Credits
Theory Course (3 Theory Periods/Week)	03
Theory Course (More than 3 Theory Periods/Week)	04
Laboratory Course	02
Term paper	02
Final year Project	10

5.3 Transitory Regulations: For students admitted under advance standing (mentioned in 2.3) these transitory regulations will provide the *modus operandi*.

At the time of such admission, based on the Programme pursued (case by case)

1) Equivalent courses completed by the student are established by the BOS concerned.
2) Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by B.E.C.
3) A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at B.E.C.
4) Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is merged.

5.4 Curriculum for each Programme of study:

1) The Four year curriculum of any B.TechProgramme of study in any branch of engineering is formulated based on the guidelines mentioned in 5.2 and will be recommended by the concerned Board of Studies and is approved by the Academic council of the college.
2) In case of students admitted under lateral entry, the respective regular curriculum contents from second year onwards are to be pursued by them.
3) In case of students admitted under advanced standing, the Programme curriculum will be prepared by the concerned Board of Studies and the Academic Council has to approve the same.
4) After approval from the Academic Council, Programme curriculum for the same shall be prepared and made available to all the students along with the academic regulations.

5.5 The Maximum duration permitted and cancellation of admission:

5.5.1 The maximum duration permitted for any student to successfully complete any four year B.Tech. Programme of study shall be:

1) Eight academic years in sequence from the year of admission for a normal student admitted into first year of any Programme and
2) Six academic years in sequence from the year of admission for a Lateral entry student admitted into second year of any Programme and
3) For students admitted with advanced standing, the maximum time for completion of Programme study shall be twice the period in terms of academic years in sequence, stipulated in the Programme curriculum defined at the time of admission.

5.5.2 In case, any student fails to meet the applicable conditions for the eligibility of degree in the maximum stipulated period as in ***5.5.1***, his/her admission stands cancelled.

6.0 EXAMINATION SYSTEM & EVALUATION:

6.1 The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades and grade points will be awarded as per section ***11.0.*** The performance of a student in each course is assessed with assignment tests, term examinations on a continuous basis during the semester called Continuous Assessment (CA)and a Final Examination (FE) conducted at the end of the semester. For each theory, design and/or drawing course, there shall be a comprehensive Final Examination (FE) of three hours duration at the end of each Semester, except where stated otherwise in the detailed Scheme of Instruction.

6.2 The distribution of marks between Continuous Assessment(CA) and Final Examination(FE) to be conducted at the end of the semester will be as follows:

Nature of the course	CA	FE
Theory subjects	40	60
Drawing	40	60
Practicals	40	60
Term Paper	40	60
Project work	50	100

6.3 **Continuous Assessment (CA) in Theory and Drawing subjects:**

1) Ineach Semester there shall be two Term examinations and two Assignment Tests in every theory course. The duration of the Assignment Test shall be 45 minutes and that of the Term Examination shall be 90 minutes. Assignment sheets shall be given at least one week in advance of the commencement of the tests. Students shall answer the question(s) [or question(s) similar in model] from the Assignment sheet stapled to or printed on the script which is distributed in the examination hall.

The Term Examination is conducted in the regular mode according to a schedule which will be common for a particular year of study. The maximum weightage for Term Examinations, Assignment Tests and the calculation of marks for CA in a theory course is given in the following table.

Weightage for different heads to calculate CA for 40 marks in a Theory course			
	Term Exams (Max. 20 marks)	Assignment Tests (Max. 15 marks)	Attendance (Max. 5 marks)
Better Performed test/exam	13	10	5
Other test/exam	7	5	

2) For drawing courses, there shall be only two Term examinations in a semester with no Assignment Tests. In case of such courses a maximum of 15 marks shall be given for day-to-day class work and a maximum of 20 marks shall be awarded to the Term examinations taking into account the performance of both the Term examinations giving weightage of 13 marks for the Term Examination in which the student scores more marks and the remaining 7 marks for the other term examination.

3) A maximum weightage of 5 marks will be given in the CA for attendance in all theory and drawing courses as indicated in ***7.1.1.***

6.4 Final Examination (FE) in Theory and Drawing subjects:

1) For each theory, design and/or drawing course, there shall be a comprehensive Final Examination (FE) of three hours duration at the end of each Semester for 60 marks, except where stated otherwise in the detailed Scheme of Instruction.

Question paper setting shall be entrusted to external examiners from the panels approved by the respective Boards of Studies.

2) A minimum of 24 marks (40%) are to be secured exclusively in the final examination (FE) of theory/drawing course and a minimum total of 40 marks in FE and CA put together in a theory / drawing course is to be secured in order to be declared as passed in that course and for the award of the grade in the course.

6.5 Continuous Assessment (CA) in laboratory courses:

1) The evaluation for Laboratory course is based on CA & FE. The CA for 40 marks comprises of 20 marks for day to day laboratory work, 5 marks for record submission and 15 marks for a laboratory examination at the end of the semester.
2) In any semester, a minimum of 90 percent of prescribed number of experiments / exercises specified in the syllabi for laboratory course shall be taken up by the students. They shall complete these experiments / exercises in all respects and get the record certified by the concerned internal lab teacher and the Head of the Department to be eligible to appear for the Final Examination in that laboratory course.

6.6 Final Examination (FE) in laboratory courses:

1) For each laboratory course, the final examination (FE) shall be conducted by one internal and one external examiner appointed by the Principal and the duration of the exam shall be for three hours. The FE is for 60 marks which include 30 marks for a lab experiment/exercise, 20 marks for Viva-voce and 10 marks for the certified record.
2) A minimum of 30 marks (50%) shall be obtained in FE and a minimum total of 40 marks in FE and CE put together in a laboratory course are to be secured in order to be declared as passed in the laboratory course and for the award of the grade in that laboratory course.

6.7 Evaluation of term paper:

1) A term paper is to be submitted by each student in the 7th semester which would be a precursor to the project work to be done in the 8th semester. The evaluation is based on CA for 40 marks, which includes a minimum of two seminars/presentations for 20 marks and the report submitted at the end of the semester which is evaluated for 20 marks.
2) The final examination (FE) shall be conducted for 60 marks by one internal and one external examiner appointed by the Principal. The FE contains Viva-voce and the demonstration of the model developed or work performed as a part of the term paper.
3) A minimum of 30 marks (50%) shall be obtained in FE and a minimum total of 40 marks in FE and CE put together in the term paper are to be secured in order to be declared as passed in the term paper and for the award of the grade in the term paper.

6.8 Evaluation of Project:

1) In case of the Project work, the evaluation shall be based on CA and FE. The CA for 50 marks consists of a minimum of two Seminars/ presentations for 25 marks and the Project Report submitted at the end of the semester which is evaluated for 25 marks.
2) FE shall be in the form of a Viva- voce and the demonstration of the thesis work for 100 marks. Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the Principal. A minimum of 50 marks shall be obtained in FE exclusively and a minimum total of 60 marks in FE and CE put together are to be secured in order to be declared as passed in the Project and for the award of the grade.

6.9 A student who could not secure a minimum of 50% aggregate marks in CA of a semester is not eligible to appear for the Final Examinations conducted at the end of the semester and shall have to repeat that semester.

NOTE : A student who is absent for any Test / Exam / Seminar / Presentation as a part of Continuous Assessment (CA), for any reason whatsoever, shall be deemed to have scored zero marks in the respective component and no provision for make-up shall be provided.

7.0 ATTENDANCE REGULATIONS:

7.1 Regular course of study means a minimum average attendance of 75% in all the courses of study prescribed for a semester in the curriculum, computed by considering total number of hours / periods conducted in all courses as the denominator and the total number of hours / periods actually attended by the student in all courses, as the numerator.

7.1.1 A maximum of 5 marks weightage in CA in each theory/drawing course shall be given for those students who put in a minimum of 75% attendance in the respective theory/drawing course in a graded manner as indicated below:

Attendance of 75% and above but less than 80%	1 mark
Attendance of 80% and above but less than 85%	2 marks
Attendance of 85% and above but less than 90%	3 marks
Attendance of 90% and above	5 marks

7.2 Condonation of shortage in attendance may be recommended on genuine medical grounds, up to a maximum of 10% provided the student puts in at least 65% attendance as calculated in *7.1* above and provided the principal is satisfied with the genuineness of the reasons.

7.3 A student, who could not satisfy the minimum attendance requirements, as given above, in any semester, is not eligible to appear for the Final examinations and shall have to repeat that semester.

8.0 DETENTION: A student is said to have been detained and not allowed to appear for Final Examination(FE) at the end of the semester when

8.1 The student does not have a minimum 75% attendance or 65% attendance with condonation in all subjects put together in that semester or the student has not scored a minimum of 50% of marks in CA in all the courses of that semester put together.

Such a student shall have to repeat the same semester subsequently and satisfy the above requirements afresh to become eligible to appear for the Final Examination (FE), conducted at the end of the semester.

9.0 CONDITIONS FOR PROMOTION

9.1 A student not detained in the first semester of a year of study shall be promoted to second semester of that year of study.

9.2 A student shall be eligible for promotion to II year of B.Tech. Programme if he/she is not detained in the second semester of first year B.Tech. Programme irrespective of the number of backlog courses in I year B.Tech.

9.3 A student shall be eligible for promotion to III year of B.Tech. Programme if he/she is not detained in the second semester of II year B.Tech. Programme and has passed all but **three** courses of I year B.Tech. (including laboratory course).

9.4 A student shall be eligible for promotion to IV year of B.Tech. Programme if he/she is not detained in the second semester of III year B.Tech. Programme and has passed all but **three** courses of II B.Tech. (including laboratory course) and all but **one** course of I B.Tech. (including laboratory course).

10.0 Registration: Every eligible student (not detained and promoted) has to register himself /herself at the beginning of every semester indicating all the Courses taken up for pursuit by him/her during that Semester.

10.1 When a student is debarred for one or more semesters, his/her registration in the present semester is cancelled and the student is debarred from registering in future during the debarred period.

10.2 In any case while re registering in any semester, he or she will have to pay the requisite fee once again.

11.0 GRADING SYSTEM

11.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each course. The letter grades and the corresponding grade points are as given in the Table.

Table: Grades & Grade Points

Grade	Grade points	% of Marks
O	10	90% and above
A+	9	80% – 89%
A	8	70% – 79%
B+	7	60% – 69%
B	6	50% – 59%
C	5	40% – 49%
F	Failed, 0	Less than 40%

11.2 A student who earns a minimum of 5 grade points (C grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course. **However it should be noted that a pass in any course/term paper/Project shall be governed by the rules mentioned in 6.0**.

12.0 GRADE POINT AVERAGE

13.0

13.1 The Grade Point Average (GPA) will be calculated according to the formula:

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

Where C_i = number of credits for the course *i*,

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

13.2 Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation.

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

14.0 ELIGIBILITY FOR AWARD OF B.TECH. DEGREE: A student shall be eligible for award of the B.Tech degree if he/she fulfils all the following conditions;

1) Registered and successfully completed all the components prescribed in theProgramme of study to which he/she is admitted,
2) Obtained CGPA greater than or equal to 5.0 (Minimum requirements for Pass),Has no dues to the Institute, hostels, Libraries, NCC/NSS etc., and
3) No disciplinary action is pending against him/her.

15.0 AWARD OF CLASS: A candidate who becomes eligible for the award of B.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Table: CGPA required for award of Degree

Distinction	**≥ 8.0***
First Class	**≥ 7.0**
Second Class	**≥ 6.0**
Pass	**≥ 5.0**

* In addition to the required CGPA of 8.0, the student must have necessarily passed all the courses of every semester **in the minimum stipulated period for the Programme**.

15.1 Grade Sheet: A grade sheet (Memorandum) will be issued to each student indicating his performance in all courses taken in that semester and also indicating the Grades and SGPA.

15.2 **Transcripts**: After successful completion of the total Programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee. Partial transcript will also be issued up to any point of study to any student on request and by paying the stipulated fee in force.

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

15.4 The Governing body of B.E.C (Autonomous) has to approve and recommend to the AcharyaNagarjuna University for the award of a degree to any student.

16.0 IMPROVEMENT OF CLASS:

16.1 A candidate, after becoming eligible for the award of the Degree, may reappear for the Final Examination in any of the theory courses as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of two academic years after becoming eligible for the award of the Degree.

However, this facility shall not be availed of by a candidate who has taken the Original Degree Certificate. Candidates shall not be permitted to reappear either for CA in any course or for Final Examinations (FE) in laboratory courses (including Project Viva-voce) for the purpose of improvement.

17.0 SUPPLEMENTARY EXAMINATIONS: In addition to the Regular Final Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. Candidates taking the Regular / Supplementary examinations as Supplementary candidates may have to take more than one Final Examination per day. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstances.

18.0 INSTANT SUPPLEMENTARY EXAMINATIONS: Candidates who fail in one theory course of 4^{th} year 2^{nd} semester can appear for Instant Supplementary Examination conducted after declaration of the revaluation results of the said exam.

19.0 MALPRACTICES: The Principal shall refer the cases of malpractices in Continuous Assessments (CA) and Final Examinations (FE) to an Enquiry Committee constituted by him / her. The Committee will submit a report on the malpractice committed by the student to the Principal. The Principal along with the members of the Committee is authorised to award a suitable punishment.

20.0 ADDITIONAL ACADEMIC REGULATIONS:

20.1 Any attempt to impress upon the teachers, examiners, faculty and staff of Examinations, bribing for either marks or attendance will be treated as malpractice.

20.2 When a student is absent for final examination, he/she is treated as to have appeared and obtained zero marks in that component and Grading is done so.

20.3 When a component of Continuous Assessment (CA) or Final Examination (FE) is cancelled as a penalty, he/she is awarded zero marks in that component.

21.0 AMENDMENTS TO REGULATIONS:

The Academic Council of Bapatla Engineering College (Autonomous) reserves the right to revise, amend or change the Regulations, Schemes of Examinations, and/ or Syllabi or any other matter pertained suitable to the needs of the students, society, industry without any notice.

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BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

First Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
ME111 /MA01	Mathematics – I	4	1		40	60	100	4
ME112 / PH01	Engineering Physics – I	3	1		40	60	100	3
ME113 / CY01	Engineering Chemistry-I	3	1		40	60	100	3
ME114 / EN01	English Language & Communication	3	1		40	60	100	3
ME115	Engineering Mechanics-I	4	1		40	60	100	4
ME116 / CS01	Computer Programming with C	4	1		40	60	100	4
ME151 / PHL01	Physics Laboratory-I	-	-	3	40	60	100	2
ME152 /CYL02	Chemistry Laboratory	-	-	3	40	60	100	2
ME153 /CSL01	Computer Programming Lab.	-	-	3	40	60	100	2
	TOTAL	21	6	9	360	540	900	27

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE: BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

First Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
ME121 /MA02	Mathematics – II	4	1		40	60	100	4
ME122 / PH02	Engineering Physics – II	3	1		40	60	100	3
ME123 / CY02	Engineering Chemistry-II	3	1		40	60	100	3
ME124	Engineering Mechanics-II	4	1		40	60	100	4
ME125 / BT01	Environmental Studies	3			40	60	100	3
ME126 /ME01	Engineering Graphics	3	3		40	60	100	3
ME161 / PHCY L01	Physics & Chemistry Laboratory-II	-	-	3	40	60	100	2
ME162/ENL01	English Language Laboratory	-	-	3	40	60	100	2
ME163/MEL01	Workshop	-	-	3	40	60	100	2
	TOTAL	20	7	9	360	540	900	26

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE : BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

Second Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
ME211 /MA03	Mathematics-III	4	-		40	60	100	4
ME212	Mechanics of Materials-I	4	1		40	60	100	4
ME213	Basic Thermodynamics	4	1		40	60	100	4
ME214 / EE03	Electrical Technology	4			40	60	100	4
ME215	Kinematics of Machines	4	1		40	60	100	4
ME216	Machine Drawing	3	1		40	60	100	3
ME251	Fuels & Oil Testing Lab	-	-	3	40	60	100	2
ME252	Computer Aided Drafting Lab	-	-	3	40	60	100	2
ME253 / EEL03	Electrical Technology Lab	-	-	3	40	60	100	2
	TOTAL	23	4	9	360	540	900	29

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE : BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

Second Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Theory	Tutorial	Lab	CA	FE	Total Marks	
ME221/MA04	Mathematics-IV	4	-		40	60	100	4
ME222	Mechanics of Materials-II	4	1		40	60	100	4
ME223	Applied Thermodynamics	4	1		40	60	100	4
ME224	Casting, Forming & Welding Technology	4			40	60	100	4
ME225	Fluid Mechanics	4	1		40	60	100	4
ME226	Materials Science & Metallurgy	4			40	60	100	4
ME261	Fluid Mechanics &Strength of Materials Lab	-	-	3	40	60	100	2
ME262	Computer Applications in Mechanical Engineering Lab	-	-	3	40	60	100	2
ME263	Workshop Practice	-	-	3	40	60	100	2
	TOTAL	24	3	9	360	540	900	30

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE: BAPATLA

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SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

Third Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
ME311/ MA08	Probability & Statistics and optimization Techniques	4			40	60	100	4
ME312	Design of Machine Elements-I	4	1		40	60	100	4
ME313	I.C. Engines & Gas Turbines	4	1		40	60	100	4
ME314	Metal cutting & Machine tools	4			40	60	100	4
ME315	Hydraulic Machines	4			40	60	100	4
ME316	Operations Research	4	1		40	60	100	4
ME351	I.C.Engines Lab	-	-	3	40	60	100	2
ME352	Machine Shop Practice	-	-	3	40	60	100	2
ME353/ ENL02	Soft skills Lab	-	-	3	40	60	100	2
	TOTAL	24	3	9	360	540	900	30

CA: Continuous Assessment **FE: Final Examination**

BAPATLA ENGINEERING COLLEGE: BAPATLA

(*Autonomous***)**

SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

Third Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
ME321	Machine Dynamics	4	1		40	60	100	4
ME322	Design of Machine Elements-II	4	1		40	60	100	4
ME323	Heat Transfer	4	1		40	60	100	4
ME324	Manufacturing Engineering	4			40	60	100	4
ME325/EI07	Basic Electronics & Microprocessors	4			40	60	100	4
ME326	Elective – I	4			40	60	100	4
ME361	Heat Transfer Lab	-	-	3	40	60	100	2
ME362	CAD - MODELING LAB	-	-	3	40	60	100	2
ME363/EIL02	Basic Electronics and Microprocessors Lab	-	-	3	40	60	100	2
	TOTAL	24	3	9	360	540	900	30

CA: Continuous Assessment **FE: Final Examination**

Elective – I

1. ME326(A) Operations management
2. ME326(B) Mechanics of composite Materials
3. ME326(C) Refrigeration and Air Conditioning
4. ME326(D) Fluid power & control systems

BAPATLA ENGINEERING COLLEGE: BAPATLA

(*Autonomous***)**

SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

Final Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
ME411	Industrial Management and Enterpreunureship development	4			40	60	100	4
ME412	Design Of Machine Elements-III	4	1		40	60	100	4
ME413	Engineering Metrology and Mechanical Measurements	4			40	60	100	4
ME414	Automation & Computer Aided Manufacturing	4	1		40	60	100	4
ME415	Elective - II	4	1		40	60	100	4
ME416	open Elective	3	1		40	60	100	3
ME451	Term Paper			3	40	60	100	2
ME452	CAD - ANALYSIS LAB			3	40	60	100	2
ME453	Design & Metrology Lab			3	40	60	100	2
	TOTAL	23	4	9	360	540	900	29

CA: Continuous Assessment **FE: Final Examination**

Elective – II

(1) ME415(A) Finite Element Methods
(2) ME415(B) Computational Fluid Dynamics
(3) ME415 (C) Mechatronics
(4) ME415(D) Solar Energy and Utilization

open Elective

1. ME416 (A) Power Plant Engineering
2. ME416 (B)Robotics

BAPATLA ENGINEERING COLLEGE: BAPATLA

(*Autonomous***)**

SCHEME OF INSTRUCTION & EXAMINATION

FOR

MECHANICAL ENGINEERING

w.e.f 2010-2011 (Semester System)

Final Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab/ Project	CA	FE	Total Marks	
ME421	Professional Ethics and Human Values.	3	1		40	60	100	3
ME422	Automobile Engineering	4			40	60	100	4
ME423	Elective - III	4	1		40	60	100	4
ME424	Elective – IV	4	1		40	60	100	4
ME461	Project Work			10	50	100	150	10
ME462	Computer aided Manufacturing Automation Lab			3	40	60	100	2
	TOTAL	15	3	13	250	400	650	27

CA: Continuous Assessment **FE: Final Examination**

Elective (III)

(1) ME423(A) Power Plant Engineering
(2) ME423(B)Optimization Techniques
(3) ME423(C)Computer Integrated Manufacturing
(4) ME423(D)Computer Aided Design

Elective (IV)

(1) ME424(A) Robotics
(2) ME424(B)Computer Graphics
(3) ME424 (C)Computer aided Process planning
(4) ME424 (D)Enterprise Resource planning

MATHEMATICS – I

(Common for all branches)

MA01

I B.Tech I Semester

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

Matrix Algebra: Rank of a Matrix, Linear Independence, Vector Space, Solutions of Linear Systems, Inverse of a Matrix by Gauss-Jordan Elimination, Vector Spaces, Inner Product Spaces, Linear Transformations. Eigen Values, Eigen Vectors, Some applications of Eigen value problems. Symmetric, Skew-Symmetric and Orthogonal Matrices.

