B. Tech. (Mechanical Engineering)
Programme Code: EURME200802
REGULATIONS
(W.e.f. 2012-013 admitted batch)

1.0 ADMISSIONS

1.1 Admissions into B.Tech. (Mechanical Engineering) programme of GITAM University are governed by GITAM University admission regulations.

2.0 ELIGIBILITY CRITERIA

2.1 A minimum of 60% marks aggregate in Physics, Chemistry and Mathematics and First class or equivalent grade in 10+2 or equivalent examination approved by GITAM University in single attempt.

2.2 Admissions into B.Tech. will be based on an All India Entrance Test (GAT) conducted by GITAM University and the rule of reservation, wherever applicable.

3.0 STRUCTURE OF THE B.Tech. PROGRAMME

3.1 The Programme of instruction consists of:

(i) A general core programme comprising Basic Sciences, Basic Engineering, Humanities & Social Sciences and Mathematics.
(ii) An engineering core programme imparting to the student the fundamentals of engineering in the branch concerned.
(iii) An elective programme enabling the students to take up a group of departmental / interdepartmental courses of interest to him/her.

In addition, a student has to

(i) Carry out a technical project approved by the department and submit a report.
(ii) Undergo summer training in an industry for a period prescribed by the department and submit a report.

3.2 Each academic year consists of two semesters. Every branch of the B.Tech. programme has a curriculum and course content (syllabi) for the courses recommended by the Board of Studies concerned and approved by Academic Council.

4.0 CREDIT BASED SYSTEM

4.1 Each course is assigned certain number of credits which will depend upon the number of contact hours (lectures & tutorials) per week.

4.2 In general, credits are assigned to the courses based on the following contact hours per week per semester.

One credit for each Lecture / Tutorial hour.
One credit for two hours of Practicals.
Two credits for three (or more) hours of Practicals.

4.3 The curriculum of B.Tech. programme is designed to have a total of 190 to 201 credits for the award of B.Tech. degree.

4.4 Every course of the B Tech programme will be placed in one of the nine groups of courses with minimum credits as listed in the Table 1.

Table 1: Group of Courses

S.No,	Group of Courses	Code	Minimum credits
1	Humanities & Social Sciences	HS	12
2	Basic Sciences	BS	17
3	Mathematics	MT	10
4	Basic Engineering	BE	26
5	Core Engineering	CE	68
6	Departmental Elective	DE	9
7	Inter Departmental Elective	IE	8
8	Project Work	PW	8
9	Industrial Training	IT	2
Total			160

5.0 MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

6.0 REGISTRATION

Every student has to register himself/herself for each semester individually at the time specified by the Institute / University.

7.0 CONTINUOUS ASSESSMENT AND EXAMINATIONS

7.1 The assessment of the student's performance in each course shall be based on continuous evaluation and Semester-end examination. The marks for each component of assessment are as shown in the Table 2.

Table 2: Assessment Procedure

S. No.	Component of Assessment	Marks Allotted	Type of Assessment	Scheme of Evaluation
1	Theory	40	Continuous Evaluation	i) Thirty (30) marks for mid Semester examinations. Three mid examinations shall be conducted for 15 marks each; performance in best two shall be taken into consideration. ii) Ten (10) marks for Quizzes, Assignments and Presentations.
		60	Semester-end Examination	Sixty (60) marks for Semester-end examinations
	Total	100		
2	Practicals	100	Continuous Evaluation	i) Fifty (50) marks for regularity and performance, records and oral presentations in the laboratory. Weightage for each component shall be announced at the beginning of the Semester. ii) Ten (10) marks for case studies. iii) Forty (40) marks for two tests of 20 marks each (one at the mid-term and the other towards the end of the Semester) conducted by the concerned lab Teacher.
3	Project work (VII & VIII Semesters)	100	Continuous Evaluation	i) Forty (40) marks for periodic evaluation on originality, innovation, sincerity and progress of the work, assessed by the Project Supervisor. ii) Thirty (30) marks for mid-term evaluation for defending the Project, before a panel of examiners*. iii) Thirty (30) marks for final Report presentation and Viva-voce, by a panel of examiners*
4	Industrial Training (VII Semester)	100	Continuous Evaluation	i) Thirty (30) marks for Project performance, assessed by the Supervisor of the host Industry/Organization. Submission of Project Completion Certificate from host organization is mandatory. ii) Forty (40) marks for Report and Seminar presentation on the training, assessed by the Teacher Coordinator. iii) Thirty (30) marks for presentation on the training, before a panel of examiners*.
5	Comprehensive Viva-voce (VIII Semester)	100	Continuous Evaluation	Through five periodic Viva-voce exams for 20 marks each, conducted by a panel of examiners*. The course content for Viva exams shall be announced at the beginning of the Semester.

**Panel of Examiners shall be appointed by the concerned Head of the Department.*

8.0 RETOTALLING, REVALUATION & REAPPEARANCE

8.1 Retotalling of the theory answer script of the end-semester examination is permitted on a request made by the student by paying the prescribed fee within ten days of the announcement of the result.

8.2 Revaluation of the theory answer script of the end-semester examination is also permitted on a request made by the student by paying the prescribed fee within fifteen days of the announcement of the result.

8.3 A Student who has secured 'F' Grade in any theory course / Practicals of any semester shall have to reappear for the semester end examination of that course / Practicals along with his / her juniors.

8.4 A student who has secured 'F' Grade in Project work / Industrial Training shall have to improve his report and reappear for viva – voce Examination of project work at the time of special examination to be conducted in the summer vacation after the last academic year.

9.0 SPECIAL EXAMINATION

9.1 A student who has completed the stipulated period of study for the degree programme concerned and still having failure grade ('F') in not more than 5 courses (Theory / Practicals), may be permitted to appear for the special examination, which shall be conducted in the summer vacation at the end of the last academic year.

9.2 A student having 'F' Grade in more than 5 courses (Theory/practicals) shall not be permitted to appear for the special examination.

10.0 ATTENDANCE REQUIREMENTS

10.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end - semester examination and he/she will not be allowed to register for subsequent semester of study. He /She has to repeat the semester along with his / her juniors.

10.2 However, the Vice Chancellor on the recommendation of the Principal / Director of the University College / Institute may condone the shortage of attendance to the students whose attendance is between 66% and 74% on genuine medical grounds and on payment of prescribed fee.

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 in each course. The letter grades and the corresponding grade points are as given in Table 3.

Table 3: Grades & Grade Points

Grade	Grade points	Absolute 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, a minimum of 24 marks is to be secured at the semester end examination of theory courses in order to pass in the theory course.

12.0 GRADE POINT AVERAGE

12.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

$$GPA = \frac{\Sigma [C \times G]}{\Sigma C}$$

Where

C = number of credits for the course,
G = grade points obtained by the student in the course.

12.2 Semester Grade Point Average (SGPA) is awarded to those candidates who pass in all the courses of the semester.

12.3 To arrive at Cumulative Grade Point Average (CGPA), a similar 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.

12.4 The requirement of CGPA for a student to be declared to have passed on successful completion of the B.Tech. programme and for the declaration of the class is as shown in Table 4.

Table 4: 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 **first attempt**.

13.0 ELIGIBILITY FOR AWARD OF THE B.Tech. DEGREE

13.1 **Duration of the programme**:
A student is ordinarily expected to complete the B Tech. programme in eight semesters of four years. However a student may complete the programme in not more than six years including study period.

13.2 However the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

13.3 A student shall be eligible for award of the B.Tech. degree if he / she fulfil all the following conditions.

a) Registered and successfully completed all the courses and projects.
b) Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.
c) Has no dues to the Institute, hostels, Libraries, NCC / NSS etc, and
d) No disciplinary action is pending against him / her.

13.4 The degree shall be awarded after approval by the Academic Council.

RULES

1. With regard to the conduct of the end-semester examination in any of the practical courses of the programme, the Head of the Department concerned shall appoint one examiner from the department not connected with the conduct of regular laboratory work, in addition to the teacher who handled the laboratory work during the semester.

2. In respect of all theory examinations, the paper setting shall be done by an external paper setter having a minimum of three years of teaching experience. The panel of paper setters for each course is to be prepared by the Board of Studies of the department concerned and approved by the Academic Council. The paper setters are to be appointed by the Vice Chancellor on the basis of recommendation of Director of Evaluation / Controller of Examinations.

3. The theory papers of end-semester examination will be evaluated by internal/external examiner.

4. Panel of examiners of evaluation for each course is to be prepared by the Board of Studies of the department concerned and approved by the Academic Council.
5. The examiner for evaluation should possess post graduate qualification and a minimum of three years teaching experience.

6. The appointment of examiners for evaluation of theory papers will be done by the Vice Chancellor on the basis of recommendation of Director of Evaluation / Controller of Examinations from a panel of examiners approved by the Academic Council.

B.Tech. (Mech.) – Scheme of Instruction

I SEMESTER

Sl. No.	Course Code	Name of the Course	Category	Scheme of Instruction		Scheme of Examination			Credits to be awarded
				Hours per week		Duration in Hrs.	Max Marks		
				L/T	D/P		Sem. End Exam	Con. Eval	
1	EUREG 101	Engg. English – I	HS	3	---	3	60	40	3
2	EURMT 102/EIRMT102	Engg. Mathematics	MT	4	---	3	60	40	4
3	EURPH 103	Engg. Physics - I	BS	4	---	3	60	40	4
4	EURCH 104	Engg. Chemistry – I	BS	4	---	3	60	40	4
5	EURCS 105	Programming with C	BE	3	---	3	60	40	3
6	EURME 106	Engineering Drawing	BE	1	3	4	60	40	3
PRACTICALS :									
	EURIE 111	Workshop practice	BE	---	3	3	40	60	2
	EURCS 113	Programming with C Lab	BE	---	3	3	40	60	2
	EURCH 114	Engg. Chemistry Lab	BS	---	4	3	40	60	2
		Total:		**20**	**13**	**---**	**480**	**420**	**27**

II SEMESTER

Sl. No.	Course Code	Name of the Course	Category	Scheme of Instruction		Scheme of Examination			Credits to be awarded
				Hours per week		Duration in Hrs.	Maximum Marks		
				L/T	D/P		Sem. End Exam	Con Eval	
1	EUREG 201	Engg. English – II	HS	3	---	3	60	40	3
2	EURMT 202/EIRMT 201	Higher Engineering Mathematics – I	MT	3	---	3	60	40	3
3	EURMT 203/ EIRMT 202	Higher Engineering Mathematics – II	MT	3	---	3	60	40	3
4	EURPH 204	Engg. Physics - II	BS	3	---	3	60	40	3
5	EURCH 205	Engg. Chemistry – II	BS	3	---	3	60	40	3
6	EURCS 206	Object Oriented programming with C++	BE	3	---	3	60	40	3
DRAWING / PRACTICALS :									
	EURPH 212	Engg. Physics Lab	BS	---	3	3	40	60	2
	EURCS 213	Objected oriented	BE	---	3	3	40	60	2

		programming with C++ Lab							
	EURME 215	Engineering Graphics Lab	BE	---	4	3	40	60	2
				18	**10**	**---**	**480**	**420**	**24**

III SEMESTER

Course Code	Name of the Course	Category	Instruction hours per week				Maximum Marks			Credits
			L	T	P	Total hours	C	s	T	
EURME 301	Engineering Mechanics	BE	3	1		4	40	60	100	4
EURME 302/ EURIE303	Manufacturing Technology – I	CE	3			3	40	60	100	3
EURME 303/EIRME303	Applied Thermodynamics – I	CE	2	1		3	40	60	100	3
EURME 304	Material Science	CE	3			3	40	60	100	3
EURME 305/EIRME 305	Fluid Mechanics	CE	2	1		3	40	60	100	3
EURME 306	Environmental Studies	HS	4			4	40	60	100	4
DRAWING / PRACTICALS										
EURME 311	Computer Aided Machine Drawing Lab	CE	1		2	3	100	--	100	2
EURME 312	Manufacturing Technology – I Lab	CE			3	3	100	--	100	2
EURME 313	Mech. Engg - I Lab	CE			3	3	100	--	100	2
EURME 314	Industrial Tour	IT					--	--		NA
Total										**26**

IV SEMESTER

Course Code	Name of the Course	Category	Instruction hours per week				Maximum Marks			Credits
			L	T	P	Total hours	C	S	T	
EURME 401/EURIE 403	Numerical Methods in Engineering	CE	2	1		3	40	60	100	3
EURME 402/EIRME402	Manufacturing Technology – II	CE	3			3	40	60	100	3
EURME 403	Applied Thermodynamics – II	CE	2	1		3	40	60	100	3
EURME 404	Mechanics of Solids – I	CE	2	1		3	40	60	100	3
EURME 405/EURIE406	Elements of Electrical & Electronics Engineering	BE	3	1		4	40	60	100	4
EURME 406/EIRME406	Hydraulic Machines & Systems	CE	2	1		3	40	60	100	3
DRAWING / PRACTICALS										
EURME 411	Electrical Engineering Lab	BE			3	3	100	--	100	2
EURME 412	Fluid Mechanics & Hydraulic Machinery Lab	CE			3	3	100		100	2
EURME 413	Mech. Engg. - II Lab	CE			3	3	100	--	100	2
Total										**25**

V SEMESTER

Course Code	Name of the Course	Category	Instruction hours per week				Maximum Marks			Credits
			L	T	P	Total hours	C	S	T	
EURME 501/EIRME405	Theory of Machines-I	CE	2	1		3	40	60	100	3
EURME 502	Metrology & Computer Aided Inspection	CE	3			3	40	60	100	3
EURME 503	Engineering Economics and Management Principles	BE	3			3	40	60	100	3
EURME 504	Mechanics of Solids -II	CE	2	1		3	40	60	100	3
EURME 505	Instrumentation and Control Systems	CE	3			3	40	60	100	3
EURME 506	Machine Design-I	CE	2	1		3	40	60	100	3
DRAWING / PRACTICALS										
EURME 511	Personality Development	HS					--	--		NA
EURME 512	Mechanics of Solids Lab	CE			3	3	100		100	2
EURME 513	Manufacturing Tech.- II Lab	CE			3	3	100	--	100	2
	Total									**22**

VI SEMESTER

Course Code	Name of the Course	Category	Instruction hours per week				Maximum Marks			Credits
			L	T	P	Total hours	C	S	T	
EURME 601/EIRME 501	Theory of Machines-II	CE	2	1		3	40	60	100	3
EURME 602	Introduction to Finite Element Method	CE	2	1		3	40	60	100	3
EURME 603/EIRME602	Heat and Mass Transfer	CE	2	1		3	40	60	100	3
EURME 604	Automobile Engineering	CE	3			3	40	60	100	3
EURME 605	Methods Engineering and Work Design	CE	3			3	40	60	100	3
EURME 606	Machine Design-II	CE	2	1		3	40	60	100	3
DRAWING / PRACTICALS										
EURME 611	Computer Aided Production Drawing Lab	CE			3	3	100	--	100	2
EURME 612	Metrology Lab	CE			3	3	100	--	100	2
EURME 613	FEM and Numerical Methods Lab	CE			3	3	100		100	2
EURME 614	Advanced Communication Skills and English Language Lab	CE			3	3	100	--	100	2
Total										**26**

VII SEMESTER

Course Code	Name of the Course	Category	Instruction hours per week				Maximum Marks			Credits
			L	T	P	Total hours	C	S	T	
EURME 701	Operations Research	CE	2	1		3	40	60	100	3
EURME 702	CAD/CAM	CE	4			4	40	60	100	4
EURME 703	Power Plant Engineering	CE	3			3	40	60	100	3
EURME 721-724/EIRME 721-724	Department Elective-I	DE	3			3	40	60	100	3
EURME 731-734/EIRME 731-734	Department Elective-II	DE	3			3	40	60	100	3
DRAWING / PRACTICALS										
EURME 711	Heat and Mass Transfer Lab	CE			3	3	100	--	100	2
EURME 712	CAD/CAM Lab	CE			3	3	100	--	100	2

EURME 713	Industrial Engineering lab	CE			3	3	100	--	100	2
EURME 714	Industrial Training	IT			3		100	--	100	2
EURME 715	Project Work	PW			3	6	50	50	100	3
	Total									**27**

VIII SEMESTER

Course Code	Name of the Course	Category	Instruction hours per week				Maximum Marks			Credits
			L	T	P	Total hours	C	S	T	
EURME 801	Production Planning & Control	CE	3	-		3	40	60	100	3
EURME841-845/EIRME 841-845	Departmental Elective –III	DE	3			3	40	60	100	3
EURME851-8518/EIRME 851-8518	Inter Departmental Elective –I	IE	4			4	40	60	100	4
EURME861-862/EIRME 861-862	Inter Departmental Elective-II	IE	4			4	40	60	100	4

DRAWING / PRACTICALS

EURME 811	Project Work	PW			9	9	50	50	100	6
EURME 812	Innovative/Creative Lab	CE			3	3	100		100	2
EURME 813	Comprehensive Viva-Voce						--	100	100	2
Total										24

DEPARTMENT ELECTIVE-I

S.No	Course Code	Name of the Course
1	EURME721/EIRME 721	Mechanical Vibrations
2	EURME722/EIRME 722	Computational Fluid Dynamics
3	EURME723/ EIRME 723	Management Information Systems
4	EURME724/ EIRME 724	CNC & APT
5	EURME 725/ EIRME 725	Applied Materials Science
6	EURME 726/ EIRME 726	Statistical Quality Control

DEPARTMENT ELECTIVE-II

S.No	Course Code	Name of the Course
1	EURME731/ EIRME 731	Refrigeration and Air conditioning
2	EURME732/EIRME 732	Inventory Control
3	EURME733/ EIRME 733	Modern Manufacturing Methods
4	EURME734/ EIRME 734	Supply Chain Management

DEPARTMENT ELECTIVE-III

S.No	Course Code	Name of the Course
1	EURME 841/ EIRME 841	Mechatronics
2	EURME 842/ EIRME 842	Renewable Energy Sources
3	EURME 843/ EIRME 843	Total Quality Management
4	EURME 844/ EIRME 844	Advances in Manufacturing Technology
5	EURME 845/ EIRME 845	Engineering optimization

INTER DEPARTMENTAL ELECTIVE – I

S.No	Course Code	Name of the Course
1	EURME 852/ EIRME 852	Database Management Systems
2	EURME 853/ EIRME 853	Software Engineering
3	EURME 856/ EIRME 856	Artificial Intelligence
4	EURME 8511/ EIRME 8511	Neural Networks & Fuzzy Logic
5	EURME 8518/ EIRME 8518	Data Structures

INTER DEPARTMENTAL ELECTIVE –II

S.No	Course Code	Name of the Course
1	EURME 862/ EIRME 862	Operating Systems
2	EURME 863/ EIRME 863	Web Technologies
3	EURME 8620/ EIRME 8620	Data Mining
4	EURME 8621/ EIRME 8621	Micro Processors Application in Mechanical Engineering

SYLLABUS
B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EUREG 101: ENGINEERING ENGLISH-I

Hours per week: 4 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit – I

Introduction to Communication: Role and Importance of Communication, Features of Human communication, Process of Communication, Types of Communication: Verbal and Non-Verbal, Importance of Listening in Effective Communication and Barriers to Communication.

Unit – II

Effective Vocabulary: Words Often Confused, One-word Substitutes, Idiomatic Usage, Using Dictionary and Thesaurus .

Unit – III

Functional Grammar: Functions: Making proposals, Offering suggestions, Apologizing, Requesting, Offering and Refusing help, Giving and asking for information, Making complaints, Interrupting, Giving and asking directions, Inviting, Asking Permission, Expressing ability, etc., Articles, Prépositions, Tenses , Concord.

Unit – IV

Communication through Writing: Paragraph writing, Communication through letters: official and personal letters, letters of complaint, letters of enquiry and responses. Résumé writing, Cover letters, E-mail etiquette, Punctuation.

Unit – V

Reading for Enrichment: Sachin Tendulkar, Michael Jackson

Text Books Prescribed:

1. E. Suresh Kumar et al., **Enriching Speaking and Writing Skills,** Orient Blackswan, 2012.

Reference Books:

1. E. Suresh Kumar et al., Communication Skills and Soft Skills, Pearson, 2010.

B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURMT 102/EIRMT 102: ENGINEERING MATHEMATICS

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I

First order Differential Equations: Formation – Variables seperable – Homogeneous, non Homogeneous, Linear and Bernoulli equations. Exact equations - Applications of first order differential equations – Orthogonal Trajectories, Newton's law of cooling, law of natural growth and decay.