UNIT - II

Matrix Algebra: Complex Matrices: Hermitian, Skew-Hermitian and Unitary.
Similarity of Matrices, Basis of Eigen Vectors, Diagonalization.

Differential Calculus: Rolle's Theorem, Lagrange's Mean Value Theorem and Taylor's Theorem (without Proofs), Taylor's and, Maclaurin's Series for functions of one variable. Maxima and Minima of functions of Two Variables, Lagrange's method of Multipliers.

UNIT - III

First Order Differential Equations: Basic concepts, Geometrical meaning, Separable Differential Equations, Exact Differential Equations, Integrating Factors, Linear Differential Equations, Bernoulli's Equation, Orthogonal Trajectories of curves, Some Engineering Applications: Growth-Decay and Newton's Law of Cooling.

UNIT - IV

Linear Differential Equations of Second Order: Homogeneous Linear Equations of Second Order, Second Order Homogeneous Equations with Constant Coefficients, Case of Complex Roots, Euler-Cauchy Equations, Non-Homogeneous Equations, Solution by Undetermined Coefficients, Solution by Variation of Parameters, Applications-Modeling of Electric Circuits.

TEXT BOOK:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 8th edition, John Wiley & Sons.

REFERENCE BOOK:

1. George B, Thomas, Jr. and Ross L. Finney, “Calculus and Analytic Geometry”, Addison Wesley.

ENGINEERING PHYSICS – I

(Common to all branches)

PH01

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

OPTICS (11 Periods)

INTERFERENCE: Two-wave interference, coherence, cosine law, Michelson interferometer and its applications, (determination of wavelengths of monochromatic light and resolution of two nearby wavelengths).

DIFFRACTION: Fresnel &Fraunhoffer diffraction, fraunhoffer diffraction due to single slit, plane diffraction grating, dispersive and resolving power of grating.

POLARISATION: Introduction, Brewester's and Malus law, double refraction,Nicol prism, quarter wave plate, half wave plate.

UNIT – II

LASERS & FIBER OPTICS (10 Periods)

LASERS: Properties of lasers**,** Spontaneous and stimulated emission, Population inversion, active medium, Solid state (Ruby) laser, Gas(He-Ne) laser, semiconductor (Ga-As) laser, Applications.

HOLOGRAPHY: Principle, recording and reproduction of holography, Applications.

FIBER OPTICS: Structure and types of optical fibers, acceptance angle, Numerical aperture, fiber optic communication and its advantages.

UNIT – III

ELECTRICITY & MAGNETISM (10 Periods)

Gauss's law in static electricity (qualitative only), Gauss's law of magnetism, circulating charges, Cyclotron-constructing, working and limitations, Hall effect and its applications, displacement current, Maxwell's equations (qualitative treatment), E M oscillations, velocity of

EM waves, energy transport and the pointing vector, radiation pressure, AC circuit containing series LCR circuit-resonance condition.

UNIT – IV

MODERN PHYSICS (11 Periods)

Dual nature of light, de-Brogli's concept of matter waves, Davison-Germer electron diffraction experiment, Heisenberg's uncertainty experiment and applications (non-existence of electron in a nucleus and finite width of spectral lines), one dimensional time- independent Schrödinger wave equation, physical significance of wave function, applications of time-independent wave equation to particle in a box(one dimensional), tunneling, the scanning tunneling microscope.

TEXT BOOKS:

1. R.K Goure and S.C. Gupta, "Engineering Physics", New Delhi.
2. Halliday, Resnik, Krane, "PHYSICS", John Wiley & Sons.

REFERENCE BOOKS:

1. "Optics", A. Ghatak (TMH).
2. "Concepts of Modern Physics", AurthurBeiser (TMG).
3. "A text book of engineering physics", M.N. Avadhanulu, P.G. Kshirasagar, S.Chand& Co.,.
4. Serway and jewett, "Physics for scientist and engineers with Modern physics", 6^{th} edition, Tomson Brooks/Cole, Indian reprint.

ENGINEERING CHEMISTRY – I

(Common to all branches)

CY01

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

WATER TECHNOLOGY **(11 Periods)**

Characteristics – alkalinity – types of alkalinity and determination – hardness – types and estimation by EDTA method (problems); Domestic water treatment – disinfection methods (Chlorination, ozonation. UV treatment) – Boiler feed water – requirements – disadvantages of using hard water in boilers: Scales, Sludges, Caustic embrittlement, boiler corrosion, Priming and foaming – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning –demineralization process –Lime Soda Process- desalination of brackish water by electro dialysis and reverse osmosis.

UNIT – II

POLYMERS: **(12 Periods)**

Polymers: Definition, Polymerization, types, addition and condensation polymerization, free radical polymerization mechanism.

Plastics: Classification, Preparation, Properties and uses of PVC, Teflon, polycarbonate, polyurethane, nylon-6,6, PET.

Rubber: vulcanization of rubber, synthetic Rubbers: Buna-S, Buna-N and Polyurethane rubbers.

SURFACE CHEMISTRY:

Surface Chemistry: Solid surfaces, types of adsorption, Frendlich and Longmuir adsorption isotherm, BET adsorption equip. Calculation of surface area of solid & application adsorption: role of adsorbents in catalysis, ion-exchange adsorption and pollution abatement; classification of colloids, Electrical & optical properties micelles, applications of colloids in industry.

UNIT – III

(11 Periods)

RENWEBLE AND NON RENWEABLE ENERGY SOURCES

Thermal and Chemical energy: Introduction to solid fuels - calorific value (lower, higher)- determination of calorific value(Bomb Calorimeter) - pulverized coal – carbonization (Bee Haive method - Otto Hoffman by product method)- Proximate and ultimate analysis of coal - Flow Chart in Thermal Power Stations.- Introduction to Geo Thermal Energy-working – applications-Introduction to Solar Cells –Solar Panels-Applications-Green House Concept - wind energy – fuel cells – hydrogen – oxygen fuel cell – batteries – alkaline batteries – lead–acid, nickel–cadmium and lithium batteries.

UNIT – IV

ENGINEERING MATERIALS (11 Periods)

Refractories – classification – acidic, basic and neutral refractories – properties: refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling – manufacture of alumina, magnesite and zirconia bricks, Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide.

Composites: definition, types, polymer matrix composites.

Lubricants – mechanism of lubrication, liquid lubricants - properties: viscosity index, flash and fire points, cloud and pour points, oiliness –solid lubricants – graphite and molybdenum sulphide.

Nanomaterials: Introduction to nanochemistry – preparation of few Nano materials:carbon nanotubes, Fullerenes etc – Properties of Nano materialas and their Engineering applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain and Monica Jain, “Engineering Chemistry”, DhanpatRai Pub, Co., New Delhi (2002).
2. S.S. Dara & Mukkati K., “A text book of engineering chemistry”, S.Chand & Co.Ltd., New Delhi (2006).
3. “Text Books of Engineering Chemistry”, C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).

REFERENCE BOOKS:

1. B.K.Sharma, "Engineering chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
3. "Enginering Chemistry", J.C. Kuriacase & J. Rajaram, Tata McGraw Hill co., New Delhi 1. (2004).
4. "Chemistry of Engineering Meterials", R.P Mani and K.N.Mishra, CENGAGE learning.
5. "Applied Chemistry – A text for Engineering & Technology", Springar (2005).
6. "Text Book of Engineering Chemistry", ShasiChawla, DhantpatRai Publishing Company, NewDelhi (2008).
7. "Engineering Chemistry", R. Gopalan, D. Venkatappayya, D.V. SulochanaNagarajan, Vikas Publishers (2008).

ENGLISH LANGUAGE AND COMMUNICATION

(Common to all branches)

EN01

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Objective of the course: To impart Basic skills of communication in English in through intensive practice to the First year student, So as to enable them to function confidently and effectively in that language in the professional sphere of their life.

Unit – 1

Grammar: This area exposes the learners to improve the standard proficiency level, avoiding grammatical mistake in communication.

1. Tenses
2. Preposition
3. Parts of speech

Unit – 2

Writing skills: This area promotes a format and well structured sentences required in professional writing

1. Paragraph writing
2. Letter writing
3. Essay writing

Unit – 3

Vocabulary: This unit offers an extensive knowledge of words and word meaning, essential for communication and contemporary test

1. Analogies
2. Idioms and phrases and their use
3. Antonyms & Synonyms

Unit – 4

Reading skills: Reading skills enable the student to turn writing into meaning and achieve the goals of reading independently, comprehensibly and fluently

1. Reading comprehension
   i. Scanning
   ii. Skimming
   iii. Glance

TEXT BOOK:

1. "Objective English for Competitive Examination (Third edition)", Hari Mohan Prasad, Uma ReniSinha, Tata McGraw Hill.

REFFRENCE BOOKS:

1. "Effective Technical Communication", M.AshrafRizvi, Tata McGraw Hill.
2. "Cambridge Preparation Guide for TOFEL".
3. "Dictionary of Technical Terms".
4. "Cambridge Advanced Learner's Dictionary".
5. "Cambridge Idioms Dictionary".
6. "Basic Correspondence & Report Writing", Sharma, Tata McGraw Hill.
7. "Business Correspondences and Report Writing", R.C.Sharma, Krishna Mohan, Tata McGraw Hill.
8. "Dictionary of Misspelled and Easily Confused Words", David Downing, Deborah K.Williams, Tata McGraw Hill.

ENGINEERING MECHANICS – I

(Exclusive to Mechanical Engineering)

ME115

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

General Principles: Mechanics – Fundamental concepts – Units of measurements – International systems of units – Numerical calculations – General procedure for analysis.

Force Vectors: Scalars and vectors – Vector operations – Vector addition of forces – Addition of a system of coplanar forces – Cartesian vectors – Addition and subtraction of Cartesian vectors – Force vector directed along a line – dot product.

Equilibrium of a Particle: Condition for equilibrium of a particle – The free body diagram – Coplanar force systems – Three dimensional force systems.

UNIT – II

Force System Resultants: Moment of a force (Scalar formation) – Cross product – Moment of a force (Vector formation) - Principle of moments – Moment of a force about a specified axis – Moment of a couple – Equivalent system – Resultants of a force and a couple system – Further reduction of a force and couple system.

Equilibrium of a Rigid Body: Conditions for rigid body equilibrium – Equilibrium in two dimensions: Free body diagrams, Equations of equilibrium, Two and three force members – Equilibrium in three dimensions: Free body diagrams, Equations of equilibrium – Constraints for a rigid body.

Virtual Work: Definition of work and virtual work – Principle of virtual work for a particle and a rigid body – Principle of virtual work for a system of connected rigid bodies.

UNIT – III

Structural Analysis: Simple trusses – The method of joints – Zero force members – The method of sections – Frames and machines.

Friction: Characteristics of dry friction – Problems involving dry friction – Wedges – Frictional forces on screws.

UNIT – IV

Center of Gravity and Centroid: Center of gravity and center of mass for system of particles – Center of gravity, center of mass and centroids for a body – Composite bodies – Theorem of Pappus and Guldinus – Resultant of a simple distributed loading.

Moments of Inertia: Definition of moments of inertia for areas – Parallel axis theorem for area – radius of gyration of an area – Moments of inertia of an area by integration – Moment of inertia of composite areas – product of inertia for an area – Mass moment of inertia.

TEXT BOOK

1. Engineering Mechanics. Statics and Dynamics by R.C. Hibbeler and Ashok Gupta. Pearson Education.

REFERENCE BOOKS

1. Vector mechanics for Engineers. Statics and Dynamics by Beer and Johnston, Tata McGraw-Hill publishing company, New Delhi
2. Engineering Mechanics by S. Timoshenko and D. H. Young – McGraw-Hill International Edition
3. Engineering Mechanics. Statics and Dynamics by J. L. Meriam and L. Kraige
4. Engineering Mechanics. Statics and Dynamics by Irving H. Shames and G. Krishna MohanaRao, Pearson Education.

COMPUTER PROGRAMMING WITH C

(Common to all Branches)

CS01

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction:

Computer Fundamentals: Computer and it's components, hardware/software**,** algorithm, characteristics of algorithms, flowchart, symbols used in flowchart, history of C, basic structure of a C program.

C Tokens: Character set, variables, keywords, data types and sizes, type qualifiers, numeric constants and their forms of representation, character constants, string constants, declaration and initialization of variables.

Operators & Expressions: Arithmetic operators and expressions, type-conversion rules, coercion, assignment operators and expressions, increment and decrement operators, conditional operator, statements, preprocessor directives, input/ output functions and other library functions. Relational operators and expressions, boolean operators and expressions, operator precedence and associativity.

Control Statements: if-else statement, else-lf statement and switch statement.

Programming Exercises for Unit I :

C-expressions for algebraic expressions, evaluation of arithmetic and boolean expressions. Syntactic errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, filling the blanks in *a* given program. Programs using Scientific and Engineering formulae.Finding the largest of the three given numbers.Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, computation of electricity bill and conversion of lower case character to its upper case.

UNIT – II

Control Statements: while loop, for loop, do while loop, nested Control statements, break and continue statements.

Arrays: One-Dimensional numeric and character arrays and Two-Dimensional numeric and character arrays.

Programming Exercises for Unit - II:

To print the sum of the digits of a given number and to display the image of a given number.To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number.To print graphic patterns of symbols and numbers and computation of statistical parameters of a given list of numbers.To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not. Transpose of a matrix, product and sum of matrices and sorting of names using arrays.

UNIT – III

Functions: Function definition, parameter passing mechanisms and simple recursion.

Scope & extent: Scope rules and storage classes.

Pointers and Dynamic Memory Allocation: Pointer variables**,** pointer arithmetic, dynamic memory allocation, array of pointers, command line arguments, passing pointer variables as parameters to functions.

Programming Exercises for Unit - III:

Functions - Insertion sort, Linear search. Recursive functions to find factorial &GCD(Greatest Common Divisor), string operations using pointers and pointer arithmetic and dynamic memory allocation. Swapping two variable values. Sorting a list of names using array of pointers and command line arguments.

UNIT – IV

Structures: Structures, array of structures, pointers to structures, unions and difference between structure and union.

Files: File handling functions for input and output.

Programming Exercises for Unit - IV:

Operations on complex numbers, matrix operations with the matrix and the size of the matrix as a structure, sorting a list of student records on register number using array of pointers and to read an input file of marks and generate a result file.

TEXT BOOK:

1. Byron Gottfried, "Programming with C", Schaum's Outline series.

REFERENCE BOOKS:

1. Kernighan BW and Dennis Ritchie M, "C programming language", 2nd ed, Prentice Hall.
2. Yashavant P. Kanetkar, "Let us C", BPB Publications.
3. E.Balagurusamy, "Programming in ANSI C", 4th ed, Tata Mcgraw-Hill.
4. Herbert Schildt, "C: The Complete Reference", 4th edition, Tata Mcgraw-Hill.

PHYSICS LAB – I

(Common to all branches)

PH L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF EXPERIMENTS

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using Stewart-Gee's apparatus.
3. Determination of thickness of thin wire using air wedge interference bands.
4. Determination of radius of curvature of a Plano convex lens by forming Newton's rings.
5. Determination of wavelengths of mercury spectrum using grating normal incidence method.
6. Determination of dispersive power of a given material of prism using prism minimum deviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
9. Verify the laws of transverse vibration of stretched string using sonometer.
10. Determination of numerical aperture of an optical fiber.

CHEMISTRY LAB – I

(*Common to all branches)*

CY L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions , Normality, Molarity, Molality etc and laboratory ware used, error ,accuracy, precision, Theory of indicators, use of volumetric titrations.

2. Volumetric Analysis:
    a. Estimation of acid content in un-known solution
    b. Estimation of Iron by Dichrometric method
    c. Estimation of Copper by Iodometric method
    d. Estimation of available chlorine in bleaching powder

3. ANALYSIS OF WATER: Estimation of :
    a. TOTAL HARDNESS BY EDTA METHOD
    b. TURBIDITY
    c. CONDUCTIVITY
    d. pH
    e. TOTAL DISSOLVED SALTS
    f. SALANITY
    g. ALKALINITY
    h. DISSOLVED OXYGEN

4. BACTERIAL COUNT: The student has to get his water sample and the teacher has to explain the analysis and the results are to be compared with the INDIAN STANDRDS.

5. CONSTRUCTION OF GALVANIC CELL: Based on the position of the metals in the electrochemical series a model electrochemical Cell is constructed and the values are determined and effect of metal ion concentration, Temperature etc. on emf are calculated.

TEXT BOOKS:

1. "Practical Engineering Chemistry", K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. "Inorganic quantitative analysis", Vogel.

REFERENCE BOOKS:

1. "Text Book of engineering chemistry", R. N. Goyal and HarrmendraGoel.
2. "A text book on experiments and calculation Engg.", S.S. Dara.
3. "Instrumental methods of chemical analysis", Chatwal, Anand, Himalaya publications.

COMPUTER PROGRAMMING LAB

(Common to all Branches)

CS L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF PROGRAMS

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement).

Domestic Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 200	0.50 per unit
201 – 400	100 plus 0.65 per unit
401 – 600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Commercial Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 50	0.50 per unit
100 – 200	50 plus 0.6 per unit
201 – 300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the following (using loops):
   a) $1 + x^2/2! + x^4 / 4!+ \ldots$upto ten terms
   b) $x + x^3/3! + x^5/5!+ \ldots$ upto 7 digit accuracy

3. Write a C program to check whether the given number is
   a) Prime or not.
   b) Perfect or Abundant or Deficient.

4. Write a C program to display statistical parameters (using one – dimensional array).
    a) Mean
    b) Mode
    c) Median
    d) Variance.

NOTE: Use functions for each subtask in the following programs

5. Write a C program to read a list of numbers and perform the following operations
    a) Print the list.
    b) Delete duplicates from the list.
    c) Reverse the list.
6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message "Element not found in the List".
7. Write a C program to read two matrices and compute their sum and product.
8. A menu driven program with options (using array of character pointers).
    a) To insert a student name
    b) To delete a name
    c) To print the names
9. Write a C program to read list of student names and perform the following operations
    a) To print the list of names.
    b) To sort them in ascending order.
    c) To print the list after sorting.
10. Write a C program that consists of recursive functions to
    a) Find factorial of a given number
    b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.
11. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author and the system searches the list and displays whether it is available or not. If it is not an appropriate message is displayed, if it is then the system displays the book details and request for the number of copies required ,if the requested copies are available the total cost of the

requested copies is displayed otherwise the message “required copies not in stock” is displayed. Write a program for the above in structures with suitable functions.

12. Write a C program to read a data file of student’s records with fields(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

MATHEMATICS – II

(Common for all branches)

MA02

I B.Tech. II Semester

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Fourier Series: Periodic Functions, Trigonometric Series, Fourier Series, Functions of Any Period P = 2L, Even and Odd Functions, Half Range Expansions, Complex Fourier Series, Approximation by Trigonometric polynomials.

UNIT – II

Laplace Transforms: Laplace Transform, Inverse Transform, Linearity, Shifting, Transforms of Derivatives and Integrals, Differential Equations, Unit Step Function, Second Shifting Theorem, Dirac's Delta Function, Convolution theorem (without proof).

UNIT – III

Integral Calculus: Evaluation of double integrals (Cartesian & Polar), Changing the order of integration, Evaluation of triple integrals, Applications of triple integrals to find area and volume.

UNIT – IV

Vector calculus: Scalar and vector point functions, Gradient of a scalar field, Directional derivative, Divergence of a vector field, curl of a vector field, Line integrals, Line integrals independent of path, Green's theorem in the plane (without proof), Surface integrals, Triple integrals, Divergence theorem of Gauss (without proof), Applications to Engineering problems, Stokes theorem(without proof).

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

REFERENCE BOOKS:

1. "Advanced Engineering Mathematics", Peter V. O'Neil, Thomsons Brooks/Cole.
2. "Advanced Calculus", Murray R Spiegel, Schaum's outline series.

Prerequisites: Elementary integral calculus, Linear differential equations of second and higher order, Elementary calculus.

Text Book:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

ENGINEERING PHYSICS – II

(Common to all branches)

PH02

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

Electron theory of solids & semiconductor physics (10 periods)

Electron theory of solids:Failure of classical free electron theory, quantum free electron theory, Fermi-Dirac distribution and its temperature dependence, Kronig-Penny model (Qualitative), effective mass of electron, concept of hole.

Semiconductor physics: Classification of semiconductors, P-N junction diode and its characteristics, carrier concentration in P and N type semiconductors, Equation of continuity.

UNIT – II

Magnetic, Dielectric and Ferro-electric materials (10 periods)

Origin of magnetic moment of an atom, Bohr magneton, Weiss theory of Ferro magnetism (Qualitative), Hysteresis curve, soft and hard magnetic materials, ferrites and its applications.