Unit-II

Higher order Differential Equations: Complete solutions - Rules for finding complementary function - Inverse operator - Rules for finding particular integral - Method of variation of parameters - Cauchy's and Legendre's linear equations - Simultaneous linear equations with constant coefficients - Applications of linear differential equations to Oscillatory Electrical circuits L-C, LCR – Circuits - Electromechanical Analogy.

Unit-III

Mean Value Theorems: Rolle's, Lagrange's and Cauchy's mean value theorems. Taylor's and Maclaurin's theorems and applications (without proofs).

Unit-IV

Infinite Series: Definitions of convergence, divergence and oscillation of a series - General properties of series - Series of positive terms - Comparison tests - Integral test - D' Alembert's Ratio test - Raabe's test - Cauchy's root test - Alternating series - Leibnitz's rule - Power series - Convergence of exponential, Logarithmic and binomial series (without proofs).

Unit-V

Linear Algebra: Rank of a Matrix – Elementary Transformations – Echelon form - Normal form (self study). Consistency of Linear system of equations $A X = B$ and $A X = 0$. Eigen Values and Eigen Vectors – Properties of eigen values(without proofs) – Cayley – Hamilton theorem (Statement only without proof) – Finding inverse and powers of a square matrix using Cayley – Hamiton theorem – Reduction to diagonal form – Quadratic form - Reduction of Quadratic form into canonical form – Nature of quadratic forms.

Text Books:

1. Higher Engineering Mathematics, Dr.B.S Grewal, Khanna Publishers.

References:

1. Advanced Engineering Mathematics, Erwin Kreyszig.Wiley Eastern Pvt. Ltd.
2. Textbook of Engineering Mathematics, N.P.Bali. Laxmi Publications (P) Ltd.
3. Higher Engineering Mathematics, Dr.M.K.Venkata Raman. National Pub. Co.
4. Calculus and Analytic Geometry Thomas / Finney Sixth edition -Narosa Publishing House

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B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURPH 103-ENGINEERING PHYSICS-I

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit - I

Thermodynamics: Heat and Work - First Law of Thermodynamics and Applications - Reversible and Irreversible Processes - Carnot's Cycle and Efficiency - Second Law of Thermodynamics - Carnot's Theorem - Entropy - Entropy in Reversible and Irreversible Processes - Entropy and Second Law - Entropy and Disorder – Third Law of Thermodynamics

Unit - II

Electromagnetic Oscillations And Alternating Currents: Energy Stored in a Capacitor and an Inductor - LC Oscillations (Qualitative and Quantitative) - Analogy to Mechanical Motion-Damped Oscillations - Damped Oscillations in an RLC Circuit - Alternating Current (Including Equations for Voltages and Currents) - Fundamental Definitions - (Cycle, Time period, Frequency, Amplitude, Phase, Phase Difference, Root Mean Square (RMS) value, Average Value, Form Factor, Quality Factor, Power in Alternating Current Circuits) - Forced Oscillations and Resonance - The Series RLC Circuit.

Electromagnetic Waves: Induced Magnetic Fields - Displacement Current - Maxwell's Equations - Traveling Waves and Maxwell's Equations - The Poynting Vector - Light and the Electromagnetic Spectrum.

Unit- III

Dielectric Properties: Introduction - Fundamental Definitions - Local Field - Claussius-Mossotti Relation -Different Types of Electric Polarizations (electronic, ionic, and dipolar polarizations) - Frequency and Temperature Effects on Polarization - Dielectric Loss - Dielectric Breakdown - Determination of Dielectric Constant – Properties and Different Types of Insulating Materials - Ferroelectric Materials - Spontaneous Polarization in $BaTiO_3$ – Electrets.

Unit-IV

Magnetic Properties: Introduction - Fundamental Definitions - Different Types of Magnetic Materials-Weiss Theory of Ferromagnetism - Domain Theory of Ferromagnetism – Hysteresis - Hard and Soft Magnetic Materials - Ferrites - Microwave Applications - Magnetic Bubbles

Unit-V

Super Conductivity: Introduction - BCS Theory - Meissner Effect - Properties of Superconductors - Type-I and Type-II Superconductors - High Tc Superconductors - Applications.

Ultrasonics: Introduction - Production of Ultrasonics by Magnetostriction and Piezo-electric Effects – Detection and Applications of Ultrasonics.

Text Books:

1. Physics Part I & II, Resnick, Halliday, Krane. John Wiley & Sons
2. Engineering.Physics, P.K.Palani samy. Scitech Publications (India) Pvt Ltd., Chennai

References:

1. Heat, Thermodynamics, and Statistical Physics, Agarwal, Singhal, Satya Prakash. Pragati Prakashan, Meerut.
2. Solid State physics, S.O.Pillai. New Age International (P)Limited, New Delhi
3. Materials Science, M. Arumugam. Anuradha Agencies, Kumbhakonam
4. A Text Book of Engg. Physics, Kshirsagar & Avadhanulu. S.Chand and Co
5. The Feynman Lectures on Physics, Addison-Wesley

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B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURCH 104: ENGINEERING CHEMISTRY-I

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit- I

Water Technology - Sources and Purification of Water: Sources of Water – Impurities in Water- Hardness of Water – Temporary and Permanent. Hardness-Units. Municipal Water treatment- Sedimentation – Coagulation–Filtration-Sterilisation - Desalination of Brackish Water - Reverse Osmosis and Electrodialysis.

Unit- II

Water Technology-Softening Methods and Boiler Troubles: Industrial Water treatment- Lime - Soda Ash Method - Chemical reactions –Problems - Zeolite and Ion exchange processes. Boiler Troubles – Boiler corrosion- Scale and Sludge formation - Caustic Embrittlement-Priming and Foaming – Internal conditioning methods like – phosphate, carbonate conditioning.

Unit– III

Surface Chemistry and Nanochemistry: Colloids: Types of Colloids – Preparation of Colloidal solutions – Micelles – Applications of Colloids Adsorption: Classification – Adsorption of Gasses on solids - Applications of Adsorption. Nanochemistry: Introduction – Wet chemical methods of preparation (Microemulsion – Sol gel and Co – precipitation).

Unit- IV

Polymers: Types of Polymerization– Mechanism of addition polymerization-Moulding constituents and Moulding techniques. Differences between Thermo Plastic and Thermosetting Resins. Preparation and Properties of Polyethylene, PVC, Polystyrene, Polyamides (Nylon-6:6), Polycarbonates and Bakelite - Engineering applications of Plastics, Poly Siloxanes, Polyphosphines.

Unit- V

Engineering Material Science: Refractories– Classification - criteria of a good refractory. Preparation and properties of silica, magnesite and silicon carbide refractories - clay bond, silica nitride bond and self bond in silicon carbide.

Glass: – Manufacture of glass – types of glasses- Soft glass – hard glass and pyrex glass.

Ceramics: – Structural clay products, white wares and Chemical stone wares.

Cement: Chemical composition of Portland cement, Manufacture- Setting and Hardening of Cement.

Text Books:

1. Engineering Chemistry, P.C. Jain and M. Jain, Dhanapat Rai & Sons, Delhi.
2. Engineering Chemistry, B.K.Sharma, Krishna Prakashan, Meerut.
3. A Textbook of Engineering Chemistry, Sashi Chawla, Dhanapath Rai & Sons, Delhi.
4. Text Book of NanoScience and NanoTechnolog, by B.S. Murthy and P.Shankar, University Press.

References:

1. A Textbook of Engineering Chemistry, S.S.Dara, S.Chand & Co. New Delhi.
2. Material Science and Engineering, V.Raghavan, Prentice-Halln Idia Ltd.

B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURCS 105: PROGRAMMING with C

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit – I

Algorithm, flowchart, program development steps, structure of C program, Compilers, Linker, Preprocessor, identifiers, basic data types and sizes, Constants, variables, operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Input-output statements, statements and blocks, programming examples.

Unit – II

Control Structures: if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels. Designing structured programs, Functions, basics, parameter passing, block structure, user defined functions, standard library functions, recursive functions, Comparison of Iteration and Recursion, header files, C preprocessor, storage classes- extern, auto, register, static, scope rules, example c programs.

Unit – III

Arrays: concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays.

Pointers: concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory management functions, command line arguments, c program examples.

Unit – IV

Strings: What are Strings, Arrays of Strings and Standard Library String Functions.

Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bitfields, C program examples.

Unit – V

Input and output - concept of a file, , File Structure , text files and binary files,

streams, standard I/O, Formatted I/O, file I/O operations, error handling, C program examples.

Text Book:

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.

References:

1. Programming with ANSI and Turbo C by Ashok N. Kamthane, published by PEARSON Education
2. Let us C by Yashwant Kanetkar, published by BPB Publications.
3. MASTERING **C**, by K R Venugopal, S R Prasad published by Tata McGraw Hill.

B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURME106: ENGINEERING DRAWING

Hours per week: 4 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Importance, Significance and scope of engineering drawing, Lettering, Dimensioning.

Geometrical Constructions: Introduction, bisecting a line, perpendiculars lines, parallel lines, divide a line, circle, bisect an angle, trisect an angle, center of an arc, construction of squares, regular polygons, regular polygons inscribed in circles, inscribed circles.

Engineering Curves: Introduction, Conic sections, ellipse, parabola, hyperbola, cycloidal curves, epicycloid and hypocycloid.

Unit-II

Orthographic projections: Introduction, principle of projection, methods of projection, orthographic projection, planes of projection, first angle projection and third angle projection.

Projections of Points: Introduction, projections of points in different quadrants

Unit-III

Projections of Straight lines: Introduction, line parallel to one or both the planes, line contained by one or both the planes, line perpendicular to one of the planes, line inclined to one plane and parallel to the other, line inclined to both the planes, traces, inclinations, and true lengths of the lines.

Unit-IV

Projections of Planes: Introduction, types of planes, perpendicular planes, perpendicular to one pane and parallel to other plane, perpendicular to one plane and inclined to other plane, oblique planes.

Projections on auxiliary planes: types of auxiliary planes, perpendicular to one pane and parallel to other plane, perpendicular to one plane and inclined to other plane, oblique planes.

Unit-V

Projections of Solids: Introduction, types of solids, polyhedral tetrahedron- prism, pyramid and solids of revolution- cylinder, cone. Projections of solids, simple

positions, axis inclined to on plane and parallel to other, axis inclined to both the planes.