Dielectric materials, Types of polarizations, internal field (qualitative), Classius – Mossetti equation, Frequency dependence of polarization, Ferroelectrics and its applications.

UNIT – III

Advanced materials (12 periods)

Nano-materials: Introduction to nano-materials, Fabrication of nano-materials and carbon nano tubes (CVD and sol-gel), physical and chemical properties of nano materials, Applications of nano materials (Structural point, Storage of information, Strength point)

Superconductivity: Meissner effect, types of superconductors, elements of BCS theory, Applications of superconductors.

Opto-electronic devices: Working and applications of solar cell,LED, LCD, Photo Diode.

UNIT – IV

Analytical techniques (10 periods)

Nuclear techniques: Radio isotopes and its applications (Medical and Industrial), GM-counter, scintillation counter.

Ultrasonics: Properties of ultrasonics, General applications of ultrasonics.

Medical applications: Cardiology, Neurology, Ultrasonic imaging.

NDT: Pulse echo technique, cavitation effect, Time of flight diffraction technique.

Structure determination: Crystal planes, Bragg's law, structural analysis of crystal using X-Ray powder diffraction method.

TEXT BOOKS:

1. "Engineering physics",M.R.Sreenivasan, Newage International Publication.
2. "Engineering Physics", Palaniswamy, ScitechPulishers.
3. "Solid State Physics", Dekkar.

REFERENCE BOOKS:

1. "Material Science for scientists and Engineers", Srinivasan&Srivastava, TMH Publishers.
2. "A text book of engineering physics", M.N.Avadhanulu& P. Krushisagar, S.Chand Pub.
3. "Material Science", VijayaRangarajan.

ENGINEERING CHEMISTRY – II

(Common to all branches)

CY02

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I **(11 Periods)**

ELECTROCHEMISTRY

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance –potentiometer titrations (redox - Fe^{2+}vs dichromate and precipitation – Ag^{+} vs CI^{-}titrations) and conduct metric titrations (acid-base – HCI vs, NaOH) titrations.

UNIT - II **(11 Periods)**

CORROSION AND CORROSION CONTROL

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

GREEN CHEMISTRY: Introduction-concepts-Engineering Applications.

UNIT – III

(12 Periods)

LIQUID AND GASEOUS FUELS AND COMBUSTION: Petroleum based: Petroleum processing and fractions – cracking – catalytic cracking and methods-knocking and anti-knocking Agents – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes.

Gaseous fuels- water gas, producer gas, CNG and LPG, Flue gas analysis – Orsat apparatus – theoretical air for combustion.

PHASE RULE AND ALLOYS: Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT – IV **(11 periods)**

ANALYTICAL TECHNIQUES: Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy –principles – instrumentation (problem) (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) –estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain, Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002).
2. S.S.Dara, Mukkanti K.,"A text book of Engineering Chemistry", S.Chand& Co., Ltd., New Delhi (2006).
3. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

REFERENCE BOOKS:

1. B.K.Sharma, "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. "Enginering Chemistry", J.C.Kuriacase&J.Rajaram, Tata McGraw Hill, New Delhi (2004).
3. "Chemistry of Engineering Materials", R.P Mani, K.N.Mishra, CENGAGE learning.
4. "Applied Chemistry - A text for Engineering & Technology", – Springar (2005).
5. "Text Book of Engineering Chemistry", ShasiChawla, DhantpatRai Publishing Company, NewDelhi (2008).
6. "Engineering Chemistry", R. Gopalan, D. Venkatappayya, D.V. SulochanaNagarajan, Vikas Publishers (2008).

ENGINEERING MECHANICS – II

ME124

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Kinematics of a Particle: Introduction – Rectilinear kinematics: Continuous motion – General curvilinear motion – Curvilinear motion: Rectangular components – Motion of a projectile – Curvilinear motion: Normal and tangential components – Absolute dependent motion analysis of two particles – Relative motion analysis of two particles using translating axes.

UNIT – II

Kinetics of a Particle: Force and Acceleration Newton's law of motion – The equation of motion – Equation of motion for a system of particles – Equation of motion: Rectangular coordinates - Equation of motion: Normal and tangential coordinates.

Kinetics of a Particle: Work and Energy The work of a force – Principle of work and energy – Principle of work and energy for a system of particles – Power and efficiency – Conservative forces and potential energy - Conservation of energy.

UNIT – III

Kinetics of a Particle: Impulse and Momentum Principle of linear impulse and momentum - Principle of linear impulse and momentum for a system of particles – Conservation of linear momentum for a system of particles – Impact

Planar Kinematics of a Rigid Body : Rigid body motion – Translation – Rotation about a fixed axis – Absolute motion analysis – Relative motion analysis (Consider only simple cases, not related to mechanisms): Velocity – Instantaneous center of zero velocity – Acceleration.

UNIT – IV

Planar Kinetics of a Rigid Body: Force and Acceleration Planar kinetic equations of motion – Equations of motion: Translation – Equations of motion: Rotation about a fixed axis – Equations of motion: General plane motion

Planar Kinetics of a Rigid Body: Work and Energy Kinetic energy – The work of a force – The work of a couple – Principle of work and energy – Conservation of energy.

TEXT BOOK

1. Engineering Mechanics. Statics and Dynamics by R.C. Hibbeler and Ashok Gupta. Pearson Education.

REFERENCE BOOKS

1. Vector mechanics for Engineers. Statics and Dynamics by Beer and Johnston, Tata McGraw-Hill publishing company, New Delhi
2. Engineering Mechanics by S. Timoshenko and D. H. Young – McGraw-Hill International Edition
3. Engineering Mechanics. Statics and Dynamics by J. L. Meriam and L. Kraige
4. Engineering Mechanics. Statics and Dynamics by Irving H. Shames and G. Krishna Mohana Rao, Pearson Education.

ENVIRONMENTAL STUDIES

(Common for all branches)

BT01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness.

Ecosystems: Introduction, types, Structure and Functions of Ecosystems, Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries)

Biodiversity: Definition and levels of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation and Hot Spots of Biodiversity.

Values of Biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values.

Threats to Biodiversity: Habitat loss, Extinction of Species, Poaching of wildlife

Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT – II

Natural Resources: Exploitation and Related Pollution Problems

Land: Land as a resource, causes and effects of land degradation

Forest: Use of forests, causes and effects of deforestation and conservation of forests

Water: Distribution of Water Resources, floods and drought, causes, effects and control of water pollution.

Energy: Classification of Resources, Importance of energy, causes and effects of nuclear pollution.

Causes, Effects and Control of Air Pollution and Noise Pollution.

Solid Waste Management: Urban and Industrial wastes, Composting and Vermiculture and 3 R - approach.

UNIT –III

Sustainability: Theory and Practice, Equitable use of resources for sustainable life styles. Rain water harvesting, Watershed management, Cloud Seeding, Acid rain, Ozone layer depletion, Global warming, Population Growth and its Impact on environment, Green Revolution,

Resettlement and Rehabilitation program, Mining and Dams and their conflictions, Environmental Impact Assessment

UNIT –IV

Environmental acts: Water (Prevention and Control of pollution) act, Air (Prevention and Control of pollution) act, Environmental protection act, Wild life protection act, Forest Conservation act.

International Conventions: Stockholm Conference 1972, Earth Summit 1992 and Copenhagen Conference 2009

Case Studies: Chipko movement, Narmada BachaoAndolan, Silent Valley Project, Madhura Refinery and TajMahal, Chernobyl Nuclear Diaster, Ralegaon Siddhi (Anne Hazare) and Bhopal Tragedy.

Text Book:

1. Environmental Studies by Benny Joseph,Tata McGraw-Hill Publishing Company Limited, New Delhi.

Reference Books:

1. Text Book of environmental studies, ErachBharucha, UGC.
2. Environmental Studies, AnubhaKaushik and C. P. Kaushik.
3. A basic course in environmental studies, S. Deswal and A. Deswal, DhanapathRai& Co.
4. Essentials of environmental studies, Kurian Joseph and R.Nagendram, Pearson Education Pt Ltd, Delhi.
5. Environmental studies, R.Rajagopalan, Oxford University Press.
6. Environmental Pollution Control Engineering, C. S. Rao, Wiley Eastern Ltd., New Age International Ltd.,
7. Introduction to Environmental Science, Anjaneyulu Y, B S Publications
8. Principles of Environmental Studies, Manoharachary C and Jayarama Reddy P, B S Publications.
9. Comprehensive environmental studies- JP Sharma, Laxmi Publications.
10. Environmental Science, 11th Edition – Thomson Series – By G Tyler Miller, Jr.
11. Environmental Science and Engineering by Dr. Suresh, K.Dhaneja, Publishers SK Kataria& Sons, New Delhi-110006.

ENGINEERING GRAPHICS

(Common to all branches)

ME01

Lectures	:	3 Periods/Week, Tutorial: 3	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION: Introduction to Drawing instruments and their uses, geometrical construction procedures ***2x3 =6 periods***

CURVES: Conic sections – general construction methods for ellipse, parabola and hyperbola. Other methods to construct ellipse only, cycloid, involute of a circle ***4x3=12periods***

UNIT – II

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines.Traces of lines.

6x3=18periods

UNIT – III

PROJECTIONS OF PLANES : Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

4x3=12periods

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions. ***5x3=15 periods***

UNIT – V

ISOMETRIC PROJECTIONS: Isometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only). **3*x3=9 periods***

ORTHOGRAPHIC PROJECTIONS: Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings). ***4x3=12 periods***

TEXT BOOK:

1. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand). (First angle projection)

REFERENCE BOOK:

1. Engineering Drawing by Dhananjay A Jolhe, Tata McGraw hill publishers
2. Engineering Drawing by Prof.K.L.Narayana& Prof. R.K.Kannaiah.

PHYSICS & CHEMISTRY LABORATORY – II

(Common to all branches)

PHCY L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

(A Selected list of Experiments from the following)

PHYSICS LAB-II

1. Determine the rigidity modulus of the given material of the wire usingTorsionalpendulum.
2. Determination of room temperature using platinum resistant thermometer.
3. Draw the load characteristic curves of a solar cell.
4. Determination of Hall coefficient of a semiconductor.
5. Determination of velocity of ultrasonic wave in a given liquid usingultrasonicinterferometer.
6. Draw the characteristic curves of a G.M. counter and calculate the bestoperatingvoltage.
7. Determination of voltage and frequency of an A.C. signal using C.R.O.
8. Draw the I/V characteristic curves of a P-N junction diode.
9. Determination of Forbidden energy gap of Si &Ge.
10. Determination of wavelength of laser source using Diode laser.

CHEMISTRY LAB – II

1. **PRODUCTION OF BIODIESEL**: The teacher has to perform the transesterfication reaction of FATTY ACID and the Biodiesel thus produced can be used for analysis.
2. Estimation of properties of oil:
    a. Acid Number
    b. Viscosity
    c. Saponification value
    d. Aniline point
    e. Flash and Fire points
    f. Pour and Cloud point.

3. **PREPARATION OF**:
    a. PHENOL –FORMALDEHYDE RESIN
    b. ASPIRIN
    c. Phenylbenzoate
    d. Soap
4. **SOIL ANALYSIS**: pH, Determination of Zinc, Iron and Copper.
5. **Kinetics:** To determine the rate constant of hydrolysis of methyl acetate catalyzed by an acid and also the energy of activation. (or) To study the kinetics of reaction between $K_2S_2O_8$ and KI.

Demonstration Experiments (Any two of the following) :

a. Determination of dissociation constant of weak acid-by pH metry
b. Preparation of Thiokol rubber
c. Adsorption on Charcoal
d. Heat of reaction

6. **FOOD ANALYSIS:** Determination Saturated and Unsaturated Fatty Acids, pH,etc.

TEXT BOOKS:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Vogels Text Book of Quantitative Chemical Analysis 6th Edition (2002).

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R. N. Goyal and HarrmendraGoel.
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications, 5th edition 2004

ENGLISH LANGUAGE LAB

(Common to all branches)

EN L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

OBJECTIVES

This course enables the students to expedite the process of improving communication in both formal and in formal situation. A special attention has been paid to the needs of competitive and current demands.

Introduction to communication: Difference between communication and communication skills, Types of communication, Barriers to communication.

Introduction to skills: Listening skills, writing skills, Reading skills, and Speaking skills.

Pronunciation drills: Phonetics, British English and American English.

Conversational skills: Dialogue, Telephonic Interaction.

Professional writings & skills: Resumes, Reports, Business letters and Interview skills.

Practical: Extempore Debates, Group discussion, and Oral presentation.

RECOMMENDED SOFTWARES:

Digital Language Lab - Networking Software, HiClass – Software.

English Language – Listening, Speaking Reading, Writing Skills: A lania series – English Mastery, Levels A, B (Set of 2 CDs), English Discoveries (Set 0f 12 CDs).

English Grammar / Pronunciation: Live Action English Interactive, Speech Solutions

Dictionaries: Cambridge Advanced Learner's**,** Oxford Genie & Advanced

Writing: Easy writer, Creative writing

Professional English: Telephonic English**,** English in mind

English for ETS: Barron's**,** TOEFL Mastery**,** IELTS**,** GRE

WORKSHOP

(Common to all branches)

ME L01

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. **Carpentry**
    a. Half Lap joint
    b. Dovetail joint
    c. Mortise &Tenon joint
2. **Welding using electric arc welding process/gas welding**
    a. Lap joint
    b. Tee joint
    c. Butt joint
3. **Sheet metal operations with hand tools**
    a. Trapezoidal tray
    b. Funnel
    c. T-joint
4. **House wiring**
    a. To control one lamp by a single switch
    b. To control two lamps by a single switch
    c. Stair-case wiring

ME211 MATHEMATICS-III

II Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

Fourier integrals: From Fourier series to the Fourier integral, Application of the Fourier integral, Fourier Cosine and Sine integral, Evaluation of integrals, Fourier cosine and sine Transforms: Fourier Cosine Transforms, Fourier Sine Transforms, Linearity, Transforms of Derivatives, Fourier Transform: Complex form of the Fourier integral, Fourier Transform and its inverse, Linearity. Fourier Transform of Derivatives, Convolution.

UNIT-II

Partial differential equations: Basic concepts, Modeling-Vibrating string, Wave Equation Separation of Variables Use of Fourier series, D'Alembert's Solution of the Wave Equation, Heat Equation-Solution Fourier series, Steady-State Two-Dimensional Heat Flow

UNIT-III

Numerical Methods in general: Introduction, Solution of Equations by Iteration, Newton's Method for Solving Equations f(x) = 0, Convergence of Newton's method, Interpolation:Lagrange interpolation, Newton's divided difference interpolation, Equal spacing: Newton's forward Difference formula, Newton's Backward Difference formula, Inverse interpolation, Numerical integration and Differentiation: Trapezoidal Rule, Error Bounds and Estimate for the Trapezoidal Rule, Simpson's Rule of integration, Error of Simpson's rule

UNIT-IV

Numerical methods in linear algebra: Linear Systems: Gauss Elimination, LU Factorization, Gauss-Seidel iteration Method, Method of least Squares, Methods of First order Differential Equations: Euler's method, Runge-Kutta methods, Methods for Elliptic Partial Differential Equations: Laplace equation, Poisson equation

TEXT BOOK:

1."Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

REFERENCE BOOKS:

1."Advanced Engineering Mathematics", Peter V. O'Neil, Thomsons Brooks/Cole.

ME212 MECHANICS OF MATERIALS- I

II Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week,Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

TENSION, COMPRESSION AND SHEAR: Introduction to Mechanics of materials, normal stress and strain, stress strain diagram for mild steel, elasticity and plasticity, linear elasticity, Hooke's law and Poisson's ratio, shear stress and strain, volumetric strain and bulk modulus, allowable stresses and allowable loads.

(9)

AXIALLY LOADED MEMBERS: Introduction, changes in lengths of axially loaded members, changes in lengths under non uniform conditions.

(6)

UNIT-II

STATICALLY INDETERMINATE AXIALLY LOADED MEMBERS: Statically indeterminate structures, thermal effects, misfits and pre strains, strain energy (8)

TORSION: Introduction, torsion of circular bars, non uniform torsion, relationship between E and G, transmission of power by circular shafts, strain energy in torsion.

(7)

UNIT-III

SHEARING FORCE AND BENDING MOMENT: Introduction, Types of Beams, Loads and Reactions. Shearing force and bending moment, relationships between loads, Shear forces and bending moment s, S.F. and B.M. diagrams.

(15)

UNIT-IV

STRESSES IN BEAMS: Introduction, normal strains and stresses in beams. Shear stresses in beams of rectangular cross section, shear stresses in beams of circular cross section.

(8)

ANALYSIS OF STRESS AND STRAIN: Introduction, plane stress, principal stresses and maximum shear stresses, Mohr's circle for plane stress, Hooke's law for plane stress.

(7)

Text Books:

1. 'Mechanics of Materials' by James M Gere

Reference Books:

1.'Strength of materials' by G.H. Ryder: MacMillan India Ltd. publishers.

2.'Mechanics of Materials' by Beer and Johnston

3.'Strength of Materials' by L.S.Srinath

4.'Applied strength of materials' by Robort L.Mott

ME213 BASIC THERMODYNAMICS

II Year B.Tech.(Mech) First Semester

Lectures	:	4 Periods/Week, Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

FUNDAMENTAL CONCEPTS AND DEFINITIONS: Introduction, Macroscopic and microscopic points of view, Thermodynamic system and control volume, Perfect gases, properties and state of a substance, Thermodynamic equilibrium and Quasi-static Process, thermodynamic path, cycle, Zeroth law of thermodynamics, concept of temperature.

(8)

WORK AND HEAT: Definitions and units, Work done at the moving boundary of a system, work done in various non-flow processes, comparison of heat and work.

(7)

UNIT II

FIRST LAW OF THERMODYNAMICS FOR NON-FLOW SYSTEMS: First law for a system undergoing a cycle and for a change in state of system, internal energy and enthalpy, constant volume and constant pressure specific heats and their relation to internal energy and enthalpy of ideal gases.

(7)

FIRST LAWOF THERMODYNAMICS FOR FLOW SYSTEMS*:* Control mass and control volume, first law of thermodynamics for a control volume, Steady flow energy equation and its application to engineering equipment.

(8)

UNIT III

SECOND LAW OF THERMODYNAMICS: Limitations of first law, PMM of first kind**,** Heat engines and Refrigerators, Statements of Second law, PMM of second kind, reversible and irreversible processes, factors that render a process irreversible, Carnot cycle and Carnot theorems, Thermodynamic temperature scale.

(6)

ENTROPY: Inequality of Classius, Entropy change in reversible process, T-ds relations, Entropy change of a system during an irreversible process, Principle of increase of entropy, Applications, Entropy change of an ideal gas, Availability, Maximum work.

(9)

UNIT IV

GAS POWER CYCLES: Air standard Carnot cycle, Otto cycle, Diesel cycle, Dual Combustion cycle and Brayton cycle, Air standard efficiency and MEP.

(7)

PURE SUBSTANCE: Definition**,** process of steam generation, P-v, T-s and h-s diagrams, properties of saturated and superheated steam, Use of Steam Tables, Mollier chart.

(8)

TEXT BOOKS:

1. Engineering Thermodynamics- P.K.Nag, TMH, New Delhi.
2. Thermal Science and Engineering- D.S.kumar, S.K.Kataria publ, New Delhi.
3. Thermodynamics—Rajput, Laxmi Publ, New Delhi.

REFERENCE BOOKS:

1. Fundamentals of Engineering Thermodynamics-Rathakrishnan-PHI, New Delhi.
2. Thermodynamics -- J.P.Holman, MGH, New York.
3. Engineering Thermodynamics—Cengel & Boles, TMH

ME214 ELECTRICAL TECHNOLOGY

II Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

DC and AC circuits: Kirchoffs laws, simple circuits -Alternating current - waveforms - RMS - Average values-simple R-L-C- circuits. Power factor, 3-phase Balanced circuits.

(7)

D.C. Machines - Constructional features - Methods of excitation-Load characteristics of shunt, series, compound generators-Torque development in motor-Torque equation.

(8)

UNIT II

Load and speed control Characteristics of shunt, Series and compound motors-losses and efficiency of motors and generators-principle of starters-3 point starter only.

(7)

Transformers : E.M.F. equation-equivalent circuit - regulation - losses and efficiency - open circuit and short-circuit tests.

(8)

UNIT Ill

Induction machines : Constructional features-Principle of operation- concept of rotating magnetic field, torque-slip characteristics - Principle of starters, Fundamentals of single-phase induction motors and their starting.

(8)

Synchronous machines : Principle - constructional features E.M.F. equation-applications of synchronous motors.

(7)

UNIT IV

Measuring Instruments : Principles and operation of moving - coil and moving-iron instruments-Dynamometer-type wattmeter.

Utilization: Principles of resistance and induction heating - principles of electrical traction-speed time characteristics.

TEXT BOOKS :

1.Electrical Technology by B. Hughes (ELBS)

2.Electrical Technology by B.L. Theraja, (S. Chand & Co.)

3.A course in Electrical Power by Soni, Gupta Bhatnagar.

REFERENCE BOOKS :

1.Electrical Technology by H. Cotton (Sir Issac Pittman & Sons Ltd., London).

2.Utilization of Electrical Energy by Openshaw & Taylor

3.Electrical Machinery by P.S. Bimbra

ME215 KINEMATICS OF MACHINES

II Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week, Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION : Mechanisms and machines, Rigid and resistant bodies, Link, Kinematic pair, Degrees of Freedom, Classifications of Kinematic pairs, kinematic-chain, Linkage, Mechanism, and structure, Classification of mechanisms, Equivalent Mechanisms, Four - Link (bar) Mechanism, Inversions of Slider - Crank Chain, Double – Slider Chain.

(7)

VELOCITY ANALYSIS: Introduction, Absolute and Relative Motion, Vectors, Addition and subtraction of Vectors, Motion of a Link, Four Link Mechanism, Angular Velocity of Links, Velocity of Rubbing, Slider - Crank Mechanism, Crank and Slotted Lever Mechanism. (8)

UNIT II

Instantaneous centre, Notation, Number of I - Centres, Kennedy's theorem, Locating I - Centres, Angular velocity by I - Centre Method.

(5)

ACCELERATION ANALYSIS : Acceleration, Four-Link Mechanism, Angular acceleration of Links, Acceleration of Intermediate and offset points, slider-Crank Mechanism, Coriolis acceleration component, Crank and slotted lever Mechanism.

(10)

UNIT Ill

KINEMATIC SYNTHESIS: Stages of synthesis-Concepts of type, Number and dimensional synthesis - Tasks of dimensional synthesis, Concepts of function generation, Rigid body guidance and path generation, Freudenstein equation for function generation using three precision points. (7)

CAMS : Introduction, Types of cams, Types of Followers, Definitions, Graphical synthesis of cam profile.(Knife Edge, Roller and Flat faced Followers). (8)

UNIT IV

GEARS : Introduction, Classification gear terminology, Law of Gearing, Velocity of Sliding, Forms of Teeth, Cycloidal Profile Teeth, Involute Profile Teeth, Path of contact, Arc of contact, Number of pairs of Teeth in contact, Interference in Involute Gears, Minimum number of Teeth, Interference between Rack and Pinion, Undercutting, Comparison of Cycloidal and Involute tooth forms.

(8)

GEAR TRAINS: Introduction, simple Gear Train, Compound Gear Train, Reverted Gear train, Planetary or Epicyclic Gear Train, Analysis of Epicyclic Gear Train, Torques in Epicyclic Trains. Tabular and Algebraic Methods.

(7)

TEXT BOOKS:

1.Theory of Machines of by S.S.Rattan. TMH.

2.Theory of Mechanisms and Machines by C.S.Sharma, Kamlesh Purohit, PHI

REFERENCE BOOK:

1.Theory of Mechanisms and Machines by Ghosh and Mallik

2.Mechanism and Machine Theory by J.E. Shigley

ME216 MACHINE DRAWING

II Year B.Tech. (Mech) First Semester

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. Sectional views : Introduction, Full & half sectional views

(9)

2.Screwed fasteners : Screw thread nomenclature , types & classification of screw threads , Square & hexagonal headed bolted joints.

(9)

3. Keys, Cotters and Pin joints : Saddle & sunk keys, Cotter joint with sleeve , Knuckle joint

(9)

4.Shaft couplings : Universal coupling , Protected flange coupling

(6)

5.Assembly Drawings : Stuffing box , Screw jack , Eccentric, Pipe vice

(12)

Text book :

1. Machine Drawing by K.L.Narayana, P.Kannaiah & K.Venkata Reddy,

Reference book :

1. Machine Drawing by K.R.Gopala Krishnan

ME251 FUELS & OIL TESTING LAB

II Year B.Tech. (Mech) **First** ***Semester***

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Any **Ten** Experiments out of the following are to be performed

1. Viscosity measurement using Redwood No.I viscometer.
2. Viscosity measurement using Redwood No.II viscometer.
3. Viscosity measurement using Saybolt viscometer.
4. Viscosity measurement using Engler's viscometer.
5. Carbon residue test using Conradson's carbon residue apparatus
6. Calorific value of LPG using Junker's Gas Calorimeter
7. Calorific value of liquid fuel using Bomb Calorimeter
8. Calorific value of solid fuel using Bomb Calorimeter
9. Measurement of flash point using Abel's apparatus
10. Measurement of flash point using Pensky-Martin's apparatus
11. Measurement of flash and fire points using Cleveland's open cup apparatus
12. Grease penetration test using Penetrometer apparatus

ME252 COMPUTER AIDED DRAFTING

(Using Computer packages)

II Year B.Tech (Mech.) First Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. Introduction, Basic commands-drawing, modify, editing & dimensioning. Layers, AutoCAD – screen menus.

2. Sectional views of castings
3. Assembly drawings
   a) Pipe vice b) Lathe tail stock c) Swivel bearing

Reference books:

1. AutoCAD 14 for Engineering drawing made easy by P.Nageswara Rao, TMH,
2. An Introduction to AutoCAD 2000 by A.Yarwood, Longman Publishers.
3. Machine Drawing by K.L.Narayana, P.Kannaiah, and K.Venkata Reddy, Wiley Eastern Limited, New Age International.

ME253 ELECTRICAL TECHNOLOGY LABORATORY

II Year B.Tech (Mech.) First Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

(Any Ten Experiments)

1. Verification of Kirchoff's laws
2. Determination of Parameters of coke coil
3. O.C.C. of a D.C.Shunt generator
4. Load Test on DC shant generator
5. Measurement of low and medium resistance of a D.C. machine
6. Load test on D.C. shunt motor
7. Swinburn's test
8. Speed control of a D.C. shunt motor
9. Equivalent circuit of a single phase transformer using sc and oc test .
10. Load test on 1 – phase transformer.
11. Regulation of alternative synchronous impedance method.
12. Load test on 3 phase squirrel cage induction motor
13. Predetermination of efficiency and regulator of 1 – phase transform.
14. Measurement of power by using two-watt meters in 3 phase load

ME221 MATHEMATICS-IV

II Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

Complex numbers and functions, conformal mapping:

Introduction to Complex Numbers, Derivative. Analytic Function, Cauchy's- Riemann equations. Laplace equation.

Geometry of analytic functions: conformal mapping, linear fractional transformations

UNIT-II

Complex Integration:

Line integral in the complex plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivates of analytic functions.

UNIT-III

Taylor , Laurent series and Residue Integration

Taylor Series and Maclaurin series, Laurent Series, singularities and zeros. Infinity, Residue integration method, evaluation of Real Integrals.

UNIT-IV

Special Functions

Power Series method, Legendre's equation

gendre's equation, Legendre Polynomials $P_n(x)$, Bessel's equation. Bessel functions

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th Edition, John Wiley,2000

REFERENCE BOOK:

1. "Theory and Problems of Complex Variables", Murray R Spiegel, Schaum's outline series

Prerequisites: Elementary calculus MA 02

Text Book:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons, 2000.

Reference book:

2. "Theory and Problems of Complex Variables", Murray R Spiegel, Schaum's outline series.

ME222 MECHANICS OF MATERIALS- II

II Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

DEFLECTIONS OF BEAMS : Introduction, Differential Equations of the Deflection Curve, Deflections by Integration of the Bending Moment Equation. Moment Area Method, Macaulay's Method.

(9)

COLUMNS : Buckling and Stability, Columns with Pinned ends, Columns with other support conditions, Limitations of Euler's Formula, Rankine's Formula, Columns with eccentric Axial Loads, Secant formula.

(6)

UNIT II

STATICALLY INDETERMINATE BEAMS: Statically indeterminate Beams, Analysis by the differential equations of the Deflection curve, Moment Area Method.

(8)

CONTINUOUS BEAMS: Clapeyron's theorem of three moments, Beams with constant and varying moments of inertia.

(7)

UNIT III

PRESSURE VESSELS: Thin Spherical and Cylindrical Pressure Vessels [Biaxial Stresses], Thick Cylinders: Lame's theory, Radial Deflection, Compound Cylinders.

(7)

CURVED BEAMS : Stresses in Beams of small and large initial curvature, The Winkler-Bach theory, Stresses in Crane Hook and C-Clamp with Rectangular, Circular and Trapezoidal cross-sections.

(8)

UNIT IV

SHEAR CENTRE : Bending Axis and Shear Centre, Position of Shear Centre, Shear flow, Shear Centre of Channel section, Angle section, T- section and I- section

(6)

CENTRIFUGAL STRESSES : Introduction, Rotating Ring, Rotating Disc, Rotating Disc of uniform strength.

(9)

TEXT BOOK:

1. Mechanics of Materials by James M Gere.
2. Strength of materials by Sadhu Singh, Khanna Publishers

REFERANCBOOK:

1. Advanced Solid Mechanics by L.S. Srinath
2.Strength of materials by G.H. Ryder: MacMillan India Ltd. Publishers

ME223 APPLIED THERMODYNAMICS

II Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

VAPOR POWER CYCLES: Rankine cycle, Effect of pressure and temperature on the Rankine cycle, reheat cycle, regenerative cycle (9)

STEAM BOILERS: Function, classification, working of Babcock and Wilcox boiler, Mountings & Accessories. (6)

UNIT II

STEAM NOZZLES: Types of nozzles, isentropic flow through nozzles, Effect of friction, Nozzle efficiency, Critical pressure ratio and maximum discharge, calculation of throat and exit areas using Mollier diagram. (8)

STEAM CONDENSERS: Jet and Surface condensers, condenser vacuum and vacuum efficiency, Condenser efficiency, Thermodynamic analysis, Air pumps, Capacity of air extraction pump. (7)

UNIT III

STEAM TURBINES: Types of steam turbines, Impulse turbines: pressure and velocity compounding, velocity diagrams, work output, power, blade efficiency and stage efficiency. Reaction turbines: velocity diagrams, degree of reaction, work output, power, blade efficiency and stage efficiency. Governing of turbines, Overall efficiency and reheat factor.

(15)

UNIT IV

REFRIGERATION: Need for Refrigeration, Definitions, Methods of refrigeration, Working of Refrigerator & Heat pump, Bell - Coleman cycle, Refrigerating effect, COP , vapor compression refrigeration system, influence of various parameters on cycle performance, Vapor absorption refrigeration cycle.

(8)

PSYCHROMETRY AND AIR CONDITIONING: -Introduction, Psychrometric properties, Psychrometric chart, Psychrometric processes, Types of Air conditioning systems. (7)

TEXTBOOKS:

1.Treatise on Heat Engineering-V.P.Vasandani and D.S.Kumar, Metropolitan Book co, New Delhi.

2.Thermal Engineering ---Rajput, Laxmi Publ, New Delhi.

3.Thermal Science and Engineering- D.S.kumar, S.K.kataria Publ, New Delhi.

REFERENCE BOOKS:

1.Engineering Thermodynamics----Cengel and Boles, TMH.

2.Refrigeration and Air Conditioning -- C.P. Arora, TMH.

3.Engineering Thermodynamics—Achuthan, PHI, New Delhi

ME224 CASTING, FORMING AND WELDING TECHNOLOGY

II Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

METAL CASTING: Introduction, advantages of Casting method, pattern types, materials and allowances. Sand moulding procedure, Moulding materials and equipment. Preparation, control and testing of moulding sands, Cores, Cupola: Description, operation and zones. (15)

UNIT II

GATING DESIGN: Design Considerations

SPECIAL CASTING METHODS: Permanent Mould Casting, Die Casting, Centrifugal casting, Investment casting, shell moulding, CO_2 process and continuous casting. Fettling of castings, casting defects: causes, remedies and testing. (15)

UNIT III

WELDING: Gas and arc welding - Principles of oxy-acetylene welding, oxyacetylene flame cutting, MMAW (Manual metal arc welding), TIG, MIG, submerged arc welding. Resistance welding principles - Butt welding, Spot welding, Seam welding. Thermit Welding, Electro slag welding. Laser beam welding. Brazing & Soldering, welding defects - causes and remedies. (15)

UNIT IV

METAL WORKING PROCESSES: Introduction, Hot and Cold working of metals. Rolling, Forging, Extrusion, Tube making, Swaging, Spinning, Coining, Embossing and Wire drawing. (6)

SHEET METAL WORKING OPERATIONS: Introduction, Types of Sheet metal working operations, Blanking and Punching operations, Clearance and shear as applied to Punching/Blanking operations, Simple related problems, High energy rate forming of metals, Bending, deep drawing, load estimation using homogeneous deformation methods. (9)

TEXT BOOKS:

1. Manufacturing Technology-Vol- I by PN Rao, TMH
2. Workshop Technology Vol.1 by S.K.Hazra Chowdary. Khanna Publishers
3. A course in Work shop technology, Vol-I by B.S.Raghuvanshi, Dhanpatrai & sons.

REFERENCE BOOKS:

1. Welding Technology by Little, TMH
2. Principles of Metal Casting by Heine, Loper, Rosenthal, TMH.
3. Manufacturing Engineering & Technology, Kalpakjian, Pearson Education / PHI

ME225 FLUID MECHANICS

II Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION: Definition of fluid, Properties of a fluid – density, specific weight, specific gravity, viscosity, compressibility, surface tension, capillarity, vapor pressure, Classification of fluid (6)

FLUID STATICS: Pressure, variation of pressure in a fluid, measurement of pressure – simple and differential manometers, pressure head, Pascal's law, Total pressure and center of pressure on plane surfaces, Buoyancy and Metacentric height. (9)

UNIT II

FLUID KINEMATICS: Velocity and acceleration of fluid particle, types of fluid flow, Description of flow pattern, Rotational and irrotational flows, velocity potential, stream function, flownet, continuity equation in Cartesian coordinates. (7)

FLUID DYNAMICS: Introduction, Euler's equation of motion, Bernoulli's equation, Pitot tube, venturimeter, orifice meter, orifice- various coefficients of an orifice. (8)

UNIT III

IMPULSE MOMENTUM EQUATION: Impulse momentum Principle, Equation and Applications - Force on pipe bend, jet propulsion of orifice tanks and ships. (3)

FLOW THROUGH PIPES: Types, Reynolds experiment, laws of fluid friction, Darcy-Wiesbach equation, minor losses, hydraulic gradient & total energy lines, pipes in series and parallel, transmission of power through a pipe, water hammer, Laminar flow through a circular pipe, Hagen-Poiseulle law, emptying of tanks with uniform cross section. (12)

UNIT IV

BOUNDARY LAYER CONCEPTS: introduction, boundary layer thickness, displacement thickness, momentum thickness, energy thickness, boundary layer growth on a flat plate, separation of boundary layer. (6)

INTRODUCTION TO COMPRESSIBLE FLUID FLOW: Equation of state, Gas laws, Equation of Continuity, Equation of motion and Equation of Energy, compressible flow regimes, Mach number, Mach cone, Shock waves, Stagnation point and properties, area velocity relationship for compressible fluid flow.

(9)

TEXT BOOKS:

1. Hydraulics and fluid mechanics -P.N. Modi & S.M.Seth, Standard Book House, New Delhi.
2. Fluid Mechanics and Fluid machines – Agarwal, TMH.

REFERENCE BOOKS:

1. Fluid Mechanics and hydraulic machines-R.K.Bansal
2. Fluid mechanics and fluid power engineering - D.S.Kumar, SK Kataria & Sons, New Delhi.
3. Fluid mechanics including Hydraulic machines - A.K.Jain.
4. Fluid Mechanics-K.L.Kumar

ME226 MATERIAL SCIENCE & METALLURGY

II Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

CRYSTALLOGRAPHY: Classification of crystals – Bravi's lattices – Miller Indices – Packing factor in cubic systems – coordination number – crystal imperfections – crystal deformation – Slip and Twinning. (8)

PHASE DIAGRAMS: Binary phase diagrams – Phase rule – one component system, two component system, isomorphous, eutectic, eutectoid, peritectic and peritectoid systems. (8)

UNIT II

HEAT TREATMENT OF STEELS: Iron–Iron carbide equilibrium diagram, TTT diagrams for eutectoid, hypo and hyper eutectoid steels, martensite and bainitic transformation. (8)

HEAT TREATMENT: Annealing, normalizing, hardening, tempering, surface hardening, age hardening, austempering, martempering and hardenability concept and experimental determination. (8)

UNIT III

STRENGTHENING MECHANISMS: Strain hardening, solid solution strengthening, grain refinement, dispersion strengthening. (6)

COMPOSITE MATERIALS:

Properties and applications of Particulate-reinforced composites, fibre reinforced composites, Laminar composites and metal matrix composites. (7)

UNIT – IV

POWDER METALLURGY: Powder metallurgy process, preparation of powders, characteristics of metal powders, mixing, compacting, sintering, Applications of Powder Metallurgy. (8)

FERROUS AND NON FERROUS MATERIALS: Composition, properties and application of ferrous and non ferrous metals and their alloys. Brief study of cast iron, steels, copper, aluminum,

Nano materials – Introduction and Applications (7)

TEXT BOOKS:

1.Introduction to Physical Metallurgy - Avner, McGrawHill

2.Material Science and Metallurgy - V. Raghavan, Pearson Education / PHI.

3.Material Science and Metallurgy - R.B.Choudary - Khanna Pub.

REFERENCE BOOK:

1.Material Science and Metallurgy - Dr.V.D.Kodgire, Everest Publishers

2.Nano materials – J.Dutta & H.Hofman

3.Manufacturing Engineering & Technology – Kalpak Jain & Schmid, Pearson / PHI

• Know how different alloying elements affect the Fe-Fe3C diagram

To know the basic concepts of heat treatment of steels & importance of TTT diagrams and its applications in hardening process.

• Know the basic concepts of hardenability and methods to measure the hardenability of given steels & different surface hardening methods and their practical applications

• Understand the microstructure, properties and applications of various non- ferrous metals and their alloys

• Know different types of ceramic materials, their structures, properties and applications in day to day life.

• Learn the importance of composite materials in industry and their types, preparation and applications.

ME261 FLUID MECHANICS AND STRENGTH OF MATERIALS LABORATORY

II Year B.Tech (Mech.) Second Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Five experiments from FM and Five experiments from SM should be done

FLUID MECHANICS LAB:

1. Orifice/Mouthpiece – Determination of coefficient of discharge.
2. Venturemeter /orifice meter – determination of coefficient of discharge
3.Pipe firction – Determination of friction factor and size of roughness of a given pipe.
4.Single – stage centrifugal pump – to draw the operating characteristics of the pump and to determine the designed discharge and designed head from it.
5. Single - acting reciprocating pump – To draw the operating characteristic curves at constant speed and determination of efficiency.
6.Pelton turbine – To draw the performance characteristic curves and determination of overall efficiency

STRENGTH OF MATERIALALS LAB:

1. Load vs Deflection - Determination of young's modulus on cantilever beam and propped cantilever beam.
2. Load vs. deflection on simply supported and overhanging beams. Determination of young's modulus of the beam material.
3.(a) Rock well Hardness test - Determination of Hardness number for different metal specimens such as mild steel, cast iron, Brass, aluminum (b) Brinnell's Hardness test,
4. Imp[act test - (a) charpy and (b) izod :Determination of impact strength of mild steel and cast iron specimens.
5. Torsion test – Determination of Modulus of Rigidity of the materials.
6. Double shear test - Determination of shear strength of mild steel/ Torsteel specimens.
7. Tension Test on UTM - Determination of mechanical properties of mild steel and cast iron specimens.
8. Tests on helical spring – Determination of stiffness of helical springs.

ME262 COMPUTER APPLICATIONS IN MECHANICAL ENGINEERING LAB

II Year B.Tech. (Mech) **Second *Semester***

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note : Develop programs for the following problems using C- language

I .SIMULATION EXERCISE: [Any TWO]

1.Hart Mechanism
2.Paucellier Mechanism
3.Robert Mechanism
4.Scott Russel Mechanism
5.Watt Mechanism
6.Pantograph Mechanism
7.Four Bar Mechanism
8.Slider Crank Mechanism
9.Tchibicheff Mechanism

II.COMPUTER APPLICATIONS: [ANY FOUR]

1.Numerical Methods
2.Differential Equation solution
3.Gauss elimination: General Matrix and skyline.
4.Two dimensional stress analysis
5.Cylinder subjected to internal pressure.
6.1D Heat Transfer (conduction)
7. Analysis of beams
8.O.R. applications like L.P., Queing Theory, CPM, PERT etc..

III. APPLICATIONS PACKAGES: [ANY ONE]

1. Simple packages for Fluid flow like fluent, Star CD etc.,
2.O.R. Packages like TORA, LINDO, PRIMAERA ,Etc.,
3.MAT Lab.
4.Any application package in Mechanical Engineering.

ME263 WORKSHOP PRACTICE

II Year B.Tech. (Mech) Second Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

PATTERN MAKING : Solid pattern , Split pattern .

MOULDING : Stepped cone pulley, Hand wheel, Bush.