Text books:

1. Engineering Drawing by N.D. Bhatt and V. M .Panchal, Charotar publishing house Pvt. Ltd, 49th edition, 2008.
2. Engineering Drawing by M.B Shah and B.C Rana, Pearson Edn, 2nd edition, 2009

References:

1. Geometrical Drawing- A generalized approach by Arunvikram, Ch.Ratnam and P.Vasudevarao, IK International Pvt.Ltd., New Delhi.
2. A text book on Engineering Drawing by K.L .Narayana and P. Kanniah (Scitec publications (India) Pvt. Ltd.

B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURCS 113: PROGRAMMING LAB WITH C

Hours per week: 3 Continuous Evaluation: 100 Marks
Credits: 2

1. a) Write a C program to ask the user to enter one char (Upper-Case letter) check whether user entered a Upper-case letter or not(by using relational and logical operators) and then if user has entered a Upper-case letter convert into a Lower-case letter? (hint: Upper-case means capital letters, use ASCII information to check for Upper-case and convert)
   b) Write a C program to ask the user to enter two integers and apply all arithmetic operations on those print the corresponding values?(hint : +,-,*,/,%)
   c) Write a C program to Determine the ranges of char, short, int and long int variables both signed and unsigned.
   i) By using size of operator (ii) By printing appropriate values from standard header (limits.h)
2. a) Write a Program to Find the Roots of a Quadratic Equation using if else and Switch statements.
   b) Write a Program which Generates One Hundred Random Integers in the Range of 1 To 100, store them in an array and then prints the average. Write three versions of the program using Different Loop Constructs.

3. a) Write a C program to find the sum of individual digits of a positive integer.
   b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
   c) Write a C program to calculate the following
   $$Sum=1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$$
4. a) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
   b) Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To solve Towers of Hanoi problem.
5. a) Write a C program to find both the largest and smallest number in a list of integers.
   b) Write a program to read set of elements in the array and sort them in ascending order.
   c) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices
ii) Multiplication of Two Matrices
iii) Transpose of a given Matrix

6. a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
   b) Write a C program to determine if the given string is a palindrome or not
   c) Given an Array of Strings Write a Program to Sort the String in Dictionary Order.
7. Write a C program that uses functions to perform the following operations:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
8. Write a C program that uses functions to perform the following operations:
   a)Count number of characters, words in a file.
   b) Write a C program to reverse the first n characters in a file.
   (Note: The file name and n are specified on the command line.)
   c) Write a C program which copies one file to another.
9. Write aprogram to print the details of employees of a organization like(Name, Date of Join, Salary) using nested structures.
10. Construct a program for managing membership of library using structures. Write a program that accepts the, code number and duration of books borrowed and displays the name and other information of all those members having dues.

B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURCH 114: ENGINEERING CHEMISTRY LAB

Hours per week: 3 Continuous Evaluation: 100 Marks
Credits: 2

The objective of the Laboratory Practicals is to make the student to acquire the basic Concepts on Engineering Chemistry.

1. Calibration of Volumetric Apparatus.
2. Determination of sodium carbonate in soda ash.
3. Estimation of Iron as Ferrous Iron in an Ore Sample.
4. Estimation of Calcium on Portland cement.
5. Estimation of volume strength of Hydrogen Peroxide.
6. a) Estimation of Active Chlorine Content in Bleaching Power.
   b) Determination of Hardness of a Ground Water Sample.
7. Determination of Chromium (VI) in Potassium Dichromate
8. Determination of Copper in a Copper Ore.
9. a) Determination of Viscosity of a Liquid.
   b) Determination of Surface Tension of a Liquid.
10. a) Determination of Mohr's Salt by potentiometric method.
    b) Determination of Strength of an acid by pH metric method.

B.Tech. Four Year Degree
Mechanical Engineering- First Semester
EURIE 111 WORKSHOP PRACTICE

Hours per week: 3 Continuous Evaluation: 100 Marks
Credits: 2

The main aim of Workshop Practice is to acquaint the student with the basic tools used in Workshop Practice and to develop skills in using these tools to perform simple tasks. The students should be able to work with these tools to prepare simple jobs in Wood Work **PRACTICE**, Sheet Metal Working, Forging and Fitting.

An illustrative list of tasks to be performed by the student is given below:

I. Wood Working - Familiarity with different types of woods used and tools used in wood Working technology.

Tasks to be performed:

1) To make Half – Lap joint
2) To make Mortise and Tenon joint
3) To make Corner Dovetail joint
4) To make Briddle joint.

II. Sheet Metal Working – Familiarity with different types of tools used in sheet metal working, Developments of sheet metal jobs from GI sheets, knowledge of basic concepts of soldering.

Tasks to be performed:

1) To make Square Tray
2) To make Taper side Tray
3) To make Conical Funnel
4) To make Elbow Pipe.

III. Forging – Familiarity with different types of tools used in forging technology. Knowledge of different types of furnaces like coal fired, electrical furnaces etc...

Tasks to be performed:

1) To make round M.S rod to square rod
2) To make L bend in given M.S. Rod.
3) To make S bend in given M.S. Rod.
4) To perform heat treatment tests like annealing, Normalizing etc..

IV. Fitting – Familiarity with different types of tools used in fitting technology.

Tasks to be performed:

1) To make "V" – fitting
2) To make Rectangular fitting
3) To make Dovetail fitting
4) To make Semi circular fitting
5) To make Hexagon fitting

❖ Student is required to work individually and complete at least three jobs in each technology.

Dress Code:

❖ **For Boys** : Blue Colour Long Apron, Khaki Trousers, Half Sleeve Shirt (Tucked-in), Black Leather Shoes.

❖ **For Girls:** Blue Colour Long Apron, Salwar Suit, Black Shoes.

Reference Books:

1. Workshop Technology, Part 1, W.A.J. Chapman, Viva Low Priced Student Edition.
2. Elements of Workshop Technology, Volume 1, S.K.Hajra Choudhury, S.K.Bose.
3. A.K.Hajra Choudhury and Nirjhar Roy, Media Promoters and Publishers Pvt. Ltd.

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EUREG 201: ENGINEERING ENGLISH-II

Hours per week: 4 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Interpersonal Communication: Introduction to Interpersonal Communication, Models of Interpersonal Relationship Development, Team Work and Persuasion Techniques.

Unit-II

Spoken Communication: Importance of spoken communication, Basics of Spoken English, Situational Dialogues, Speech Making: Formal and Informal.

Unit-III

Developing Vocabulary and Correcting Common Errors: Homonyms, Homophones and Homographs, Synonyms and Antonyms: Oral and Written.

Unit-IV

Information Transfer: Using charts, Figures, Tables, Pictograms, Maps, Note taking and Note Making.

Unit-V

Reading for Enrichment: Sir Mokshagundam Visvesvaraya, Steve Jobs: The Early Years.

Text Book:

1. E. Suresh Kumar et al., Communication for Professional Success, Orient Blackswan, 2012.

References:

1. E. Suresh Kumar et al., Communication Skills and Soft Skills, Pearson, 2010.
2. Oxford Advanced Learners' Dictionary, 2010 Edition.

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURMT202/ EIRMT 201: HIGHER ENGINEERING MATHEMATICS-I

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Partial Differentiation-1: Introduction to Partial differentiation - Total derivative - Differentiation of implicit functions - Geometrical interpretation - Tangent plane and normal to a surface - Change of variables - Jacobians.

Unit-II

Partial differentiation-2: Taylor's theorem for functions of two variables. Total differential - Maxima and minima of functions of two variables - Lagrange's method of undetermined multipliers - Differentiation under the integral sign, Leibnitz's Rule.

Unit-III

Fourier Series : Euler's formulae - Conditions for a Fourier expansion - Functions having points of discontinuity - Change of interval - Odd and even functions - Expansions of odd or even periodic functions - Half range series and practical Harmonic Analysis.

Unit-IV

Partial differential equations: Formation of partial differential equations - Solutions of a partial differential equation - Equations solvable by direct integration - Linear equations of the first order - Non-linear equations of the first order - Homogeneous linear equations with constant coefficients - Rules for finding the complementary function - Rules for finding the particular integral.

Unit-V

Applications of Partial Differential Equations: Method of separation of variables – partial differential equations – wave equation – one dimensional heat flow – two-dimensional heat flow-solution of Laplace equation –Laplace equation in polar co-ordinates.

Text Books:

1. Higher Engineering Mathematics, Dr.B.S Grewal, Khanna Publishers.

References :

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Pvt. Ltd.
2. Textbook of Engineering Mathematics, N.P.Bali, Laxmi Publications (P) Ltd.
3. Higher Engineering Mathematics, Dr.M.K.Venkata Raman. National Pub. Co.

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURMT203/ EIRMT202: HIGHER ENGINEERING MATHEMATICS – II

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

The objective of the course is to impart knowledge in Basic concepts of Mathematics relevant to Engineering applications.

Unit-I

Multiple Integrals-I: Double integrals- Change of order of integration, Double integrals in Polar coordinates- Areas enclosed by plane curves,

Unit-II

Multiple Integrals-II: Triple integrals - Volume of solids - Change of variables - Area of a curved surface. Beta and Gamma functions – Properties - Relation between beta and gamma functions – Dirichlet's integrals of type I and type II.

Unit-III

Vector Differentiation: Scalar and vector fields - Gradient, Divergence and Curl - Directional derivative – Identities - Irrotational and Solenoidal fields.

Unit-IV

Vector Integration: Line, Surface and Volume integrals - Green's theorem in the plane - Stoke's and Gauss divergence theorems - Introduction of orthogonal curvilinear co-ordinates, Cylindrical co-ordinates and Spherical polar co-ordinates (self study)

Unit-V

Laplace transforms: Transforms of elementary functions - Properties of Laplace transforms - Existence conditions - Inverse transforms - Transforms of derivatives and integrals - Multiplication by t^n - Division by t - Convolution theorem. Applications to ordinary differential equations and simultaneous linear equations with constant coefficients - Unit step function - Unit impulse function - Periodic functions.

Text Books:

1. Higher Engineering Mathematics, Dr.B.S Grewal, Khanna Publishers.

References :

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Pvt. Ltd.
2. Textbook of Engineering Mathematics, N.P.Bali, Laxmi Publications (P) Ltd.
3. Higher Engineering Mathematics, Dr.M.K.Venkata Raman. National Pub. Co.