FITTING : Four Standard Exercises

TURNING: Plain, Step and Taper turning, Right-hand and Left-hand threads, Eccentric turning, Knurling and contour turning.

ME311 PROBABILITY & STATISTICS AND OPTIMIZATION TECHNIQUES

III Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Unit-I

Probability Distributions:

Random Variables, The Binomial Distribution, The Hypergeometric Distribution, The Mean and the Variance of a Probability Distribution, Chebyshev's Theorem, The Poisson approximation to the Binomial Distribution,

Probability Densities: Continuous Random Variables, The Normal Distribution, The Normal Approximation to the Binomial Distribution.

Unit-II

Other Probability Densities: Uniform Distribution, The Log-Normal Distribution, The Gamma Distribution, The Beta Distribution, The Weibull Distribution, Joint Distributions- Discrete and Continuous

Sampling Distribution: Populations and Samples, The Sampling distribution of the Mean(σ known , The Sampling distribution of the Mean (σ unknown), The Sampling Distribution of the Variance.

Unit-III

Inferences Concerning Means: Point Estimation, Interval Estimation, Test of Hypotheses, Null Hypotheses and Tests of Hypotheses, Hypotheses Concerning one Mean, The Relation Between Tests and Confidence Intervals, Inferences Concerning two Means.

Inferences concerning variances: The estimation of variances, Hypothesis concerning one and two variances.

Applications to Reliability and Life Testing: Reliability, Failure-Time Distributions, Exponential Model in Reliability, Exponential Model in Life Testing, Weibull Model in Life Testing.

Unit-IV

Optimization Techniques

Introduction, Historical Development, Engineering Applications of Optimization, Statement of an Optimization Problem, Single Variable Optimization, Multivariable Optimization with no Constraints, Multivariable Optimization with Equality Constraints, Solution by Direct Substitution, Solution by the method of Constrained Variation, Solution by the Method of Lagrange Multipliers.

TEXT BOOKS:

[1] Miller& Freund's "Probability and Statistics for Engineers", Richard A. Johnson, 6th Edition Pearson Education Asia, 200.

[2] Optimization Theory and Applications, S. S. Rao, 2nd Edition, 1984, Wiley Eastern Limited.

REFERENCE BOOKS:

[1] Probability & Statistics for Engineers and Scientists, R.E Walpole, R.H. Myers& S.L. Myers, 6th Edition, PHI.

[2] Probability & Statistics Murray R Spiegel, John J.Schiller, R. Alu Srinivasan, Schaum's Outline series.

Prerequisite: elementary calculus, elementary statistics, elementary algebra**Text Book**: Miller & Freund's "Probability and Statistics for Engineers". Richard A. Johnson 6th edition, PHI.

ME312 DESIGN OF MACHINE ELEMENTS-I

IlI Year B.Tech. (Mech.) First Semester

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

BASICS: Basic procedure of machine design, requirements and design of machine elements, traditional design methods. Design synthesis, use of standards in design, manufacturing considerations in machine design, preferred numbers and significance. (5)

MATERIALS & THEIR PROPERTIES : Mechanical properties of materials, Common engineering materials and their properties. (4)

DESIGN FOR STATIC STRENGTH : Simple Stresses , Combined stresses , Torsional and Bending stresses, stress strain relation, various theories of failure , Factor of safety and its importance in design.(6)

UNIT II

DESIGN FOR FATIGUE STRENGTH : Stress concentration, stress concentration factors, reduction of stress concentration, fluctuating stresses, fatigue failure, endurance limit, low cycle and high cycle fatigue, notch sensitivity, endurance limit approximate estimation method, reversed stresses ,design for finite and infinite life, cumulative damage in fatigue, Soderberg and Goodman lines, modified Goodman diagrams, Gerber equation. (13)

COTTER JOINTS: Socket & Spigot cotter joints. (2)

UNIT Ill

RIVETED JOINTS: Types of riveted joints, Failures of riveted joints, Design of Boiler Joints & Lozenge Joint, Design of joints under eccentric loading. (8)

WELDED JOINTS: Types of welded joints, Design of butt and fillet welded joints, eccentrically loaded welded joints. Welded joints subjected to fluctuating loads. (7)

UNIT IV

THREADED JOINTS – basic types, bolt of uniform strength, materials and manufacture, eccentrically loaded bolted joints in shear, eccentric load perpendicular to axis of bolt, eccentric load on circular base. (7)

POWER SCREWS: Types - Mechanics of power screws, efficiency, Design of Screw Jack. (8)

TEXT BOOKS:

1.Design of machine elements by Bhandari, Tata McGraw Hill book Co.

2.Machine Design by P.C. Sharma & D.K. Agarwal.

HAND BOOKS TO BE ALLOWED IN UNIVERSITY EXAMINATION:

1.Design data book, P.S.G. College of Technology, Coimbatore

2.Design data book, Mahadevan & Balaveera Reddy - CBS Pub

ME313 I.C. ENGINES & GAS TURBINES

III Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

I.C.ENGINES: Introduction, Basic engine nomenclature, Review and classification of I.C. Engines, working principles of S.I. and C.I. Engines (both 4 stroke and 2-stroke) - valve timing and Port Timing diagrams - Differences between S.I. & C. I. and 2 stroke & 4 stroke engines

(7)

FUEL SUPPLY SYSTEMS: S.I. Engines- Chemically correct air-fuel ratio, Air-fuel mixture requirements, Carburetion, Simple float type carburetor, injection system, types, electronic fuel injection system, MPFI.

(4)

C. I. Engines- Air- fuel requirements, fuel supply and injection systems, Bosch fuel pump, electronic injection system, CRDI.

(4)

UNIT II

COMBUSTION PROCESSES: S.I.Engines- Normal combustion, abnormal combustion, Knock rating and Octane number.

(3)

C.I.Engines- Ignition delay, combustion knock in C.I. engines, Knock rating and Cetane number. (4)

TESTING OF I.C.ENGINES: Indicator diagram, evaluation of Indicated Power, Brake power, Fuel consumption, SFC, Mechanical & thermal efficiencies, mean effective pressure, air-fuel ratio, Heat balance, Engine performance curves, Variables affecting engine performance for both S.I. & C.I. Engines. (8)

UNIT III

RECIPROCATING AIR COMPRESSORS: Classification, Operation, Effect of clearance volume, compression ratio, volumetric efficiency, power input, Single-stage and Multi-stage compressors, Effect of intercooling, optimum intermediate pressure in a two-stage compressor. (7)

ROTARY COMPRESSORS: Introduction, Types and their applications, principles of working, static and total head values, Centrifugal compressor- velocity vector diagrams, pressure coefficient, pre whirl, Axial flow compressor - polytropic efficiency, Surging, Choking and Stalling, Centrifugal compressor versus axial flow compressor. (8)

UNIT IV

GAS TURBINES: Closed and Open cycle gas turbines, analysis of closed cycle gas turbine, efficiencies of Compressor and turbine, cycles with intercooling, reheat and regeneration.

(8)

JET & ROCKET PROPULSION: Basic principles of Jet propulsion - specific thrust, propulsive efficiency and overall thermal efficiency of a jet engine, Principles of Rocket propulsion, Types of rocket propulsion.

(7)

TEXT BOOKS:

1.Treatise on heat Engineering - Vasandani & Kumar-Metropolitan Book Company, New Delhi

2.Thermal Engineering- Rajput-Laxmi Pub, New Delhi

3. Internal Combustion Engines - V.Ganeshan , Tata McGraw – Hill Publishing Company Ltd..

REFERENCE BOOKS:

1.Fundamentals of I.C. Engines - P.W. Gill, J.H. Smith & Ziurys- IBH & Oxford publ, Mumbai.

2. A Course in I.C. Engines - M.L. Mathur & R.P. Sharma - Dhanpat Rai & Sons- New Delhi.

3.Gas Turbine Theory - Cohen, Rogers and Sarvanamuttu.

ME314 METAL CUTTING AND MACHINE TOOLS

III Year B.Tech. (Mech) Fi*rst *Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

MACHINING PROCESSES AND MACHINE TOOLS:

Introduction, Primary and Auxiliary Motions in Machine Tools, Parameters defining working motions of a Machine Tool. (3)

LATHE :

Constructional details, specifications, classification of lathes**.**

Lathe Mechanisms: Spindle speed Mechanisms in Belt driven and All Geared Head stock, Apron and Half-nut mechanisms. Lathe accessories – various work holding devices. Lathe operations including taper turning and thread cutting and related problems. (12)

UNIT II

DRILLING MACHINES:

Types and specifications, spindle feed mechanism, drilling operations, drilling time. (4)

SHAPING AND PLANING:

Constructional details, types of shapers and planers, specifications, Quick Return Mechanism and automatic feed mechanisms. (4)

GRINDING MACHINES:

General Principles, Wheel materials, Selection and specification of grinding wheels, Truing and Dressing of grinding wheels, types of grinding machines. (7)

UNIT III

SURFACEFINISHING OPERATIONS: Honing and Lapping operations

(3)

MILLING MACHINES:

Working Principle, Size and Specification, Up and Down Milling, Types of milling machines, Description and working of Universal Milling machine, Milling operations, Milling cutters, Indexing methods and Indexing Head, related problems.

(12)

UNIT IV

THEORY OF METAL CUTTING:

Introduction, Basic elements of machining, Nomenclature of single point cutting tool, Tool Geometry, Mechanics of chip formation, Types of chips. Determination of shear angle and chip thickness ratio, stress and strain in the chip, velocity relations, Merchant's theory of orthogonal cutting forces, related simple problems. (6)

Tool wear, Tool life and Tool life criteria (3)

Heat Generation and temperature distribution in metal cutting , cutting fluids- types and required characteristics. (3)

CUTTING TOOL MATERIALS: Requirements of Tool materials and types, economics of machining. (3)

TEXT BOOKS:

1.Workshop Technology Vol. II by Hazra Chowdary

2.Production Engineering by P.C. Sharma, S.Chand & Co.

REFERENCE BOOKS:

1.Materials and Processes in Manufacturing by E.Paul De Garmo, J.T.Black and Ronald A.Kohser.

2.Machining and machining process by PN.Rao, TMH.

3.Manufacturing Science by Ghosh & Mallick

ME315 HYDRAULIC MACHINES

III Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION: Classification of fluid machines, linear impulse momentum and angular momentum principles.

(5)

IMPACT OF JETS: Introduction, Force exerted by a fluid jet on stationary and moving flat plate and curved vanes, flow over radial curved vanes, sprinklers.

(10)

UNIT II

HYDRAULIC TURBINES: Elements of hydroelectric power plants, Heads and efficiencies of a turbine, Classification of turbines, Pelton, Francis and Kaplan turbines- Working, proportions of turbines, Numerical problems. Draft tube theory, Oil pressure Governing.

(8)

PERFORMANCE OF TURBINES: Performance under unit quantities, Performance under specific conditions - Specific speed . Selection of turbines. Performance characteristics curves, Water hammer, Cavitation in turbines- Thoma's cavitation factor

(7)

UNIT Ill

RECIPROCATING PUMPS: Types, Working principle, Power required by a Reciprocating pump, Coefficient of discharge, Slip and negative slip, Effect of Acceleration of piston on velocity and pressure in suction and delivery pipes, Indicator diagram, Maximum speed of a reciprocating pump. Air vessels. Work saved against friction by fitting air vessel.

(8)

CENTRIFUGAL PUMPS: Types, Working, Reciprocating vs. Centrifugal pump, Work done by impeller, Head of a pump, losses and efficiencies, Minimum starting speed, Specific speed, Multistage pumps, Pumps in parallel, Performance characteristic curves, limitation of suction lift, NPSH, Cavitations.

(7)

UNIT IV

DIMENSIONAL ANALYSIS & MODEL SIMILITUDE: Introduction, Buckingham's PI theorem, Types of similarities, Force ratios, Dimensionless numbers, Model Laws-Reynolds and Froude law, Types of models, Scale effect.(Qualitative treatment only)

(10)

MISCELLANEOUS HYDRAULIC EQUIPMENT: Hydraulic accumulator (simple and differential type), Hydraulic intensifier, Hydraulic press, Hydraulic crane Hydraulic lift, Hydraulic ram.

(5)

TEXT BOOK:

1. Hydraulics and Fluid Mechanics --P.N.Modi & S.M. Seth, Standard Book House, New Delhi.
2. Hydraulic Machines - Jagadish Lal

REFERENCE BOOKS:

1. Fluid Mechanics & Fluid Power Engineering - D.S.Kumar, SK Kataria &sons, New Delhi.
2. Fluid Mechanics & Hydraulic Machines - R.K.Bansal

ME316 OPERATIONS RESEARCH

III Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

LINEAR PROGRAMMING: Definition, Characteristics and Phases and Scope of Operations Research, Mathematical formulation of the problem, Graphical method, Simplex method, Artificial variables techniques: Two–phase method, Big-M method, Variants of Simplex method, Duality Principle, Dual Simplex method.

(15)

UNIT-II

TRANSPORTATION PROBLEM: Introduction, Formulation, Optimal solution, Unbalanced transportation problem, Degeneracy.

(8)

ASSIGNMENT PROBLEM: Formulation, Optimal solution, Variants of Assignment Problem, Traveling Salesman problem.

(7)

UNIT-III

QUEUING THEORY: Introduction, Characteristics of Queuing models, Single Channel Queuing Theory models with Poisson arrivals and exponential service times with infinite population. Analysis of markovian chains, Transition diagrams. (9)

SIMULATION: Introduction, Advantages, Limitations. Monte carlo simulation. Generation of Random Numbers: Mixed congruential method, Additive congruential method and multiplicative congruential method. Application problems in queuing and inventory. (6)

UNIT-IV

PERT AND CPM: Project management, network modeling-probabilistic model, various types of activity times estimation-Programme Evaluation Review Techniques- Critical Path-probability of completing the project, Critical Path Method (CPM)-critical path calculation.

(9)

DYNAMIC PROGRAMMING: Introduction, Bellman's Principle of optimality, Applications of dynamic programming: optimal subdivision problem, Linear programming problem.

(6)

TEXT BOOKS:

1. Operations Research / H.A. Taha
2. Operations Research / S.D.Sharma-Kedarnath Ramnath

REFERENCES :

1. O.R /A.M.Natarajan, P.Balasubramani, A.Tamilarasi/Pearson Education.
2. O.R / Premkumar Gupta & D.S.Hira / S.Chand & Company Ltd.
3. Operations Research / Wagner/ PHI Publications.
4. Operation Research /J.K.Sharma/MacMilan.
5. Introduction to O.R / Hiller & Libermann (TMH).
6. Operations Research, P Shankara Iyer

ME351 I.C ENGINES LAB

III Year B.Tech. (Mech) First Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Any **Ten** Experiments out of the following are to be performed

1. Valve timing diagrams on 4-stroke single cylinder petrol and diesel engine models.
2. Port Timing diagram on 2 stroke single cylinder petrol engine model.
3. Air compressor- to determine volumetric and isothermal efficiencies
4. Blower test rig- to determine overall efficiency
5. Two stroke single cylinder petrol engine – load test
6. Four stroke single cylinder petrol engine - load test & motoring test
7. Four stroke four cylinder petrol engine – load test
8. Four stroke four cylinder petrol engine – heat balance test
9. Four stroke four cylinder petrol engine – Morse test
10. Four stroke four cylinder diesel engine – load test
11. Four stroke four cylinder diesel engine – heat balance test
12. Four stroke single cylinder petrol engine – variable compression ratio test
13. Computer interfaced single cylinder Four stroke petrol engine – load test
14. Computer interfaced single cylinder Four stroke diesel engine – load test

ME352 MACHINE SHOP PRACTICE

III Year B.Tech. (Mech) First Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

TURNING :

L.H & R.H Threading, Multi-start threading, Drilling, Boring and Internal threading

DRILLING & TAPPING :

Drilling and Tapping of Different threads

MILLING :

Key-way, Spur and Helical Gear Milling, Gear Hobbing.

SHAPING :

At least three models involving production of flat surface, Stepped surface, Cutting dovetail and rectangular grooves.

PLANING AND SLOTTING :

Working on Planing and Slotting Machines

GRINDING :

At least one model on surface grinder, cylindrical grinder or tool and cutter grinder.

ME353 /ENL02 SOFT SKILLS LAB

III Year B.Tech. (Mech) First Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. NON-VERBAL COMMUNICATION

- **a.** Voluntary & Involuntary Body Language.
- **b.** Facial Expressions.
- **c.** Kinesics.
- **d.** Oculesics.
- **e.** Haptics.
- **f.** Proxemics.
- **g.** Chronemics.
- h. Para Linguistics.

2. LIFE SKILLS

- a. Good Attitude & Self Motivation.
- b.Social Behaviour &Social Norms.
- c. Ethics, Values and Positive Work Ethics.
- d.Desire to Learn and Responsibility**.**

3. EMOTIONAL INTELLIGENCE

- **a.** Self Awareness.
- **b.** Self Control.
- **c.** Self Motivation.
- **d.** Empathy.
- **e.** Relationship Skills.
- **f.** Self Esteem.

4. PEOPLE SKILLS

- **a.** Effective Listening.
- **b.** Managing Stress.
- **c.** Persuading Techniques.
- **d.** Questioning Techniques – Close End, Open End Questions and Answers.
- **e.** Role Perception.

5. COGNITIVE SKILLS

a. Situational Analysis.

b. Critical Thinking.

c. Lateral Thinking.

d. Creative Thinking.

6. EMPLOYABILITY

a. Corporate Information.

b. Group Discussion.

c. Team Building.

d. Conflict Management.

e. Negotiating Skills.

f. Interview Techniques.

RFFERENCE BOOKS:

1. "The Definitive Book Of Body Language", Allan & Barbara Pease
2. "You Can Win", Shiv Khera.
3. ""Lateral Thinking", Edward De Bono.
4. "How To Prepare For Group Discussions And Interview", Hari Mohan Prasad, Rajnish Mohan, 2nd Edition, TMH.
5. "Emotional Intelligence", Daniel Goleman.
6. " The 7 Habits Of Highly Effective People", Stephen R. Covey
7. "Working in Teams", Sandy Pokras.

ME321 MACHINE DYNAMICS

III Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week,Tutorials:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

DYNAMIC FORCE ANALYSIS : Introduction, D'Alembert's Principle, Equivalent Offset Inertia Force, Dynamic Analysis of Slider - Crank mechanism (Using Analytical method) Velocity and Acceleration of piston, Angular velocity and Angular Acceleration of Connecting Rod, Piston Effort (Effective Driving Force), Crank Effort. Turning Moment on Crankshaft, Inertia of connecting Rod.

(8)

GOVERNORS: Introduction, Types of Governors, Watt Governor, Porter Governor, Hartnell Governor, Sensitiveness of a Governor, Hunting, Isochronism, Stability,Controlling force.

(7)

UNIT II

BALANCING : Introduction, Static balancing, Dynamic balancing, Transferring of a Force from one plane to another, Balancing of Several Masses in Different planes, Primary & Secondary Balancing of Reciprocating Mass , Balancing of In line Engines, Balancing of V Engines.

(10)

GYROSCOPES : Angular Velocity, Angular Acceleration, Gyroscopic Torque, Gyroscopic Effect on Naval Ships, Stability of a two wheel vehicle.

(5)

UNIT III

FUNDAMENTALS OF VIBRATION:- Introduction, Definitions,Vector method of representing Harmonic Motions, Addition of two simple Harmonic motion of the same frequency.

(2)

UNDAMPED FREE VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS:- Introduction, Derivations of differential equations, solution of differential equation, Torsional vibrations, Equivalent stiffness of spring combinations, Energy method.

(6)

DAMPED FREE VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS:- Introduction, Different types of damping, Free vibrations with viscous damping, Logarithmic Decrement, Viscous dampers, Coulomb damping.

(7)

UNIT IV

FORCED VIBRATIONS OF SINGLE DEGREE OF FREEDOM SYSTEMS:- Introduction, Forced vibrations with constant Harmonic excitation, Forced vibration with rotating and reciprocating unbalance, forced vibrations due to excitation of the support, Critical speed of a light shaft having a single disc without damping, critical speed of a light shaft having a single disc with damping, Vibration, isolation and transmissibility, vibration measuring instruments. (15)

TEXT BOOKS:

1.Theory of Machines by S.S. Rattan

2.Theory of Mechanisms and Machines by C.S.Sharma, Kamlesh Purohit, PHI

3.Mechanical Vibrations – G.K.Groover

4.Mechanical Vibrations – Rao V.Dukkipati, J.Srinivas, PHI

REFERENCE BOOKS:

1.Theory of Machines by T. Bevan

2.Theory of Mechanisms and Machines by A. Ghosh and A.K. Mallik.

3.Theory of Machines and Mechanisms by Jagadish Lal

4.Mechanical Vibrations – W.T.Thomson

5.Mechanical Vibration – S.S.Rao

ME322 DESIGN OF MACHINE ELEMENTS-II

III Year B.Tech. (Mech.) Second Semester

Lectures	:	4 Periods/Week,Tutorials:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

SHAFTS: Design of solid and hollow shafts for strength – For Bending, Torsion, Combined bending and torsion and combined bending, torsion and axial loads

KEYS: Introduction, Design of square and flat keys

SHAFT COUPLINGS: Rigid couplings: Muff Coupling, Clamp or compression coupling ,Flange coupling, Bushed pin flexible coupling. Oldham coupling **,** universal coupling (15)

UNIT II

BEARINGS AND LUBRICATION: Lubrication, Types of lubrications, types of lubricants, properties of lubricants, types of Bearings, Bearing materials, Journal bearing design (using Mckee's equation and Raymond and Boyd charts & tables)

BALL AND ROLLER BEARINGS: Static load, Dynamic load, Equivalent radial load, selection of ball and roller bearings (15)

UNIT III

BELT DRIVES: Flat and V-belts, Belt constructions, Geometrical relationships, Analysis of belt tensions, condition for maximum power, Selection of Flat-belts, Selection of V-belts, Selection of Pulleys.

CHAIN DRIVES: Introduction, Chain drives, Advantages of chain drives over belt drives, Polygonal effect, Selection of roller chains. (15)

UNIT IV

SPUR GEARS : Classification of gears, Terminology of spur gear, standard systems of Gear Tooth, Force analysis, Gear tooth failures, Selection of material, Beam Strength of gear teeth, lubrication, Lewis Equation.

HELICAL GEARS: Terminology of helical gears, virtual number of teeth, Tooth proportions, force analysis, Beam Strength of helical gears, effective load on gear tooth, wear strength of helical gears. Lewis Equation.

BEVEL GEARS: Terminology, force analysis, Beam Strength of bevel gears, wear strength. Lewis Equation.

WORM GEARS: Terminology, Force analysis, Strength rating of worm gears, Wear rating of worm gears. (15)

TEXT BOOKS:

1.Design of machine elements by Bhandari, Tata McGraw Hill book Co.

2.Machine Design by P.C. Sharma & D.K. Agarwal.

HAND BOOKS TO BE ALLOWED IN UNIVERSITY EXAMINATION:

1.Design data book, P.S.G. College of Tech, Coimbatore

2.Design data book, Mahadevan & Balaveera Reddy - CBS Pub.

ME323 HEAT TRANSFER

III Year B.Tech. (Mech) Second ***Semester***

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION: Basic Modes and Laws of Heat transfer, thermal conductivity, Steady state Heat Conduction, General conduction equation in Cartesian and Cylindrical coordinates, initial and boundary conditions.

(4)

ONE- DIMENSIONAL STEADY STATE HEAT CONDUCTION: Heat flow through plane wall and cylinder with constant thermal conductivity , Heat flow through composite slab and Cylinders, Thermal resistance, Electrical analogy, Thermal contact resistance, problems on variable thermal conductivity, critical insulation thickness, uniform heat generation in slabs.

(7)

EXTENDED SURFACES: Types, Applications, Fin materials, Heat transfer from fins with uniform cross section, Fin efficiency and Effectiveness.

(4)

UNIT II

TRANSIENT HEAT CONDUCTION (One dimensional only) - Lumped heat capacity systems.

(3)

FORCED CONVECTION: Introduction, Principles of convection, Mass, Momentum and Energy equations for boundary layer, Hydrodynamic and thermal boundary layers and their thicknesses, Correlations for heat transfer in Laminar and Turbulent flows over a flat plate, and in pipes, relation between fluid friction and heat transfer in laminar & turbulent flows – Reynolds-Colburn Analogy.

(12)

UNIT III

NATURAL CONVECTION: Approximate analysis for laminar film on a vertical plate, Correlations for vertical plates, horizontal plates, vertical and horizontal cylinders, inclined surfaces.

(7)

HEAT EXCHANGERS: Classification, types of heat exchangers, Flow arrangement, Temperature distribution , Overall heat transfer coefficient, Fouling factor, LMTD and NTU methods of Heat exchanger analysis, correction for LMTD for use with multi pass and cross flow Heat Exchangers, Effectiveness.

(8)

UNIT IV

RADIATION: Fundamentals of Radiation: Basic Concepts and definitions, Absorptivity, Reflectivity, Transmissivity, concept of Black body, Laws of Radiation, Kirchhoff's law, Planck's law, Wein's law, Stefan Boltzman's law.

(7)

RADIANT HEAT TRANSFER: Heat Exchange by radiation between two finite parallel surfaces, Electrical analogy, solid angle and Radiation intensity, radiant heat transfer between two finite black and gray surfaces, shape factor, Radiation shields.

(8)

TEXT BOOKS:

1. Heat and Mass Transfer – Sachdeva, New Age India, New Delhi
2. Heat Transfer—Rajput, Laxmi publ, New Delhi.

REFERENCE BOOKS:

1. Heat transfer - J.P.Holman, MGH, New York.
2. Heat transfer - S.P.Sukhatme, TMH.
3. Heat Transfer – Cengel and Boles, TMH, New Delhi

NOTE: Heat and Mass Transfer Data Book by Kothandaraman and Subramanian to be allowed in University Examination.

ME324 MANUFACTURING ENGINEERING

III Year B.Tech. (Mech) *Second* Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

JIGS & FIXTURES : Introduction, design considerations in jigs & fixtures. The principle of six point location, locating pins. Clamping and clamping devices. A few examples of drilling jigs like box type, template jig, Inverted jig, indexing jig, fixtures – Lathe, milling

(8)

GEAR MANFUACTURING : Introduction to various gear manufacturing methods, gear shaping, gear hobbing, bevel gear generation - principles and methods, gear finishing methods.

(5)

THREAD MANUFACTURING PROCESSES : Thread rolling, thread milling, thread grinding.

(2)

UNIT – II

UNCONVENTIONAL MACHINING PROCESSES : Introduction, principles of operation, equipment and applications of AJM, USM, WJM, EDM, ECM, CHM, EBM, LBM and PAM

(15)

UNIT – III

PRESS WORKING TOOLS : Major components of a press, shear action in die cutting operation, centre of pressure and its calculation, scrap strip layout for blanking. (6)

Types of dies – compound die, combination die, progressive die. (3)

Drawing die – Calculation of blank size, number of draws, percentage reduction, radius on punch and die, total drawing force. (3)

Bending die – Bending methods, spring back, bending allowance, bending force. (3)

UNIT – IV

COMPUTER AIDED INSPECTION : Types of CMM (Coordinate Measuring Machines), CMM construction, CMM operation and programming, CMM software, Flexible inspection systems, CMM applications and benefits.

(8)

Machine vision, principle and introduction to stages in machine vision, image acquisition and digitization, image processing and analysis, interpretation, machine vision applications.

(7)

Text Books:

1.A Text book of Production Engineering by P.C.Sharma, S.Chand & Co.

2.Manufacturing Science by Ghosh & Mallik,

Reference Books:

1.Manufacturing engineering & technology by Kalpakjian, Pearson Education / PHI

2.Engineering metrology by R.K.Jain, Dhanpathrai & Sons

3.Automation, production systems & CIM by M.P.Groover, Pearson Education / PHI

ME325 BASIC ELECTRONICS & MICRO-PROCESSORS

III Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

BASIC ELECTRONIC DEVICES:

PN junction diode: Principle, characteristics: Zener diode : Principle, characteristics, Rectifiers: Definition, Half wave rectifier, Full wave rectifier; BJT: Principle & operation, Input,& output characteristics, Transistor as a switch, Transistor as an amplifier.

FET: Principle & operation, characteristics of JFET, & MOSFET & of JEET., its characteristics.

(15)

UNIT II

ANALOG ELECTRONCS: Operation amplifiers: Definition of op-Amplifiers, Block diagram of op –Amp, details of op – Amp characteristics, Op – Amp Configurations: Inverting configuration, Non- Inverting configuration.

OP AMPLIFIERS APPLICATIONS: Summing Amplifier, Difference Amplifier, Integrator, Differentiator, Instrumentation amplifier, Comparator, Schmitt trigger.

(15)

UNIT III

DIGITAL ELECTRONICS: Number systems: Decimal, Binary Octal, Hexa – decimal number systems, Number system conversions.

Codes: BCD Code, Excess – 3 code.

Boolean Algebra & LogicGates: Boolean Logic Postulates. Basic logic gates, Universal Logic gates, Boolean expression simplification using K – Map Method up to 4 variables.

Combinational Logic Circuits: Definition, Combinational circuit design Procedure, Design of Combinational Circuits: half – Adder, Full – adder, Half Sub tractor, Full Sub tractor, Decoder, Encoder, Multiplexer, De – Multiplexer.

SEQUENTIAL LOGIC CIRCUITS: Definition, Flip – flops: SR, JK, T, D., Race around condition, Master – slave J.K.Flip - flop, Counters: Asynchronous versus synchronous counters, Design of ripple counters, shift registers.

(15)

UNIT IV

INTRODUCTION MICROPROCESSORS: Intel 8085 architecture, Pin diagram, Instruction set OF 8085, Addressing Modes, Development of simple assembly language Programs. (15)

TEXT BOOKS:

1. Microprocer & Architectures, Programming & applications with the 8085/8080 A by Gaoneker. for Unit - IV
2. Digital Logic and Computer Design by M.Morris mano, PHI for unit – 3.
3. Semiconductor devices & Circuits by B.P. Singh for chapter – 2 of Unit – I (Dhanpati Rai)
4. Linear integrated circuits by D.Roy Chaudary& S.Jain(New - age international).

ME326/A OPERATIONS MANAGEMENT

III Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

Forecasting: Introduction, types of forecasting and their uses, General principles of forecasting, forecasting techniques: qualitative and quantitative methods of Forecasting. (7)

Production Systems: Types of production systems: job, batch, mass and flow type production. (3)

Plant Location: Factors affecting the plant location, comparison of rural and urban sites (2)

Plant Layout: Introduction, objectives, principles of plant layout, factors affecting the plant layout, types of plant layouts (3)

UNIT-II

Materials Management: Introduction, functions of materials management, inventory, inventory management, types of inventories, Selective inventory control techniques: ABC analysis, VED analysis, Inventory control systems: P–System and Q-System, problems, Material Requirement Planning: Introduction, Inputs, outputs and MRP logic. (15)

UNIT-III

Aggregate Planning: Introduction, aggregate planning strategies, aggregate planning methods: mathematical planning models, heuristic and computer search models, problems. (10)

Line Balancing: Relevant terms used, line balancing methods, problems. (5)

UNIT-IV

Scheduling: Introduction, difference with loading, scheduling policies, techniques, standard scheduling methods. (10)

Contemporary management techniques: Introduction to MRP-II, JIT, ERP and Supply chain management. (5)

TEXT BOOKS:

1. Operations Management -Joseph. G.Monks, International (3rd) Edition
2. Elements of Production Planning and Control / Samuel Eilon.
3. Modern Production/ operation managements / Baffa & Rakesh Sarin

REFERENCES:

1. Operations Management – S.N. Chary.
2. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller.

3. Production And Operation Management / Martand Telsang
4. Production Control A Quantitative Approach / John E. Biegel.
5. Production Control / Moore.

ME326/B MECHANICS OF COMPOSITE MATERIALS

III Year B.Tech. (Mech) Second **Semester**

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION: Classification and characteristics of composite materials - mechanical behavior of isotropic and orthotropic materials - terminology of laminated fibre reinforced composite materials – current and potential usage of composites. (5)

MECHANICAL BEHAVIOUR OF A LAMINA: Engineering constants for orthotropic materials – stress, strains, relation for plane stress in an orthotropic material and in a lamina of arbitrary orientation – strength of an orthotropic laminates – Basic strength theories – Determination of engineering constants – mechanics of materials approach. (10)

UNIT II

MACHANICAL BEHAVIOUR OF A LAMINATE: Classical lamination theory – lamina stress - strain behavior – Resultant forces and moment in a laminate – Types of laminates – Strength and Stiffness of laminates - Interlaminar stress in laminates. (15)

UNIT III

LAMINATED PLATES AND BEAMS: Types of laminated plates and beams – elementary mechanical behavior - Bending and buckling of laminated plates – forces and moments – Stress and Deflection under different boundary conditions. (15)

UNIT IV

PRODUCTION OF COMPOSITE MATERIALS & PRODUCTS: Matrix and their role – Principal types of fibre and matrix materials - Basic principle of production of composite materials & products - Advantages and Limitations of different processes. (6)

MOULDING AND FORMING OF COMPOSITES: Layup and curing – open and closed mould process hand layup techniques – filament winding – Pultrusion – Pulforming – Thermoforming – Injection moulding - blow moulding. (6)

APPLICATION OF COMPOSITES: AIR CRAFT**:** Missiles- automobile - electrical and electronics recreational and sports equipment - future potential of composites. (3)

TEXT BOOKS:

1. Robert M.Jones.'Mechanics of compsite Materials" Mc Graw Hillbook co.1970.

2..Meier schwartyx "Composites meterials Hand book".Mc Graw Graw Hill Book co.1984.

REFERENCE BOOKS:

1. Agarwal B.D. &Brout man LJ."Analysists and performance of Fibre composites,Johnwileay & sons.

2. Tery Richardson, "Composite – Adesign guide " Industrial press inc, NY,1987.

ME326/C REFRIGERATION & AIRCONDITIONING

IIIYear B.Tech. (Mech) Second **Semester**

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION TO REFRIGERATION: Necessity and applications, unit of refrigeration and C.O.P, mechanical refrigeration, types of ideal cycle of refrigeration, Refrigerants- desirable properties, commonly used refrigerants, nomenclature.

(6)

AIR REFRIGERATION: Bell Coleman cycle and Brayton cycle, Open and Dense air systems, Actual refrigeration system, refrigeration needs of aircrafts, adoption of air refrigeration, Justification, types of systems, problems.

(9)

UNIT II

VAPOUR COMPRESSION REFRIGERATION: Working principle, essential components of plant, simple vapor compression refrigeration cycle, Multi pressure systems – multistage compression, multi evaporator system, Cascade system, use of p – h charts, problems.

(8)

SYSTEM COMPONENTS: Compressors- general classification, comparison, advantages and disadvantages, Condensers - classification, working, Evaporators - classification, working, Expansion devices - types, working.

(7)

UNIT III

VAPOUR ABSORPTION SYSTEM: Calculation of max COP, description and working of NH_3 - water system, Li - Br, H_2O system, principle of operation of three fluid absorption system and salient features.

(10)

STEAM JET REFRIGERATION: Principle of working, application, merits and demerits. (2)

NON-CONVENTIONAL REFRIGERATION METHODS: Principle and operation of thermoelectric refrigerator and Vortex tube or Hirsch tube.

(3)

UNIT IV

INTRODUCTION TO AIR CONDITIONING: Psychrometric properties and processes, sensible and latent heat loads, S–load characterization and SHF, need for ventilation, infiltration, concepts of RSHF, ASHF, ESHF & ADP, concept of human comfort and effective temperature, comfort air conditioning, industrial air conditioning requirements, air conditioning load calculations.

(9)

AIR CONDITIONING SYSTEMS: Classification of equipment, cooling, heating, humidification and dehumidification, filters, grills and registers, deodorants, fans and blowers, heat pump, heat sources, different heat pump circuits, application.

(6)

TEXT BOOKS:

1. Refrigeration and air conditioning - C.P.Arora, TMH.
2. Refrigeration and Air conditioning - Manohar Prasad, New Age India, New Delhi.
3. A course in refrigeration and air conditioning - S.C.Arora & Domkundwar, Dhanpat Rai& sons, New Delhi.

REFERENCE BOOKS:

1. Principles of Refrigeration - Dossat.
2. Refrigeration and air conditioning - Stoecker.

NOTE: Refrigeration and Air conditioning Data book by Manohar Prasad is allowed in the exam

ME326/D FLUID POWER & CONTROL SYSTEMS

IIIYear B.Tech. (Mech) ***Second Semester***

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

HUDRAULIC PUMPS & PRESSURE REGULATION:

Fundamental principles of industrial drives. Pressure regulation, pump types: Gear Pump, Vane Pump, Piston Pump, Combination Pumps. Selection and specification of pumps, pump characteristics [9]

AIR COMPRESSORS TYPES: Piston, Screw rotary and Dynamic compressors [6]

UNIT II

HYDRAULIC & PNEUMATIC ACTUATORS:

Linear and Rotary Actuators-Selection, Specification and Characteristics, Hydraulic and pneumatic accessories [15]

UNIT III

CONTROL AND REGULATION ELEMENTS:

Pressure-direction and flow control valves, Relief valves, non return and safety valves-actuation systems [15]

UNIT IV

HYDRAULIC CIRCUITS

Reciprocation, quick return, Sequencing synchronizing circuits-accumulator circuits-industrial circuits-press circuits-hydraulic milling machine-grinding, planning, copying, forklift, earth mover circuits-design and selection of components-safety and emergency mandrels. [15]

Text Book:

1. Andrew Parr, "Hydraulics and Pneumatics", (HB), Jaico Publishing House, 1999

2. R.Srinivasan,"Hydraulic and Pneumatic controls", Vijay Nicole imprints Pvt Ltd

References:

1. Antony Esposito, "Fluid power with Applications", Prentice Hall, 1980

2. Dudley Appease and John J.Pippenger, "Basic Fluid Power", Prentice Hall, 1987

ME361 HEAT TRANSFER LAB

III Year B.Tech. (Mech) Second Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Conduct Tests on Any **Ten** of the Following:

1. Refrigeration Test Rig
2. Air Conditioning Test Rig
3. Heat Exchanger – Parallel Flow
4. Heat Exchanger – Counter Flow
5. Composite Slab / Metal Rod
6. Critical Heat flux Apparatus
7. Emissivity Apparatus
8. Pin fin – Natural Convection
9. Pin fin – Forced Convection
10. Insulating powder Apparatus
11. Drop wise and film wise condensation Apparatus
12. Forced Convection Apparatus
13. Stefan – Boltzmann's Apparatus
14. Lagged pipe Apparatus

ME362 CAD - MODELING LAB

III Year B.Tech. (Mech.) **Second** ***Semester***

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

3D modelling using any of the modelling packages like CATIA, Pro/ENGINEER, Uni-Graphics, Solid Works, Ideas, AutoDesk Inventor etc.

List of Modules to be Covered:

SKETCHER

PART MODELLING

ASSEMBLY MODELLING

DRAFTING

Draw the following Assembly drawings (Any three) :

1) Screw Jack.

2) Stuffing Box.

3) Eccentric.

4) Universal Joint

5) Connecting Rod.

Parts and Assemblies can be chosen from

1). A Text book of "Machine Drawing" by K. L. Narayana, P. Kannaiah, K. Venkata Reddy.

ME363 BASIC ELECTRONICS & MICROPROCESSORS LABORATORY

III Year B.Tech. (Mech) Second ***Semester***

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

(Any Ten Experiments)

1. VI characteristics of PN junction diode
2. VI characteristics of Zener diode
3. Half wave rectifier with and without filter
4. Common emitter configurations (BJT)
5. Characteristics of JFET
6. Characteristics of UJT
7. Logic gates using discrete components
8. Logic gates using universal gate (NAND gate)
9. Combinational Circuits (half adder, full adder, half subtractor)
10. Verification of Flip-Flop (JK & D etc.,)
11. Code converters (Gray to Binary & Binary to Gray)
12. Multiplexer and Demultiplexer
13. Addition of two numbers using 8085 Microprocessor
14. Subtraction of two numbers using 8085 Microprocessor
15. Addition of n-numbers using 8085 Microprocessor

ME411 INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

IV Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

Management: Introduction, levels of management, evolution of management thought: Taylor's Scientific Management, Henry Fayol's Principles of Management, Functions of management (5)

Organization: Introduction,principles and types of organization structures (5)

Marketing: Introduction, marketing vs selling, marketing mix, distribution channels, product life cycle. (5)

UNIT-II

Productivity: Introduction, methods to measure productivity, measures to improve productivity. (3)

Work study - Introduction, objectives, method study - objectives, steps involved, various types of associated charts, difference between micromotion and memomotion studies, Work measurement - techniques, time study - steps involved, equipment, different methods of performance rating- allowances, standard time calculation. (12)

UNIT-III

Statistical Quality Control: Introduction, techniques, variable control charts – mean chart and range charts, attribute control charts: p charts and c charts, Acceptance sampling: single sampling and double sampling plans ,OC Curves. (7)

Human Resource Management: Introduction, functions of HRM, Job Evaluation, different types of evaluation methods. Job description, merit Rating, difference with job evaluation, different methods of merit ratings. (5)

Wage Incentives Plans: Introduction, different types of wage incentive plans with merits and demerits (3)

UNIT-IV

Entrepreneur Development: Introduction, Entrepreneural characteristics, Functions of an Entrepreneur; Factors affecting entrepreneurship; Role of communication in entrepreneurship; Entrepreneurial development-Objectives, Need of Training for enterprises; Finance for the enterprises; Product, Process and Plant Design- Product analysis and Product Design process. Steps in process design and plant design. (15)

TEXT BOOKS:

1. Manufacturing Organization and Management / Amrine / Pearson Education
2. Industrial Engineering and Management / O.P. Khanna / Dhanpat Rai.
3. Principles of Motion and Time Study / Ralph Barnes
4. Work study / ILO

REFERENCES:

1. Management / Stoner, Freeman, Gilbert / Pearson Education, New Delhi

2. Production and Operations Management / Panner Selvam
3. Operations Management / Chase, Jacobs, Aquilano / Tata McGraw-Hill.
4. Human Resource Management / Gary Dessler / Pearson Education.
5. Marketing Management / Phillip Kotler / Pearson Education.
6. Management Science / A.R.Aryasri / Tata McGraw-Hill.
7. The Essence of Small Business, Barrow colin.
8.Small Industry Ram K Vepa.