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURPH 204: ENGINEERING PHYSICS – II

Hours per week: 4 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

The aim of the course is to impart knowledge in basic concepts of physics relevant to engineering applications

Unit-I

Interference: Introduction - Interference in Thin Films - Wedge Shaped Film - Newton's Rings - Lloyd's Mirror - Michelson's Interferometer and Applications.

Diffraction: Introduction - Differences between Fresnel and Fraunhofer Diffractions - Single Slit Diffraction (Qualitative and Quantitative Treatment) - Differences between Interference and Diffraction - Gratings and Spectra- Multiple Slits - Diffraction Grating - X-ray Diffraction - Bragg's Law.

Unit-II

Polarisation: Introduction - Double Refraction - Negative Crystals and Positive Crystals - Nicol's Prism -Quarter Wave Plate and Half Wave Plate - Production and Detection of Circularly and Elliptically Polarised Lights.

Lasers: Introduction - Spontaneous and Stimulated Emissions - Population Inversion – Ruby Laser - He-Ne Laser - Semiconductor Laser – Applications.

Unit-III

Modern Physics (Quantum Physics): Matter Waves - Heisenberg's Uncertainty Principle - Schrodinger's Time Independent Wave Equation - Physical Significance of Wave Function - Application to a Particle in a one Dimensional Box (Infinite Potential Well) - Free Electron Theory of Metals - Band Theory of Solids (qualitative) - Distinction between Metals, Insulators and Semiconductors - Elementary Concepts of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics (No Derivation).

Unit-IV

Semiconductors: Introduction - Intrinsic and Extrinsic Semiconductors - Carrier Concentration in Intrinsic Semiconductors - Carrier Concentration in n-Type Semiconductors - Carrier Concentration in p-Type Semiconductors - Hall Effect and Applications -Variation of Carrier Concentration with Temperature – Conductivity of Extrinsic Semiconductor - PN Junction - Forward Bias - Reverse Bias -VI

Characteristics of a PN Junction-Fundamentals of LED, LCD - Photovoltaic Cell (Solar Cell).

Unit-V

Fibre Optics: Introduction - Optical Paths in Fibre - Optical Fibre and Total Internal Reflection – Acceptance Angle and Cone of a Fibre - Fibre Optics in Communications - Applications.

Nanoscience: History – Definition - Size Dependent Properties (Qualitative): Mechanical and Electrical-Growth Techniques: Top Down (PVD, Ball Milling) - Bottom Up (Sol-Gel and Co-Precipitation) - Applications.

Text Books:

1. Physics part I & II, Resnick, Halliday, Krane. John Wiley & Sons
2. Applied Physics, P.K.Palani samy. Scitech Publications (India) Pvt Ltd., Chennai

References:

1. Modern Physics, Arthur Beiser.Tata Mc Graw-Hill
2. Solid State Physics, S.O.Pillai. New Age International (P)Limited, New Delhi.
3. Materials Science, M. Arumugam. Anuradha Agencies, Kumbhakonam.
4. A Text Book of Engg. Physics, Kshirsagar & Avadhanulu. S.Chand and Co.
5. The Feynman Lectures on Physics, Addison-Wesley

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURCH 205: ENGINEERING CHEMISTRY – II

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Non-Conventional Energy Sources and Applications: Chemical- Electrode Potential –Determination of Single Electrode Potential-Reference Electrodes – Hydrogen and Calomel Electrodes. Electrochemical Series and its Applications. Primary Cell–Dry or Leclanche Cell, Secondary Cell – Lead acid storage Cell – Ni – Cd, Li batteries , Fuel Cell–Hydrogen-Oxygen Fuel Cell. Methyl alcohol – Oxygen, Propane – Oxygen fuel cell. **Solar :** Photoelectric cells –Applications of Solar Cells

Unit-II

Corrosion Engineering: Definition of Corrosion, Theories of Corrosion –Dry Corrosion and Electro Chemical Corrosion Factors Affecting Corrosion- Nature of the Metal and Nature of the Environment. Prevention of Corrosion: Metallic Coatings –Galvanising and Tinning, Anodized Coatings, Cathodic Protection-Inhibitors, Organic Coatings-Paints –Characteristics, Constituents and their functions, Varnishes.

Unit-III

Fuel technology: calorific value and solid fuels: Classifications of Fuels – Characteristics of Fuels- Calorific Value - Units. Determination – Bomb Calorimetric Method- Dulong's formula. Solid Fuels–Coal, Classification of Coal by Rank-Analysis of Coal –Proximate and Ultimate Analysis. Coke: Manufacture of Coke- Beehive oven and Otto Hoffmann's by product Oven processes.

Unit-IV

Fuel Technology: Liquid Fuels: Refining of Petroleum - Petroleum products used as Fuels - Gasoline - Knocking and Octane Number of Gasoline, Synthetic Petrol – Bergius and Fishcher Tropsch methods. Diesel - Cetane Number, High speed and low speed Diesel oil-Power Alcohol: Manufacture, Advantages and Disadvantages - LPG.

Unit-V

Lubricants: Classification-Properties- Viscosity and Oiliness, Flash and Fire - Points, Cloud and Pour - Points. Aniline point, Saponification number – Carbon residue, Emulsification number volatilities, precipitation number, specific gravity,

neutralization number. Principles and Mechanism of Lubrication - Fluid Film, Boundary and Extreme - Pressure Lubrications.

Text Books:

1. Engineering Chemistry, P.C. Jain and M. Jain, Dhanapat Rai & Sons, Delhi.
2. Engineering Chemistry, B.K.Sharma, Krishna Prakashan, Meerut.
3. A Textbook of Engineering Chemistry, Sashi Chawla, Dhanapath Rai & Sons, Delhi.

References:

1. A Textbook of Engineering Chemistry, S.S.Dara, S.Chand & Co. New Delhi.
2. Material Science and Engineering, V.Raghavan, Prentice-Hall India Ltd.

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURCS206: OBJECT ORIENTED PROGRAMMING WITH C++

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction to OOPS: Origins of C++, Object Oriented Programming, Headers & Name Spaces,Applications of OOP, Structure of C++ Program. C++ Basics: Keywords, Constants, Data Types, Dynamic Initialization of Variables, Reference Variables, Operators in C++. C++ Class Overview: Class Definition, Objects, Class Members, Access Control, Class Scope.

Unit-II

Dynamic memory allocation and deallocation (new and delete), Parameter passing methods, static class members, Arrays of Objects, Objects as Function Arguments, Default Arguments, Const Arguments, Inline functions,Function Overloading, Friend Functions,this pointer,pointers to data members and member function.

Unit-III

Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic initialization of Objects, Copy Constructors, Dynamic Constructors, Destructors. Introduction to inheritance, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi Level Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes.

Unit-IV

Introduction to pointers, Pointers to Objects, Pointers to Derived Classes, compile time polymorphism, Run time polymorphism, Virtual Functions, Pure Virtual Functions,Virtual Destructors, Operator overloading, Rules for Operator overloading, overloading of binary and unary operators.
Files in C++: File I/O, Unformatted and Binary I/O, file handling library functions.

Unit-V

Templates: Introduction, Class Templates, Class Templates with Multiple Parameters, Function Templates, Function Templates with Multiple Parameters, Member Function Templates.

Exception Handling: Basics of Exception Handling, Types of exceptions, Exception Handing Mechanism, Throwing and Catching Mechanism, Rethrowing an Exception, Specifying Exceptions.

Text Books:

1. Object Oriented Programming in C++, E.Balagurusamy, Tata McGraw-Hill.
2. Computer Science: A Structured Approach Using C++, Behrouz A. Forouzan and Richard F. Gilberg

References:

1. Object- Oriented Programming with ANSI and Turbo C+ +, Ashok Kamthane
2. Problem Solving, Abstraction, and Design using C++ (6TH 11), Frank L. Friedman

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURPH 212: ENGINEERING PHYSICS LAB

Hours per week: 3 Continuous Evaluation: 100 Marks
Credits: 2

The main aim of the course is to acquaint the students with basic concepts in Engineering Physics using the following illustrative list of experiments.

1. J – by Callender and Barne's Method.
2. Thermal Conductivity of a Bad Conductor – Lee's Method.
3. Magnetic Field Along the Axis of a Circular Coil Carrying Current – Stewart and Gee's alvanometer.
4. Hall Effect- Measurement of Hall Coefficient.
5. Carey Foster's Bridge – Laws of Resistance and Specific Resistance.
6. Calibration of Low Range Voltmeter – Potentiometer Bridge Circuit.
7. Thickness of a Paper Strip- Wedge Method.
8. Newton's Rings – Radius of Curvature of a Plano Convex Lens.
9. Diffraction Grating – Normal Incidence.
10. Determination of Refractive Indices (o and e) of a Bi-Refringent Material (Prism).
11. Cauchy's Constants – Using a Spectrometer.
12. Dispersive Power of a Prism – Using a Spectrometer.
13. Determination of Rydberg Constant.
14. LASER – Diffraction.
15. Determination of Band Gap in a Semiconductor.
16. Optical Fibres – Numerical Aperture and Loss of Signal.
17. VI Characteristics of a pn-junction diode
18. Response of a series RLC Circuit

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURCS 213: OBJECT ORIENTED PROGRAMMING LAB WITH C++

Hours per week: 3 Continuous Evaluation: 100 Marks
Credits: 2

1. Write a CPP program that contains a function to exchange values of two arguments(swap) by using pointers and reference parameters.
2. Write a CPP program to find the given string is palindrome or not. Declare private member function to find palindrome of the given string and access it using public member function.
3. Write a CPP program to find transpose of 2D matrix and allocate memory dynamically to the matrix using dynamic memory allocation. Initialize and display contents of the matrix and deallocate memory.
4. Write a CPP program to add two polynomials of any degree using object as function arguments. Hint: create two objects each represent one polynomial equation.
5. Write a CPP program to add corresponding elements of two 2D matrices using friend function. Create two classes each capable of storing one 2D matrix. Declare the matrix under private access specifier and access them outside the class.
6. Write a program to find total and average marks of each student in class. Create a student class with student number, name, 6 subject marks as its members and initializes the details. Use friend class that access the details of student and calculates total, average marks and prints the result.
7. Write a program to add two matrices of same copy. Create two objects of the class and each of which refers one 2D matrix. Use constructor to allocate memory dynamically and use copy constructor to allocate memory when one array object is used to initialize another.
8. Write a Program to Generate Fibonacci Series by using Constructor to Initialize the Data Members.
9. Write a program for finding area of different geometric shapes (circle, Rectangle, cube). Use function overloading with type, order, sequence of arguments to find the area of shapes.
10. Write a program which prompts the user to enter a string and returns the length of the longest sequence of identical consecutive characters within the string using pointers to data members and member function. For example, in the string "aaaAAAAAjjB", the longest sequence of identical consecutive characters is "AAAAA".

11. Write a program to calculate gross and net pay of employee from basic salary. Create employee class which consists of employee name, emp_id, basic salary as its data members. Use parameterized constructor in the derived class to initialize data members of the base class and calculate gross and net pay of the employee in the derived class.
12. Write a program to calculate bonus of the employees. The class master derives the information from both admin and account classes which intern derives information from class person. Create base and all derived classes having same member functions called getdata, display data and bonus. Create a base class pointer that capable of accessing data of any class and calculates bonus of the specified employee. (Hint: Use virtual functions)
13. Write a program to add two matrices of mxn size using binary operator overloading.
14. Write a program to find transpose of a given matrix of mxn size using unary operator overloading.
15. Write a program to concatenate one string to another using binary operator overloading.
16. Write a program that uses functions to perform the following operations:
    a) To copy contents of one file into another file.
    b) To replace a word with other word in a given file?
    c) To count the no of occurrences of a word in a given file
17. Write a program to sort a given set of elements using function template.
18. Write a program to search a key element in a given set of elements using class template.
19. Write a program to find average marks of the subjects of a student. Throw multiple exceptions and define multiple catch statements to handle division by zero as well as array index out of bounds exceptions.
20. Write a program to find factorial of a given number. Throw multiple exceptions and define multiple catch statements to handle negative number andout of memory exception. Negative number exception thrown if given number is negative value and out of memory exception is thrown if the given number is greater than 20.

B.Tech. Four Year Degree
Mechanical Engineering- Second Semester
EURME 215: ENGINEERING GRAPHICS LAB

Hours per week: 3 Cont. Evaluation: 100 Marks
Credits: 2

Introduction to AutoCAD: Beginning a new drawing, exploring and interacting with the drawing window, saving and opening a file, coordinate systems, draw commands, modify commands, dimensioning and object properties.

Sections of solids: Introduction, section planes, sections and true shape of a section. Sections and sectional views of solids- prism, pyramid, cylinder and cone.

Developments of surfaces: Introduction, Developments of lateral surfaces of right solids- cube, prisms, cylinders, pyramids and cones.

Intersection of Surfaces: Introduction, line of intersection, different methods, intersection of two prisms, intersection of two cylinders, intersection of cylinder and prism, intersection of cone and cylinder, intersection of cone and prism, intersection of cone and cone.

Isometric projections: Introduction, isometric axes, lines and planes. Isometric scale, isometric view and projections of solids in simple position- prism, pyramid, cylinder, cone and sphere.

Text books:

1. Engineering Drawing by N.D. Bhatt and V. M .Panchal, Charotar publishing house Pvt. Ltd, 49th edition, 2008.
2. Engineering Graphics with AutoCAD 2011 by James D. Bethune, Prentice Hall of India 2010, 1st edition.

References:

1. Geometrical Drawing- A generalized approach by Arunvikram, Ch.Ratnam and P.Vasudevarao, IK International Pvt.Ltd., New Delhi.
2. A text book on Engineering Drawing" by K.L .Narayana and P. Kanniah (Scitec publications (India) Pvt. Ltd)

B.Tech. Four Year Degree
Mechanical Engineering- Third Semester
EURME301: ENGINEERING MECHANICS

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit – I

Resultant of Force systems: Basic Concepts : Introduction to Engineering Mechanics – Composition and Resolution of Forces , Moment of a Force, Couple, Principle of Transmissibility, Systems of forces., Varignon's theorem. Resultant of Force Systems: Concurrent and non concurrent coplanar force systems.

Equilibrium of Force systems: Free Body Diagram, Conditions for equilibrium of two force system and three force system. Lami's Theorem - Equilibrium equations Equilibrium of Force systems: Concurrent and non concurrent coplanar force systems

Unit – II

Friction: Nature of Friction, Laws of Dry Friction, Coefficient of Friction, Angle of Friction, Static Friction, Dynamic Friction and Rolling Friction, Equilibrium of coplanar force systems involving frictional forces, Wedge friction.

Analysis of Structures: Introduction, Trusses: Assumptions in analysis of plane truss, Relation between number of members and joints, Free body diagram. Analysis of Trusses: Method of Joints and Method of Sections.

Unit- III

Properties of Surfaces and Solids: First moment of area and the Centroid of sections, Centroid of Composite Areas, Centre of Gravity of a Body, Centre of Gravity of Composite Bodies – Moment of Inertia and Product of Inertia of Plane Areas by Integration – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia - Mass moment of inertia – Derivation of mass moment of inertia for Masses like Disc, Cylinder, Sphere and Thin Rod.

Unit - IV

Virtual Work: Introduction- Work done by a force, Work done by a couple, Virtual Displacement, Principle of Virtual work, Analysis using principal of virtual work.

Kinematics of Particle and Rigid Body: Introduction to Translation, Rotation and Plane Motion of a rigid body. Kinematics of Particles in Rectilinear motion - Motion with Constant Acceleration and Variable Acceleration, Motion under Gravity. Kinematics of Particles in Curvilinear motion - Using Rectangular Coordinates, Normal and Tangential Coordinates. Kinematics of Rigid body in Rotation with

respect to fixed axis - Angular Motion of Rigid Body with Constant Angular Acceleration and Variable Angular Acceleration, Kinematics of Rigid body with Plane Motion: Plane Motion of Rigid Body. Instantaneous centre method.

Unit – V

Kinetics: Force, Mass and Acceleration - D'Alemberts Principle: Introduction, Newton's Laws of Motion, Introduction to D'Alembert's principle : Equations of Motion of a body in Rectilinear and Curvilinear Motion, Motion of Mass centre of a System of Particles, Equations of Motion of a Rigid Body in Rotation and Plane Motion.

Kinetics: Work Energy Principle , Impulse Momentum Principle : Work Done by a System of Forces, Work done by a Varying force, Energy, Potential Energy, Kinetic Energy of a Particle, Kinetic Energy of a Rigid Body in Rotation and in Plane Motion, Work and Energy Principle, Law of Conservation of Energy. Linear Impulse, Linear Momentum, Principle of Linear Impulse and Linear Momentum, Problems using work energy Principle and Impulse momentum Principle.

Text Books:

1. Engineering Mechanics by S. Timoshenko and D.H.Young, McGraw-Hill International Edition – SI Version.

References:

1. Engineering Mechanics – Statics and Dynamics by Ferdinand L. Singer, Harper International Edition
2. Engineering Mechanics – Statics and Dynamics by Irving Shames, Prentice Hall of India

B.Tech. Four Year Degree
Mechanical Engineering- Third Semester
EURME302/EURIE303/EIRME301: MANUFACTURING TECHNOLOGY – I

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Foundry: Fundamentals: Introduction to Casting Process, Process Steps, Advantages, Applications, Pattern Materials, Pattern Types and Pattern Allowances, Color Coding. Moulding Materials, Basic Ingredients, Additives, Importance of Constituents. Moulding Tools and Equipment – Sand Slinger, Jolting Machine, Squeezing Machine, Jolt Squeeze Machine.

Moulding & casting processes: Sand Moulding, Types – Green, Dry, Skin Dried, Loam Sands. CO_2 Moulding, Shell Moulding. Cores, types of Cores, Core making, Core Prints. Investment Casting, Centrifugal Casting, Die Casting–Gravity & Pressure die Casting (hot chamber, cold chamber)

Unit-II

Gating & Risering: Gating System, Elements of Gating System, Sprue Design, Aspiration Effect, Gating Ratio, Runner Design, Calculation of Gating System Dimensions for Simple Objects. Risering System - Riser Design, Calculations of Riser Dimensions, Design Considerations in Casting.

Melting & Casting: Melting Furnaces – Crucible Furnace, Cupola, Charge Calculations, arc Furnace and Induction Furnace. Solidification of Castings, Casting Defects,remedies

Unit-III

Joining : Fundamentals: Classification of Welding Processes, Types of Welds, Types of Joints, Welding Positions, Edge Preparation, Welding Related Terminology.

Arc Welding: Equipment, Electrodes, Electrode Coatings, Principle of Arc, Mode of Metal Transfer, V-I Characteristics of Power Source, Shielded Metal arc Welding, Submerged arc Welding, Plasma arc Welding, Tungsten Inert Gas (TIG) Welding, Metal Inert Gas (MIG) welding.

Unit-IV

Gas Welding: Equipment, Oxy – Acetylene Flame, Types, Gas Welding Procedure, Oxygen – Hydrogen Welding, Gas Cutting

Resistance Welding: Principle, Spot Welding, Seam Welding, Projection Welding, Flash Butt Welding.

Other Welding Process: Friction Welding, Laser Beam Welding, Thermit Welding.

Brazing, Braze Welding, Soldering, Adhesive Bonding, Weld Defects. , remedies
Forming: Fundamentals, Introduction to Metal Working Process, Hot Working, and Cold Working.

Unit-V

Extrusion & Rolling: Rolling Fundamentals, Analysis of Rolling Process, calculations of Roll separating force, Neutral Plane, Rolling Stand Arrangements, Rolling Passes

Drawing: Extrusion Fundamentals, Classification of Extrusion, Wire Drawing, Tube Drawing, Impact Extrusion, Hydrostatic Extrusion.

Forging: Fundamentals, Forging, Die Forging, Roll Forging, Press Forging, Upset Forging

Sheet Metal working: Principles of Sheet Metal Working – Spring Back & Shearing. Types of Dies: Drawing, Bending, Punching, Blanking, Spinning, Coining, Embossing.