ME412 DESIGN OF MACHINE ELEMENTS-III

IV Year B.Tech. (Mech.) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

SPRINGS: Introduction, Materials, Types of springs, Helical springs under axial load, Fatigue loading, Torsion springs, Spiral springs, leaf springs. (15)

UNIT – II

BRAKES AND CLUTCHES:- Introduction to Brakes, Types, Analysis and design of block brakes, band brakes, Internal shoe brakes, external shoe brakes, pivoted shoe brakes, Temperature rise, Friction materials, Clutches, Analysis and design of simple and multiple disc clutches, cone clutches and centrifugal clutches, friction materials, comparison of brakes and clutches. (15)

UNIT – III

FLYWHEEL: Introduction, construction, Torque analysis, solid flywheel, Rimmed flywheel, stresses in rimmed flywheel, Design of flywheel. (15)

UNIT – IV

I.C.ENGINE COMPONENTS: Introduction, Design of trunk type piston, connecting rod and crank shaft. (10)

OPTIMUM DESIGN: Optimization functions of single variable and multi variables, optimization techniques, Interval halving and Golden section methods. (5)

TEXT BOOKS:

1.Design of machine elements by Bhandari, Tata McGraw Hill book Co.

2.Machine Design by Sharma & Purohit.

HAND BOOKS TO BE ALLOWED IN UNIVERSITY EXAMINATION:

1.Design data book, P.S.G. College of Tech, Coimbatore

2.Design data book, Mahadevan & Balaveera Reddy - CBS Pub.

ME413 ENGINEERING METROLOGY & MECHANICAL MEASUREMENTS

IV Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

INTRODUCTION: Elements of engineering measurements, standards of length, end and line standards. Theory of limits, Fits, Tolerances and their selection, Hole Basis and shaft basis system, IS system of limits & fits, simple problems. Interchangeability, Selective Assembly,

GAUGES: Limit gauges, Taylor's Principle of limit gauging, plug gauges, Ring gauges and design of plain cylindrical plug and ring gauges. Slip gauges, angle gauges, sine bars, spirit levels.

(15)

UNIT - II

COMPARATORS:

Sigma comparator, Solex pneumatic gauge, electrical & electronic comparator, projectors, Tool Maker's Microscope, Auto collimator, bore gauges, straight edges, angle plates.

MEASUREMENT OF SURFACE FINISH: Surface texture, roughness , waviness, Indian standard terminology, Various methods of measuring surface finish, Tomilson surface meter and Taylor Hobson Talysurf.

MEASUREMENT OF SCREW THREADS: Introduction-Types of threads-Measurement of outside diameter,inner diameter,effective diameters.

MACHINE TOOL PERFORMANCE TESTS: Static and Dynamic alignment tests- Alignment tests on Lathe, Universal Milling Machine and Pillar Drilling Machines.

(15)

MEASUREMENTS:

UNIT - III

BASIC CONCEPTS: Introduction, Measurement system elements, Definition of terms: Calibration, standards, Accuracy, Precision, Sensitivity, Resolution.

(3)

STRAIN MEASUREMENT:

Introduction, electrical resistance strain gauges principle, Method of fixing and bridge circuits for measuring strain changes, Gauge factor, Temperature compensation strain gauge. Rosette, Strain gauge applications.

(6)

FLOW MEASUREMENT:

Introduction. Variable head flow meters, orifice, Pitot tube, variable area flow meters, Hot-wire anemometer. Flow visualization methods.

(6)

UNIT - IV

PRESSURE MEASUREMENT:

Introduction, pressure measurement terms, Pressure units, Bourdon tube pressure gauge, Diaphragm and Bellows, Bridgeman gauge, Low pressure measurement: McLeod gauge, thermal conductivity gauge.

(6)

TEMPERATURE MEASUREMENT:

Introduction, Liquid in glass thermometers, Bi-metallic thermometers, Thermo-Resistive elements, Thermocouples, Thermisters and Pyrometers. (4)

FORCE AND TORQUE MEASUREMENT: Introduction, Elastic force meters, Load cells. Dynamo meters, Mechanical ,Electrical & Transmission Dynamometers. (5)

TEXT BOOKS:

1. Metrology - R.K.Jain , Khanna publishers
2. Mechanical Measurements & Control - by D.S. Kumar ,

REFERENCE BOOKS:

1 Engg.Metrology – D.M.Antony
2. A text book of Engg.Metrology – I.C.Gupta.
3. Mechanical Measurements - by T.G. Beckwith & N.L.Buck
4. Experimental Methods for Engineers by J.P.Hollman, TMH.

ME414 AUTOMATION & COMPUTER AIDED MANUFACTURING

IV Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Automation : Automation in production systems – automated manufacturing systems, computerized manufacturing support systems, reasons for automating, merits and demerits, automation principles and strategies, manufacturing industries and products, manufacturing operations – processing and assembly operations, other factory operations, Production Concepts.

(8)

Tranfer lines: fundamentals of automated production lines, system configurations, workpart transfer mechanism, storage buffers, control of the production line. Applications of automated production lines

Automatic lathes: Classification of automatic machines; single spindle automatic machines & Multi spindle automatic machines

(7)

UNIT – II

NUMERICAL CONTROL : Introduction, basic components of an NC system, classifications of NC systems, nomenclature of NC machine axes, interpolation methods, features of CNC, the machine control unit for CNC, CNC software, direct numerical control, distributed numerical control, applications of NC, advantages and disadvantages of NC, adaptive control machining.

(15)

UNIT – III

NC PART PROGRAMMING : NC coding systems, manual part programming, simple examples on drilling, milling and turning operations, computer assisted part programming, part programming with APT language, simple examples in drilling and milling operations.

(15)

UNIT – IV

GROUP TECHNOLOGY & CELLULAR MANUFACTURING : Introduction, part families, parts classification and coding, features of parts classification of coding system, selecting a coding system, developing coding system in an industry OPITZ , MICLASS, Product Flow Analysis, composite part concept, machine cell design, applications.

(6)

COMPUTER AIDED PROCESS PLANNING : Introduction, retrieval CAPP system, generative CAPP systems, benefits of CAPP.

(3)

FLEXIBLE MANUFACTURING SYSTEMS : Introduction, types of FMS, components, FMS layout configurations, computer control system, human resources, applications and benefits.

(4)

Introduction to Computer Integrated Manufacturing. (2)

TEXT BOOK:

1.Automation, Production systems and Computer Integrated Manufacturing by M.P.Groover, Pearson Education / PHI.

REFERENCE BOOKS :

1.CAD/CAM by M.P.Groover and E.W.Zimmers, Pearson Education / PHI.

2.CAD/CAM by P.N.Rao, TMH

3.Production Engineering by P.C.Sharma

ME415(A) FINITE ELEMENT ANALYSIS

IV Year B.Tech. (Mech) ***First Semester***

Lectures	:	4 Periods/Week,Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

FUNDAMENTAL CONCEPTS: Introduction, historical background, Analysis of 3-D stresses & strains, stress-strain relations, stress cubic, principal stress caliculations, temperature effects, potential energy and equilibrium, the Rayleigh-Ritz method, Weighted Residual Method, Galerkin's method, Saint venant's principle, Von Mises stress.

(15)

UNIT- II

BASIC CONCEPTS OF F.E.M. AND ONE DIMENSIONAL PROBLEMS : Fundamental concepts, Finite Element Modeling, Coordinates and Shape functions, The Potential Energy Approach, The Galerkin Approach, Assembly of the Global Stiffness Matrix and Load Vector, Properties of Global Stiffness Matrix, The Finite Element equations; Treatment of boundary conditions, Examples of Axially Loaded Members.

(8)

ANALYSIS OF PLANE TRUSSES : Introduction, ***Plane Trusses:*** Local and Global Coordinate systems, Element Stiffness Matrix, Stress Calculations, Example of plane Truss with three members.

(7)

UNIT- III

TWO DIMENSIONAL PROBLEMS : Introduction, Plane Stress and Plane Strain, Finite Element Modeling, Constant Strain Triangle (CST); Iso-parametric representation, Potential Energy Approach, Element Stiffness, Force terms, Galerkin Approach, Stress calculation, Problem modeling and boundary conditions, Examples of plane Stress and plane Strain problems with three degrees of freedom using CST Element.

(15)

UNIT- IV

Axi-Symmetric solids subjected to Axi-Symmetric loading : Introduction, Axi-Symmetric formulation, FEM using triangular element,Strain displacement relation,load vector calculations.

(5)

Scalar Field Problems : Introduction, steady-state heat transfer, one-dimensional heat conduction, governing equation, boundary conditions, the one dimensional element, functional approach for heat conduction.

(10)

Text Books:

1.Introduction to Finite Elements in Engineering by Chandrupatla & Belegundu, PHI.

2. Finite Element Analysis by P.Seshu, PHI publications

References:

1. Finite Element Analysis by C.S.Krishna Moorthy.
2. Finite Element Analysis by L.J.Segerlind.
3. Cook, Robert Davis et al, "Concepts and Applications of Finite Element Analysis" , Wiley, John & Sons,1999
4. George R Buchanan, "Schaum's Outline of Finite Element Analysis", McGraw Hill Company, 1994.
5. David V. Hutton, "Fundamentals of Finite Element Analysis "Mc Graw Hill Company.

ME415(B) COMPUTATIONAL FLUID DYNAMICS

IV Year B.Tech. (Mech) ***First Semester***

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION:-CFD as a design tool**,** as a research tool, impact of CFD, Applications. (3)

GOVERNING EQUATIONS: - Continuity, Momentum and Energy equations in3 Dimensions, Navier-Stokes equations, Single Generic Integral form equations for Continuity, Momentum and Energy. (12

UNIT II

DISCRETIZATION:-Basic aspects of discretization, Techniques used--Finite Difference, Finite Volume and Finite Element, comparison of methods, difference equations, Explicit and Implicit approaches. (15)

UNIT Ill

GRID GENERATION AND TRANSFORMATION:-Generation of grid, Transformation of non- uniform grids, General transformation of equations, form of governing equations suitable for CFD, Compressed grids, Boundary filled coordinate systems—Elliptic grid generation, Adaptive grids, Modern developments in grid generation. (15)

UNIT IV

CFD TECHNIQUES:-Introduction, LAX-WENDORFF technique, MACCORMICK technique, CRANK-NICHOLSON technique, Relaxation technique, ADI technique, suitability for different conditions. Aspects of numerical dissipation and dispersion. (15)

TEXT BOOKS:

1. Computational Fluid Dynamics, Basics with Applications—ANDERSON Jr.-MGH, 1995

2. Numerical Heat Transfer and Fluid Flow—PATANKAR-Hemisphere, NY, 1980

REFERENCE BOOK:

1. Computational Fluid Dynamics for Engineering—HOFFMAN K.A. - Engineering Education System, Austin, TX, 1989

ME415(C) MECHATRONICS

IV Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION TO MECHATRONICS, sensors & transducers: Introduction, performance terminology, classification of sensors, selection of sensors.

Signal Conditioning: Introduction data acquisition – Quantizing theory, analog to digital conversion, digital to analog conversion.

Data Presentation Systems: Data presentation elements magnetic displays, data acquisition systems, systems measurement, testing and calibration.

15

UNIT – II

ACTUATION SYSTEMS: Pneumatic and hydraulic actuation systems, stepper motors.

System Models: Modeling of one and two degrees of freedom mechanical, electrical, fluid and thermal systems. Block diagram representations for these systems.

15

UNIT– III

DYNAMIC RESPONSE of systems zero order, First order and second order systems. Block diagram representation, Transfer function. Systems in series, Systems with feed back loops.

CLOSED LOOP CONTROLLERS : Continuous and discrete processes, control modes, two step, proportional , derivative, integral, PID controllers.

15

UNIT – IV

PLC : Introduction, basic structure, I/P, O/P, processing, programming, ladder diagrams, timers, internal relays and counters, data handling, analogue input and output selection of PLC.

DESIGN: Designing mechatronics systems, possible design solutions, case studies of mechatronics systems – pick and place robot. 15

Text book:

1. W.Bolton., "Mechatronics-Electronic control systems in Mechanical and Electrical Engineering", 4th edition, Pearson Education Limited, New Delhi.

REFERENCE BOOKS:

1.David G.Alciatore, Michael B.Histand, "Introduction to Mechatronics and Measurement systems", Special Indian Edition 2007, Tata McGraw-Hill publishing Company Limited, New Delhi.

2.K.P.Ramachandran, G.K.Vijaya Raghavan, M.S.Balasundaram, “Mechatronics- Integrated Mechanical Electronic systems”, 1st edition, Wiley India Pvt Limited, New Delhi.

3.Devdas Shetty, Richard A.Kolk, “Mechatronics System Design”, 2nd Indian reprint, Thomson India edition (Cengage Learing (India) Pvt Limited.

4.M.D.Singh, J.G.Joshi, “Mechatronics” 2nd printing, PHI Learning Private Limited, New Delhi.

5.Godfey C.Onwubolu, “Mechatronics- Principles and Applications”, First printed in India 2006, Elsevier India Private Limited.

6.Newton C.Braga, “Mechatronics Source book”, First Indian reprint 2009, Cengage Learing (India) Pvt Limited.

7.Nitaigour Premchand Mahalik, “Mechatronics- Principles, Concepts and Applications”, Second reprint 2006, Tata McGraw-Hill publishing Company Limited, New Delhi.

8.W.Bolton, “Programmable logic controllers” Fourth edition, Newnens-An Imprint of Elsevier 2009.

ME415(D)SOLAR ENERGY AND UTILIZATION

IV Year B.Tech. (Mech) First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

Introduction, Energy alternative, Devices for thermal collection and storage, Thermal applications. Solar radiation: Instruments for measuring solar radiation, Solar radiation geometry, Empirical equations for prediction of availability of solar radiation, Solar radiation on tilted surfaces.

UNIT II

Liquid flat- Plate Collectors: General performance analysis, Transmissivity, absorptivity, product and overall loss coefficient and heat transfer correlations, Collector efficiency factor, Numerical. Analysis of collectors similar to the conventional collector. Testing procedures, Alternatives to the conventional collector,Numerical. Solar Air Heaters: Performance analysis of a conventional air heater, Other types of air heaters. Concentrating Collectors: Flat plate collectors with plane reflectors, Cylindrical parabolic collector, compound parabolic dish collector ,central receiver collector, numerical.

UNIT III

Thermal energy storage: Sensible heat storage, Latent heat Storage, Thermochemical storage .Solar distillation: Introduction, working principal of solar distillation, Thermal efficiency of distiller unit, External heat transfer, Top loss coefficient, Bottom and side loss coefficient, Internal heat transfer, Radioactive loss coefficient, connective loss coefficient, Evaporative loss coefficient, Overall heat Evaluation of distillation output, Passive solar stills, Conventional solar still, Basin construction, Thermal analysis of conventional solar still.

UNITIV

Photovoltaic Systems: Introduction, doping Fermi level, P-N junction characteristics, Photovoltaic effect, Photovoltaic material, Module, Cell temperature, Numerical. Economic analysis: Introduction, cost analysis.

TEXT BOOK:

1. Solar Energy: Thermal Processes, by Duffie John A, and Beckman W.A, john Wiley and Sons.
2. Solar Energy, by S.P Sukhatme, Tata Mc Graw Hill.
3. Treatise on Solar Energy, by H.P Garg, john Wiley and Sons.
4. For more details : visit http://www.uktech.in

OPEN ELECTIVE: ME416(A) POWER PLANT ENGINEERING

IV Year B.Tech. First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION: Various Energy sources, types of power plants. (1)

HYDRO ELECTRIC POWER PLANT: Hydrology, Rainfall, Run off and their measurement, hydrograph, Flow duration curve, Mass curve and calculation of storage capacity, site selection of hydro plant, different types of hydro plants.

(9)

DIESEL AND GAS TURBINE POWER PLANTS: Classification, main components of plant, plant layout, application and comparison with other plants.

(5)

UNIT II

THERMAL POWER PLANT: General layout, Fuels, Coal analysis, Coal handling, burning of coal - stoker and pulverized systems, Ash handling systems, ESP, Need for Draught, High-pressure boilers, Condensers, cooling ponds and towers (wet and dry types). (15)

UNIT III

NUCLEAR POWER PLANTS: Nuclear Fission, Nuclear Fuels, Components of Reactor, types of Nuclear Reactors, Breeding, Fast Breeder Reactor, Radiation shields, nuclear waste disposal.

(7)

PERFORMANCE FACTORS :load factor, diversity factor, use factor (3)

POWER PLANT ECONOMICS: Fixed costs, operating costs, cost per kWh, comparison of fixed and operating costs of hydro, thermal, nuclear plants, power tariffs. (3)

POLLUTION AND CONTROL: Introduction, particulate and gaseous pollutants, thermal pollution and solid waste pollution, methods to control pollution - brief description. (2)

UNIT IV

SOLAR ENERGY: Solar collectors, solar energy storage, solar ponds, solar energy utilization and applications.

(4)

WIND POWER: Basic principle, different types of wind mills, wind energy conversion systems, other applications. (3)

GEOTHERMAL POWER: sources, energy conversion system. (2)

OTEC: ocean thermal energy conversion systems, introduction to tidal power. (3)

DIRECT ENERGY CONVERSION SYSTEMS: Fuel cells, MHD, Solar cell. (3)

TEXT BOOKS:

1. Power Plant Engineering - G.R. Nagpal, Khanna publ, New Delhi
2. Power Plant Engineering –P.K.Nag, TMH
3. Non Conventional Energy Sources - G.D. Rai, Khanna publ, New Delhi.

REFERENCE BOOKS:

1. Power Plant Technology - M.M. El Wakil, MGH, New York.
2. Principles of Energy Conversion - A.W.Culp, MGH, New York.

OPEN ELECTIVE: ME416(B)*ROBOTICS*

IV Year B.Tech. First Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Unit – I

Introduction to Robotics, major component so a robot, robotic like devices, classification of robots – Classification by coordinate system and by control method, Specifications of robots, fixed versus flexible automation, economic analysis, overview of robot application.
[15]

Unit – II

Robot end Effectors : Introduction, end effectors, interfacing, types of end effectors, grippers and tools, considerations in the selection and design of remote centered devices.

[15]

Unit – III

Robotic sensory devices : Objective, Non-optical position sensors – potentiometers, synchros, inductocyn, optical position sensors – opto interrupters, optical encoders (absolute & incremental)

Proximity sensors : Contact type , non contact type – reflected light scanning laser sensors.

Touch & slip sensors : Touch sensors – proximity rod & photo detector sensors, slip sensors – Forced oscillation slip sensor, interrupted type slip sensors, force and torque sensors.

[15]

Unit – IV

Transformations and Kinematics : Objectives, homogenous coordinates, basic transformation operations, forward solution – Denavit Hartenberg procedure. Simple problems involving planar manipulators, inverse or backward solution – problems involved, techniques.

Introduction to Trajectory Planning, the manipulator jacobian. [15]

Text Books :

1. Robotic Engineering by Richard D.Klafter
2. Industrial Robotics by Mikell P.Groover

Reference Books :

1. Introduction to Robotics – John J.Ceaig
2. Robotics – K.S.Fu, Gonzalez & Hee
3. Robotics for Enginers by Yoram Korex.

ME451 TERM PAPER

IV Year B.Tech. (Mech) First Semester

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Internal marks for the term paper will be awarded based on a minimum of two SEMINARS/ PRESENTATIONS and the report submitted at the end of semester

ME452 CAD: ANALYSIS LAB

IV Year B.Tech. (Mech) First Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

The following analysis can be performed by using any of the analysis software's like ANSYS, ALGOR, NASTRAN, NISA, ABAQUS etc.,

1. STATIC ANALYSIS: TRUSS AND FRAME STRUCTURES

2-D truss

3-D truss

Beam analysis

2. STATIC ANALYSIS: TWO DIMENSIONAL PROBLEMS

2-D structure with various loadings

2-D structures with different materials

Plate with hole

3. DYNAMIC ANALYSIS: MODAL AND TRANSIENT ANALYSIS

Modal analysis

Transient Response (spring-mass system)

4 NON-STRUCTURAL PROBLEMS

Steady State heat transfer

Transient heat transfer

REFERENCES:

1. Introduction to Finite elements in Engineering by Chandrupatla & Belegundu, PHI.

2. www.mece.ualberta.ca.