Text books:

1. Manufacturing Technology, P.N.Rao, 3rd Edition, Tata McGraw Hill, 2008
2. Manufacturing Science, A.Ghosh and A.K.Mallik, 2nd Edition, East-West Press

References:

1. Principles of Metal Casting, Phillip Rosenthal, 2nd Edition, Tata McGraw Hill, 2004
2. Welding & welding Technology, Richard Little, 1st edition, Tata McGraw Hill, 2004
3. Production Technology, K.L.Narayana, S.V.Ramana & P.Vamsi Krishna , 2nd Edition, I.K. Books International
4. Principles of Foundry Technology, P.L.Jain, 5th Edition, Tata McGraw Hill, 2009
5. Tool design ,Cryll Donalsun,George H lecon,V.C.Gold .3rd edition Tata McGraw Hill

B.Tech. Four Year Degree
Mechanical Engineering- Third Semester
EURME303/EIRME 303: APPLIED THERMODYNAMICS – I

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Basic Concepts of thermodynamics- Thermodynamic Systems, Equation of State- Universal Gas Constant. Thermodynamic Systems, Micro & Macro Systems- Homogeneous and Heterogeneous Systems - Concept of Continuum- Pure Substance - Thermodynamic Equilibrium, State Property, Path, Process- Reversible and Irreversible Cycles. Specific heats at Constant Volume and Pressure. Energy as a Property of the Systems- Energy in state and Transition, Work, Heat, Point Function, Path Function.

First law of Thermodynamics: Joule's Experiments- First law of Thermodynamics- Corollaries- First law of Thermodynamics Applied to Various Non-Flow Processes- Properties of end States- Heat Transfer and Work Transfer- Change in Internal Energy. Systems Undergoing Change of State and a Cycle. Throttling and free Expansion. Steady Flow Energy Equation - First law Applied to Steady Flow Processes. First law Applied to Isolated Systems - Limitations of First law of Thermodynamics. Analysis of Flow and Non-Flow systems using First law of Thermodynamics.

Unit-II

Second law of Thermodynamics- Kelvin Plank Statement and Clausius Statement and their Equivalence, Corollaries- Perpetual Motion Machines of first kind and second kind- Reversibility and Irreversibility- Cause of Irreversibility- Carnot Cycle- Heat engine and Heat pump- Carnot Efficiency- Clausius Theorem- Clausius Inequality- Concept of Entropy- Principles of Increase of Entropy- Entropy and Disorder. Analysis of systems with entropy change

Availability and irreversibility- Energy and Available Energy. Expression for Availability and Irreversibility,. Helmholtz Function and Gibbs Function- Availability in Steady Flow- and Non-Flow Processes. Irreversibility and Change of Entropy.

Unit-III

Properties of Steam and use of Steam Tables- Properties of pure substance. Use of T-S and H-S Diagrams. Analysis of Various Thermodynamic Processes under gone by Steam. Measurement of Dryness Fraction.

Vapor Power Cycles: Vapor Power Cycle-Rankine Cycle- Thermodynamic Variables Effecting Efficiency and output of Rankine Cycle- Improvements of

Efficiency. Analysis of Rankine Cycle, Theory Related to Reheat cycle- Regenerative Cycle.

Unit-IV

I.C. engines: Classification, Comparison of two Stroke and Four Stroke Engines, Comparison of SI and CI Engines. Valve Timing and Port Timing Diagrams. Air Standard Cycles- Otto, Diesel, Dual and their Analysis. Air Standard Efficiency.

Unit-V

Reciprocating and Rotary Compressors: Reciprocating Compressors, Effect of Clearance in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter- Cooling and Pressure Drop in Multistage Compressors. – analysis of Reciprocating Compressors. Basic concepts of Rotary compressors - Roots blower, Vane type Blower, Centrifugal Compressor - Axial Flow Compressors.

Text Books:

1. Engineering Thermodynamics by P. K. Nag, Tata McGraw-Hill Publications company.
2. Thermal Engineering, by M.L.Mathur and F.S.Mehta, Jain Brothers.

References:

1. Thermal Engineering by P.L.Ballaney Khanna Publishers.
2. Thermodynamics, by Spolding and Cole.
3. Thermal Engineering by R.K. Rajput, S.Chand & Co.
4. Introduction to thermodynamics – J.B.Jones and G.A.Hawkins-John wiley &sons
5. Thermodynamics-Van wylen and Sunntagg

B.Tech. Four Year Degree
Mechanical Engineering-Third Semester
EURME304: MATERIAL SCIENCE

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Crystallography: Classification of solids – Amorphous and Crystalline solids. Space Lattice and unit Cells, Crystal Systems. Indices for Planes and Directions. Structures of Common Metallic Materials.

Constitution of Alloys: Necessity of Alloying, Types of Solid Solutions, Hume-Rothery's Rules, Intermediate Alloy Phases and Electron Compounds.

Binary phase diagrams: Gibbs Phase Rule. Lever Rule. Principles of Construction and Interpretation of Binary Phase Diagrams. Invariant Reactions. Uses and Limitations of Phase Diagrams. Allotropy of iron. Iron-Iron Carbide Phase Diagram.

Unit-II

Heat Treatment of Steels: Introduction and purpose of heat treatment, Isothermal Transformations Curves. Annealing, Normalizing, Hardening, Tempering, Austempering and Martempering of steels. Surface Hardening of Steels- Carburizing, Nitriding, Cyaniding, Flame and Induction Hardening Methods.

Unit-III

Ferrous alloys: Properties, applications and limitations of Plain carbon Steels, alloy steels-Hadfield manganese steels, stainless steels and tool steels. Cast irons- White CI, Malleable CI, Grey CI, SG CI and alloy cast irons.

Non-ferrous alloys: Properties and applications of Copper, Aluminium, Nickel and Titanium alloys.

Unit-IV

Non destructive testing methods: Dye penetrant test, Ultrasonic test, Radiography, Magnetic particle testing and Eddy current testing.

Powder metallurgy: Manufacture of metal powders, procedure of fabrication of powder metallurgy product, industrial applications of powder metallurgy, advantages and limitations of powder metallurgy

Unit-V

Nanomaterials : Definition, classification and applications of nanomaterials.

Composite Materials: Classification based on matrix, classification based on reinforcement, Types of Matrices and Reinforcements. Examples and Applications.

Methods of Fabrication of CMCs, MMCs, and PMCs

Text Books:

1. Physical Metallurgy by S.H.Avner, Tata McGraw-Hill Second edition 1997.
2. Callister's Materials Science and Engineering, Adapted by R. Balasubramaniam, Wiley India Edition, 2007.
3. Testing of Metallic Materials by A.V.K. Suryanarayana, B.S. Publications, 1st Edition, 2007.

Reference Books:

1. Materials Science and Engineering by V.Raghavan, Prentice Hall of India, Fifth edition.
2. Nano the Essentials by T. Pradeep, McGraw-Hill Professional, 2007.
3. Material Science and Engineering by L.H.Van Vlack, 5th edition, Addision Wealey(1985)
4. Structure and properties of Materials by R.M.Rose, L.A.Shepard and J.Wulff, Vol.1 to 4 John Willey (1966).
5. Essentials of Material Science by A.G.Guy, McGraw-Hill(1976).
6. The Science and Engineering Materials by D.R.Askeland. 2nd Edition, Chapman and Hall.
7. Text book of Nanoscience and Nanotechnology- BS Murty, P Shankar, Baldev Raj, BB Rath and James Murday, University Press-IIM, Metallurgy and Materials Science, 2012

B.Tech. Four Year Degree
Mechanical Engineering-Third Semester
EURME305/EIRME305: FLUID MECHANICS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Properties of fluids- Viscosity- Pressure Measurement and Manometers- Basic Principles of Hydrostatic Forces on Surfaces, Buoyancy, Meta centre. Fluid Kinematics - Classification of Flows - Stream line- Stream Tube- Stream Function- Potential Function. Fluid Dynamics - Conservation of Mass- Equation of Continuity, Conservation of Momentum- Euler's Equation, Conservation of Energy- Bernoulli's Equation and its Applications- Vortex Motion- Free and Forced Vortices- Basic Solutions of Ideal Fluid Flows- Flow Net Analysis.

Unit-II

One Dimensional Viscous Flow: Flow Through Pipes- Hagen Poiseulle Flow- Fanning's Friction Factor- Darcy's Weisbach Friction Factor- Loss of Head Due to Friction in Pipes- Flow Through Branched Pipes, Momentum Equation- Forces Due to Pipe Bends, Sudden Enlargement, Sudden Contraction, Flow Through Porous Media- Darcy's Equation. Two Dimensional Viscous Flow: Navier -Stokes Equations and Solutions.

Unit-III

Boundary Layer theory

Laminar Boundary Layer: Momentum Integral Equation- Flow over a Flat Plate- Displacement Thickness, Momentum Thickness and Energy Thickness.

Turbulent Boundary Layer: Laminar- Turbulent Transition- Momentum Equations and Reynold's Stresses- Fully Developed Turbulent Flow Through a Pipe. Analysis of boundary layer – laminar boundary layer - Turbulent Boundary Layer on a Flat Plate- Laminar Sub-Layer. Boundary Layer Separation and Control.

Unit-IV

Dimensional Analysis and Modeling Similitude: Fundamental and Derived Dimensions- Rayleigh Method- Buckingham π Theorem - Dimensionless Groups. Application of dimensional analysis to various systems. Model Testing and Similitude- Types of Similarity- Geometric, Kinematic and Dynamic Similarities – model testing methods.

Unit-V

Compressible Fluid Flow: Thermodynamic Relations- Continuity, Momentum and Energy Equations- Velocity of Sound in a Compressible Fluid- Mach number and its Significance- Propagation of Pressure Waves in a Compressible Fluids. Stagnation properties- Stagnation Pressure, Temperature and Density- relations for stagnation properties. Compressible Flow Through a Venturi meter and orifice meter- Pitot Static Tube in a Compressible Flow.

Text Books:

1. Fluid Mechanics by A.K.Mohanty, Prentice Hall of India Pvt. Ltd.
2. Fluid Mechanics by Douglas and swasfield , Pearson Asia

References:

1. Fluid Mechanics and Hydraulic Machines, by R.K.Bansal, Laxmi publications.
2. Hydraulics and Fluid Mechanics by Modi and Seth, Standard book house
3. Foundations of Fluid Mechanics, by Yuan, Prentice Hall of India.
4. Fluid Mechanics and its Applications, by S.K.Gupta and A.K.Gupta, Tata McGraw Hill, New Delhi.
5. Fluid Mechanics- S.Nagaratnam-Khanna Publishers.
6. Fluid Mechanics and Hydraulic Machines-P.K.Nag.

B.Tech. Four Year Degree
Mechanical Engineering-Third Semester
EURME306: ENVIRONMENTAL STUDIES

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

The objective of the syllabus is to provide knowledge in the basic concepts of the Environmental Studies in Engineering subjects.