ME453 DESIGN & METROLOGY LABORATORY

IV Year B.Tech. (Mech) First Semester

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

(Any Twelve Experiments)

1. Angle measurement by Bevel Protractor.
2. Angle and taper measurement by sine bar.
3. Measuring effective dia. of thread using 3 - wire method.
4. Measuring gear tooth thickness using gear tooth vernier.
5. Measuring internal diameter using bore dial gauge.
6. Measuring external diameters using Micrometer & Plotting $\bar{X}$ & R Charts
7. Measuring different parameters of a thread / gear tooth using profile projector
8. Measuring different parameters of a thread / gear tooth using Tool Makers Microscope.
9. Measurement of external diameter and thickness using Dial caliper.

ME421 PROFESSIONAL ETHICS AND HUMAN VALUES

IV Year B.Tech.(Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Human Values: Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time Co-Operation, Commitment, Empathy, Self Confidence, Character, Spirituality (14)

UNIT -II

Engineering Ethics: Senses Of 'Engineering Ethics, Variety of Moral Issues, Types of Inquiry, Moral Dilemmas, Moral Autonomy, Kohlberg's Theory,

Gilligan's Theory, Consensus and controversy, Professions and Professionalism, Professional Ideals and Virtues, Theories about Right Action, Self interest, Customs and religion, Uses of Ethical Theories. (14)

UNIT – III

Engineering as Social Experimentation: Engineering as Experimentation, Engineers as Responsible Experimenters, Codes of Ethics, Balanced Outlook on law (20)

Safety, Responsibility and Rights: Safety and Risk – Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk.

Collegiality and Loyalty, Respect For Authority, Collective Bargaining, Confidentiality, Conflicts Of Interest, Occupational Crime, Professional Rights, Employee Rights, Intellectual property rights (IPR), Discrimination.

UNIT – IV

Global Issues:

Multinational Corporations, Environmental Ethics, Computer Ethics, Weapon Development, Engineers as Managers, Consulting Engineering,Engineering as Expert Witnesses and Advisors, Moral leadership, Sample codes of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian institute of material management, Institution of Electronics and Telecommunication Engineers (IETE),India etc., (12)

Text Books:

1. Govindarajan. M, Natarajan. S, Senthilkimar.V.S, Engineering Ethics, Phi, 2004.
2. Mike Martin and Roland Schinzinger, Ethics In Engineering, Mc Graw Hill, New York 1996.
3. M.P.Raghavan, Professiional Ehics and Human Values, Scitech Publications(India) Pvt.ltd.,2009.

Reference Books:

1.Charles D Fleddermann, Engineering Ethics, Prentice Hall, New Jersey, 2004.

2.Charles E Harris, Michael S Pritchard and Michael J Robins, Engineering Ethics Concepts and Cases, Thomson Learning, United States, 2000.

3.John R Boatright, Ethics and The Conduct Of Business, Phi, New Delhi, 2003.

4.Edmund G Seebauer And Robert L Barry, Fundamentals Of Ethics For ScientistsAnd Engineering, Oxford University Press, 2001.

ME422 AUTOMOBILE ENGINEERING

IV Year B.Tech. (Mech) Second semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION: Classification of vehicles – applications, options of prime movers, transmission and arrangements.

(4)

ENGINE: Engine Classifications - number of strokes, cylinders, types of combustion chambers for petrol and diesel engines, valves, valve arrangements and operating Mechanisms, Piston - design basis, types, piston rings, firing order; Crankshafts, Flywheel.

(7)

ASSORTED EQUIPMENT: Fuel supply pumps, Mechanical and Electrical type Diaphragm pumps, Air and Fuel Filters, super chargers, Mufflers.

(4)

UNIT II

COOLING SYSTEMS: Need for cooling system, Air and water cooling.

(3)

LUBRICATING SYSTEMS: Various lubricating systems for I.C. Engines.

(3)

ELECTRICAL SYSTEM: Ignition system, Spark plugs, Distributor, Electronic Ignition, Alternator, cutout, Current and voltage regulators, charging circuit, starting motors, lighting, instruments and accessories.

(9)

UNIT III

CHASSIS & TRANSMISSION SYSTEMS: Introduction to Chassis & Transmission, Clutches – Single-plate and Multi-plate clutches, Centrifugal clutches, wet and dry type, actuating mechanisms.

(7)

TRANSMISSION: Gear Box - Theory, Four speed and Five Speed Sliding Mesh, Constant mesh & synchromesh type, selector mechanism, automatic transmission, overdrive, propeller shaft, differential - principle of working.

(8)

UNIT IV

SUSPENSION SYSTEMS: Need for suspension systems, springs, shock absorbers, axles – front and rear, different methods of floating rear axle, front axle and wheel alignment.

(8)

VEHICLE CONTROL: steering mechanisms and power steering, types of brakes and brake actuation mechanisms (air and hydraulic).

(7)

TEXT BOOKS:

1. Automobile Engineering - G.B.S.Narang.
2. Automobile Engineering - R.B.Gupta
3. Automobile Engineering - Vol I & II - Kirpal Singh

REFERENCE BOOKS:

1. Automotive Mechanics - Joseph Heitner
2. Automobile Engineering - S.Srinivasan

ME423(A) POWER PLANT ENGINEERING

IV Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

INTRODUCTION: Various Energy sources, types of power plants. (1)

HYDRO ELECTRIC POWER PLANT: Hydrology, Rainfall, Run off and their measurement, hydrograph, Flow duration curve, Mass curve and calculation of storage capacity, site selection of hydro plant, different types of hydro plants.

(9)

DIESEL AND GAS TURBINE POWER PLANTS: Classification, main components of plant, plant layout, application and comparison with other plants.

(5)

UNIT II

THERMAL POWER PLANT: General layout, Fuels, Coal analysis, Coal handling, burning of coal - stoker and pulverized systems, Ash handling systems, ESP, Need for Draught, High-pressure boilers, Condensers, cooling ponds and towers (wet and dry types), Deaeration.

(15)

UNIT III

NUCLEAR POWER PLANTS: Nuclear Fission, Nuclear Fuels, Components of Reactor, types of Nuclear Reactors, Breeding, Fast Breeder Reactor, Radiation shields, nuclear waste disposal.

(7)

FLUCTUATING LOADS ON POWER PLANTS: Various performance Factors (load factor, diversity factor, use factor etc.).

(3)

POWER PLANT ECONOMICS: Fixed costs, operating costs, cost per kWh, comparison of fixed and operating costs of hydro, thermal, nuclear plants, power tariffs. (3)

POLLUTION AND CONTROL: Introduction, particulate and gaseous pollutants, thermal pollution and solid waste pollution, methods to control pollution - brief description.

(2)

UNIT IV

SOLAR ENERGY: Solar collectors, solar energy storage, solar ponds, solar energy utilization and applications.

(4)

WIND POWER: Basic principle, different types of wind mills, wind energy conversion systems, other applications. (3)

GEOTHERMAL POWER: sources, energy conversion system. (2)

OTEC: ocean thermal energy conversion systems, introduction to tidal power. (3)

DIRECT ENERGY CONVERSION SYSTEMS: Fuel cells, MHD, Solar cell. (3)

TEXT BOOKS:

1. Power Plant Engineering - G.R. Nagpal, Khanna publ, New Delhi
2. Power Plant Engineering –P.K.Nag, TMH
3. Non Conventional Energy Sources - G.D. Rai, Khanna publ, New Delhi.

REFERENCE BOOKS:

1. Power Plant Technology - M.M. El Wakil, MGH, New York.
2. Principles of Energy Conversion - A.W.Culp, MGH, New York.

ME423(B) OPTIMIZATION TECHNIQUES

IV Year B.Tech. (Mech) Second semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

INTRODUCTION

General Characteristics of mechanical elements, adequate and optimum design, principles of optimization, formulation of objective function, design constraints -Classification of optimization problems.

(15)

UNIT - II

OPTIMIZATION TECHNIQUES

Single variable and multivariable optimization, Techniques of unconstrained minimization - Golden Section - Random , pattern and gradient search methods -Interpolation methods.

(15)

UNIT - III

OPTIMIZATION WITH EQUALITY AND INEQUALITY CONSTRAINTS: Direct methods - Indirect methods using penalty functions Lagrange multipliers; Geometric programming and stochastic programming; Multi objective optimization.

(15)

UNIT - IV

ENGINEERING APPLICATIONS

Structural applications - Design of simple truss members. Design application - design of simple axial, transverse loaded members for minimum cost, maximum weight, - Design of shafts and torsionally loaded members - Design of springs, Dynamic Applications - Optimum design of single, two degree freedom system, vibration absorbers. Application in Mechanism - Optimum design of simple linkage mechanism. (15)

TEXT BOOKS:

1.Singeresu S. Rao, "Engineering Optimization - Theory and Practice" New Age Intl. Ltd.Publishers, 2000

REFERENCES:

1.Johnson Ray, C., "Optimum design of mechanical elements", John Wiley & Sons, 1981

2.Goldberg, D.E., "Genetic algorithms in search, optimization and machine learning", Addison-Wesley, NewYork, 1989

3.Kalyanamoy Deb, "Optimization for Engineering design algorithms and Examples", Prentice Hall of India, 1995

ME423(C) COMPUTER INTEGRATED MANUFACTURING

IV Year B.Tech. (Mech.) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION:; Scope of computer integrated manufacturing, Product cycle, Production automation.

GROUP TECHNOLOGY : Role of group technology in CAD/CAM ,Integration, methods for developing part families, classification and codling, Examples of coding systems, Facility design using group technology.

UNIT – II

COMPUTER AIDED PROCESS PLANNING: Approaches to process planning – Manual, variant ,Generative approach, Process planning systems – CAPP , DCLASS ,CMPP, Criteria for selecting a CAPP system, Part feature recognition.

UNIT – III

INTEGRATIVE MANUFACTURING PLANNING AND CONTROL : Role of integrative manufacturing in CAD/CAM integration, over view of production control – Forecasting, Master production schedule, rough cut capacity planning, M.R.P., order release, shop floor control, Quality assurance, Planning and control systems, Cellular manufacturing.

UNIT – IV

COMPUTER AIDED QUALITY CONTROL: Terminology in quality control, contact inspection methods, Non – Contact inspection methods, computer Aided Testing, Integration of CAQC with CAD/CAM .

COMPUTER INTEGRATED MANUFACTURING SYSTEMS: Type of manufacturing systems, Machine tools and related equipment, Material handling systems, Computer control systems, FMS.

TEXT BOOKS:

1. Mikel P.Graoover, Emery W. Zimmer ,"CAD/CAM PHI Ltd.,

2. David D.Bed.worth , Mark R.Henderson, Philip M. Woife, "Computer aided design and Manufacturing ",McGraw Hill Publishers.

ME423(D) COMPUTER AIDED DESIGN

IV Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

INTRODUCTION: Fundamentals of CAD, Design process, Applications of computer for design, Benefits of CAD, Computer peripherals for CAD work station, Graphic terminal, CAD software, CAD database and structure.

(8)

DISPLAY DEVICES: Video display devices – Raster scan display, CRT , DVST, Inherent memory display devices, Random Scan Display, Input devices.

(7)

UNIT- II

PRIMITIVES: Points and Lines, Line drawing algorithms, DDA algorithm, Bresenham's line algorithm, Circle generation algorithm, Mid point circle algorithm. (7)

GEOMETRIC MODELING: 2D wire frame modeling, 3D Wire frame modeling, Wire frame models , Entities and their definitions. Concept of Parametric and nonparametric representation of curve, Curve fitting techniques, Definitions of cubic splines.

(8)

UNIT - III

SURFACE MODELING: Surface modeling and entities, Parametric space of Surface, Blending functions, Surface of revolution,. (7)

SOLID MODELING: Solid models, Solid entities, Solid representation, Sweep representation, Constructive solid geometry and Boundary representation, Solid modeling based applications.

(8)

UNIT- IV

GEOMETRIC TRANSFORMATIONS: Transformation Principles, Translation,Scaling, Rotation, Matrix Representations and Homogeneous Coordinates, Composite transformations .

(15)

TEXT BOOKS:

1.CAD/CAM by Mikel P.Groover and Emory W.Zimmers,Prentice Hall of India , Delhi

2.CAD/CAM by P.N.Rao, Tata McGrawhill , Delhi

3.CAD/CAM by Ibrahim Zeid, Tata McGrawhill,Delhi.

4.Principles of Interactive Computer Graphics by Newman and Sproull, McGrawhill

ME424(A) ROBOTICS

IV Year B.Tech. (Mech) Second Semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction to Robotics, major components of a robot, robotic like devices, classification of robots – Classification by coordinate system and by control method, Specifications of robots, fixed versus flexible automation, economic analysis, overview of robot application. 15

UNIT – II

Robot end Effectors : Introduction, end effectors, interfacing, types of end effectors, grippers and tools, considerations in the selection and design of remote centered devices.

15

UNIT – III

Robotic sensory devices : Objective, Non-optical position sensors – potentiometers, synchros, inductocyn, optical position sensors – optic interrupters, optical encoders (absolute & incremental)

Proximity sensors : Contact type , non contact type – reflected light scanning laser sensors.

Touch & slip sensors : Touch sensors – proximity rod & photo detector sensors, slip sensors – Forced oscillation slip sensor, interrupted type slip sensors, force and torque sensors. 15

UNIT – IV

Transformations and Kinematics : Objectives, homogenous coordinates, basic transformation operations, forward solution – Denavit Hartenberg procedure. Simple problems involving planar manipulators, inverse or backward solution – problems involved, techniques.

Introduction to Trajectory Planning, the manipulator jacobian.

15

TEXT BOOKS :

1.Robotic Engineering by Richard D.Klafter

2.Industrial Robotics by Mikell P.Groover

REFERENCE BOOKS :

1.Introduction to Robotics – John J.Craig

2.Robotics – K.S.Fu, Gonzalez & Lee

3.Robotics for Enginers by Yoram Koren.

4. Robotics Technology and Flexible Automation by S.R.Deb

5. Robotics by Saeed.B.Niku

ME424(B) COMPUTER GRAPHICS

IV Year B.Tech. (Mech) Second semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

GEOMETRY AND LINE GENERATION: Introduction, Lines, Line segments, Perpendicular Lines, Distance between a point and a Line, Vectors, Pixels and Frame Buffers.

GRAPHIC PRIMITIVES: Introduction, Display devices, Primitive operations, The Display-File Interpreter, Normalized Device Coordinates, Display-File structures. (15)

UNIT II

POINT PLOTTING TECHNIQUES: Coordinate system, Incremental methods, Line Drawing Algorithms, Circle generators.

LINE DRAWING DISPLAYS: The CRT, Inherent-Memory devices, The storage-Tube display, The Refresh Line-Drawing Display. (15)

UNIT III

POLYGONS: Introduction to Polygons, Polygon representation, Polygon Interfacing Algorithms, Filling Polygons, Filling with a pattern, Initializing, Antialiasing

TRANSFORMATIONS: Introduction, Scaling Transformations, Rotation, Homogeneous Coordinates and Translations, Coordinate Transformations, Rotation about an Arbitrary point, Inverse Transformations. (15)

UNIT IV

SEGMENTS *(Algorithmic Approach only)* : Introduction, The Segment table, Segment creation, Closing a Segment, Deleting a Segment, Renaming a Segment.

WINDOWING AND CLIPPING: Introduction, The Viewing Transformation, Viewing transformation implementation, Clipping, The Cohen-Sutherland Algorithm, Clipping of Polygons. (15)

TEXT BOOK:

Computer Graphics by Steven Harrington.

REFERENCE BOOKS:

1. Procedural elements for Computer Graphics by Rogers.
2. Principles of Interactive Graphics by Newman and Sproull.

ME424(C) COMPUTER AIDED PROCESS PLANNING

IV Year B.Tech. (Mech) Second semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

1. INTRODUCTION

The Place of Process Planning in the Manufacturing cycle-Process planning and production Planning-Process planning and Concurrent Engineering, CAPP, Group Technology **15**

UNIT II

2. PART DESIGN REPRESENTATION

Design Drafting-Dimensioning-Conventional Tolerance- Geometric Tolerance-CAD-input/output devices-Topology- Geometric transformation-Perspective transformation-Data Structure-Geometric modeling for process planning--GT Coding-The OPITZ system-The MICLASS System **15**

UNIT III

3. PROCESS ENGINEERING AND PROCESS PLANNING

Experience based planning-Decision table and Decision trees-Process capability analysis-Process planning-Variant process planning-Generative approach-Forward and backward planning, Input format, AI **15**

UNIT IV

4. COMPUTER AIDED PROCESS PLANNING SYSTEMS

Logical Design of process planning-Implementation considerations-Manufacturing system components, Production Volume, No. of production families - CAM-I, CAPP, MIPLAN, APPAS, AUTOPLAN and PRO, CPPP **15**

References:

1. Gideon Halevi and Roland D. Weill, "Principle of process planning- A Logical Approach", Chapman & Hall, 1995

2. –Chang T. C. & Richard A.Wysk, "An Introduction to automated process planning systems", PrenticeHall1985

3. Chang,T.C., "An Expert Process Planning System", Prentice Hall,1985

4. Nanua Singh, "Systems Approach to Computer Intergrated Design and Manufacturing", John Wiley &Sons,1996

5. Rao P.N., "Computer Aided Manufacturing", Tata McGraw Hill Publishing Co., 2000.

Web References:

1. http://claymore.engineer.gusu.edu/jackh/eod/automate/capp/capp.htm

2. http://Estraj.ute.sk/journal/engl-027/027.htm

ME424(D) ENTERPRISE RESOURSE PLANNING

IV Year B.Tech. (Mech) Second semester

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT I

MANUFACTURING INDUSTRY: Management characteristics and Information Requirements. Industry classification, Product , Market, Process characteristics, Manufacturing Planning, and control, Technoiques ERP ,Concept & Evaluation History: MRP -1 , MRP – 2, Advancement, Client survivor Technology, RDBMS.

SALES PURCHASE, INVENTRORY CONTROL, CONCEPTS: Classifications, coding of Material , Finished goods, sales, Enquires, Quotation, Order , Invoices, Delivery, Finished good valuation, Purchase requisition, Enquiry, Supplier, Quotation, Purchase order, Material Receipts, Material issues, Methods of issue, valuation (FIFO/LIFO, Weighted Average cost/ std.Cost). Returns, From operations, Returns to supplier, Stock Adjustments, Physical stock verification, ABC Analysis, Lot and Locations, Controls, Replenishment order control (Safety, stocks, Report paint, Economic order quantity). (15)

UNIT II

MANUFACTURING: product configuration, Bill of material, Master production Scheduling, Material. Requirement Planning, Capacity, Requirement Planning, Loading and Scheduling. An over view of man power planning and customer manufacturing planning.

FINANCIAL AND COST ACCOUNTING:

Basic accounting principles, Daybook, cash, journal, purchase and sales, Ledgers, - general, supplier , customer, Advances. etc., Bank Reconciliation, Trial Balance, Profit, & Loss, Income & Expenditure. Account and Balance sheet. Fixed assets and depreciation Budgeting – Revenue, Capital cash, Cost. Elements – Direct materials, Direct Labour, Direct expenses, and over heads. Margin of Cost and Break even analysis standard costing.Activity based costing.

(15)

UNIT III

INTRODUCTION TO A TYPICAL ERP SOFTWARE : Overview of ERP modules and tools of a software like BaaN.

DISTRIBUTION MODULE: Module architecture, an over view, Item data, Purchase orderings/ Control, sales, Ordering, Control, Replenishment order Control, Electronic Data Interchange.

(15)

UNIT IV

MANUFACTURING MODULE: Module architecture – an overview, capacity Requirement Planning. Engineering Change Control, Engineering data management, Master Production. Scheduling, Masterials

Requirement planning, Product classification / Configuration , Production Planning and Control, Repetitive Manufacturing,.

FINANCE MODULE: Module architecture an overview, accounts payable, Accounts receivable, General Ledger, cost allocation, cash management, Activity based costing, Fixed assets, Financial, Budgeting system.

(15)

TEXT BOOKS: 1) Joseph or Ticks", Materials Requirement Planning the New Way in Production, and Inventory Management (McGraw Hill Books company New Delhi1975.,

Reference Book:

BaaN –Student Manuals BaaN Education Books.Hyderabad..1990.

ME461 PROJECT WORK

IV Year B.Tech. (Mech) Second Semester

Practicals	:	6 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	100

The Project Report has to be submitted at the end of the semester and marks will be awarded based on the Viva-voce examination

ME462 CAM & AUTOMATION LAB

IV Year B.Tech. (Mech) **Second** *Semester*

Practicals	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

I. Manual Part Programming and tool path simulation on CNC Lathe for the following operations.

1) Step turning,

2) Taper turning,

3) Profile turning

4) External threading

5) Drilling, boring and internal threading

II. Manual Part Programming and tool path simulation on CNC Machining centre for the following operations.

1) Slot milling.
2) Step milling
3) Diagonal milling.
4) Profile milling.
5) Hexagon milling & drilling.

III. Modeling, Part Program generation and tool path simulation using Master CAM software.

IV. Programming examples on PLC.