Unit – I

Multidisciplinary nature of environmental studies & Natural Resources: Definition, scope and importance, need for public awareness. Natural Resources: Renewable and non-renewable resources, natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over – utilization of surface and ground water, floods, drought, conflicts over water, dams- benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit - II

Ecosystems and Biodiversity and its conservation: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:- Forest ecosystem. Grassland ecosystem. Desert ecosystem. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity and its conservation Introduction – Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values. Biodiversity at global, National and local levels. India as a mega – diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In – situ and Ex-situ conservation of biodiversity.

Unit – III

Environmental Pollution: Definition, causes, effects and control measures of :- Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes, Effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Diaster Management: floods, earthquake, cyclone and landslides.

Unit – IV

Social Issues and the Environment: From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: its problems and concerns. Case Studies, Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products.

Unit - V

Human Populations and the Environment and Environment Production Act and Field Work: Population growth, variation among nations. Population explosion – Family Welfare programme. Environment and human health. Human rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Field Work: Visit to local area to document environmental assets river / forest / grassland / hill / mountain. Visit to local polluted site – Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

Text Book:

1. Text book of environmental studies for undergraduates courses by Each Bharuchs, published by – University Grants Commission, Universities Press, India.

2. Text book of environmental studies for undergraduates courses by Benny Joseph. published by Tata Mc Graw Hill Publishing company limited.

3. Text book of environmental studies by Kaushik & Kaushik.

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publishing Ltd., Bikaner.
2. Brunner R.C., 1989, Hazardous Waste Incineration, Mc Graw Hill Inc.480p.

B.Tech. Four Year Degree
Mechanical Engineering-Third Semester
EURME311: COMPUTER AIDED MACHINE DRAWING LAB

Hours per week: 3 Cont. Evaluation: 100 Marks
Credits: 2

Screw threads: Definitions, V-Threads, Square Thread, Conventional Representation of Threads, Right Hand and Left Hand Threads.

Screw fastenings: Introduction, Hexagonal Nut, Square Nut, Flanged Nut, Dome Nut, Ring Nut, Washer, Types of Bolts, Lock Nut, Castle Nut, Eye Foundation Bolt, Rag Bolt Lewis Bolt and Spanner.

Keys and Cotter Joints: Introduction, Taper Key, Sunk Taper Key, Round Key, Saddle Key, Feather Key, Splined Shaft, Woodruff Key, Socket and Spigot Joint, Knuckle Joint.

Shaft Couplings: Box and Split Muff Coupling, Flanged, Universal and Oldham's Coupling.

Shaft Bearings: Solid Bearing, Bushed Bearing, Foot Step Bearing and Pedestal Bearing.

Assembly Drawings: Stuffing Box of Steam Engine, Eccentric of Steam Engine, Connecting Rod of an IC Engine, Screw Jack, Swivel Bearing, Tool Post of Lathe Machine.

Note: 1) The above Mechanical Components can be Drawn using Mechanical Drafting packages like AutoCAD/MDT/CATIA.
2) Drawings as per IS.
3) All Drawings are in 2-D in which one chapter should be drawn in 3-D.
4) Few Assemblies may be drawn manually

Text Books:

1. Machine Drawing by N.D.Bhatt, V.M.Panchal, 42nd edition, Charotar Publishing House.
2. Machine Drawing by R.K Dhawan 2nd edition, S.Chand and Co Ltd., New Delhi.

References:

1. Machine Drawing by K.L.Narayan, P.Kannaiah and K.Venkata Reddy, 2nd edition, New Age publications 2003.
2. Engineering Graphics with AutoCAD 2002 by James D Bethune, First Indian edition, Pearson Education 2003.

B.Tech. Four Year Degree
Mechanical Engineering-Third Semester
EURME312: MANUFACTURING TECHNOLOGY – I LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

List of experiments:

Molding Practice:

1. Preparation of a green sand mould using Single piece pattern.
2. Preparation of a green sand mould using Split Piece Pattern with Core.
3. Preparation of a green sand mould using Connecting rod pattern.

Sand testing:

4. Determination of Average Grain Size for sand sample using sieve shaker.
5. Estimation of a) Clay content and
   b) Moisture content in a given sand sample.
6. Determination of Permeability of the given moulding sand specimen.
8. Determination of a) Compression strength and
   b) Shear strength of a given sand specimen.

Welding practice:

9. Preparation of a Butt joint using electric arc welding.
10. Preparation of a Lap joint using arc welding.
11. Preparation of a T- joint using arc welding.

B.Tech. Four Year Degree
Mechanical Engineering-Third Semester
EURME313: MECHANICAL ENGINEERING - I LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

Cycle – I

1. Study of variation of Kinematic viscosity of Newtonian fluid using Redwood viscometer.
2. Study of variation of Kinematic viscosity of Non-Newtonian Fluid using 'Brooke field viscometer'
3. Valve & Port timing diagram of I.C. Engines
4. Determine the flash point & Fire point of given sample
5. Determination of Moment of inertia of reciprocating parts of I.C. engine
6. Determination of Cloud & Pour point of given oil sample

Cycle – II

7. Determination of Boiling and Freezing point of water
8. Determination of Calorific value of solid& Liquid fuels using Bomb calorimeter
9. Determination of Calorific value of gaseous fuel using Junkers Gas Calorimeter
10. Determination of Oxidation stability of given oil sample
11. Determination of Corrosion preventive properties of a given oil sample using copper strip corrosion test
12. Determination of Cetane number of fuel sample

B.Tech. Four Year Degree
Mechanical Engineering-Third Semester
EURME314: INDUSTRIAL TOUR

Hours per week: 7-10 Days Cont. Evaluation: NA
Credits: NA

The student will visit core Industries like Steel Plant, BHPV, BHEL, and Hindustan Shipyard, etc or related Research / Software Establishments.

The Industries to be visited should be from the Approved list by the Department / TPC.

At least 4 Industries are to be visited by the student

The duration of the Industrial tour would be week to ten days.

The tour will be organized by the Department in the break between two Semesters of their second year of study.

Each student will have to submit an individual report on the tour for assessment within ten days of return from the tour.

Grade will be Awarded (for 1 credit) to the student based on the student's report and Viva-Voce Examination to be conducted by the Department by appointing examiners like Laboratory examination.

The amount of Tour expenditure is restricted as per College rules.

Staff member(s) will accompany students for the entire tour. College will Reimburse the Tour-expenses to the staff member(s) as per the College rules.

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME401/EURIE403: NUMERICAL METHODS IN ENGINEERING

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Modeling, Computers, and Error Analysis: Mathematical Modeling and Engineering Problem Solving, Approximations and Round-Off Errors, Truncation Errors and the Taylor Series. **Roots of Equations**: Bracketing Methods – Bisection Method, False Position Method; Open Methods – Fixed Point Iteration, Newton-Raphson Method, Secant Method; Applications.

Unit-II

Linear Algebraic Equations: Gauss Elimination – Solving Small Numbers of Equations, Gauss-Jordan; LU Decomposition and Matrix Inversion, Special Matrices and Gauss-Seidel, Applications. **Curve Fitting**: Interpolation – Newton's and Lagrange interpolation polynomials, Applications.

Unit-III

Numerical Differentiation and Integration: Newton-Cotes Integration Formulas – Trapezoidal Rule, Simpson's Rules, Integration with Unequal Segments, Open Integration Formulas, Multiple Integrals; Integration of Equations - Gauss Quadrature; Numerical Differentiation – High Accuracy Differentiation Formulas, Richardson Extrapolation, Derivatives of Unequally spaced Data; Applications.

Unit-IV

Ordinary Differential Equations: Runge-Kutta Methods – Euler's Method, Improvement of Euler's Method, Runge-Kutta Methods, Systems of Equations; Boundary-Value and Eigen value Problems, Applications.

Unit-V

Partial Differential Equations: Finite Difference: Elliptic Equations – The Laplace Equation, Solution Techniques, Boundary Conditions, The Control Volume Approach; Finite Difference: Parabolic Equations – The Heat Conduction Equation, Explicit Methods, Simple Implicit Method, The Crank-Nicolson Method; Applications.

Text Book:

1. Numerical Methods for Engineers, S. C. Chapra and R. P. Canale, Tata McGraw-Hill Company Ltd.

References:

1. Applied Numerical Methods with MATLAB for Engineers and Scientists, S. C. Chapra, McGraw-Hill Company Ltd.
2. Applied Numerical Methods for Digital Computation, M. L. James, G. M. Smith, J. C. Wolford, Harper & Row Publishers.

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME402/ EIRME402: MANUFACTURING TECHNOLOGY – II

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Mechanics of Metal Cutting: Terms and Definitions, Chip Formations, Forces Acting on the Cutting Tools and their Measurement, Chip Thickness, Theory of Ernest and Merchant, Theory of Lee and Shaffer, Friction and Temperature in Metal Cutting, Measurement of Temperature on Tool Rake Face- Techniques, Nomenclatures of Cutting Tools, Tool Designation Systems-ASA, ORS, Tool Angles, Tool Materials, Tool life - Taylor's Equation, Mechanism of Tool Wear, Machinability, Cutting Fluids.

Unit-II

Machine Tools using Single Point Tools: Lathes Types-Specifications, Lathe Accessories and Attachments, Different Operations, Boring Machines- Types, Jig-Boring, Shaper- Mechanisms, Operations, Planar Mechanisms, Operations, Speeds, Feeds, Calculation of Metal Removal, Economics of Single Point Cutting Tool.

Unit-III

Machine Tools using Multi Point Tools: Drilling Machine, Drill Press -Types, Operations, Milling Machines; Vertical and Horizontal Attachments, Indexing-Methods, Operations, Broaching Machine, Specifications, Operations, Calculation of Metal Removal, Production of Gears- Methods.

Unit-IV

Abrasive Machining: Abrasive wheels- Manufacturing, Specifications, Grinding Machines- Classification, Precision Grinding Processes- Polishing, Buffing, Honing, and Lapping.

Unit-V

Non Conventional Machining Processes-USM - Ultra Sonic Machining, AJM - Abrasive Jet Machining, EDM - Electric Discharge Machining, EBM -Electron Beam Machining, CHM - Chemical Machining, ECM - Electro Chemical Machining, LBM - Laser Beam Machining - Applications, Advantages, Limitations.

Text books:

1. A Course in Workshop Technology (Vol. II), B.S. Raghuwanshi, Dhanpat Rai & Co (p) Ltd
2. A Text book of Production Technology, P.C.Sharma, 9th Ed., S.Chand & Company Ltd, 2008.

References:

1. Work Shop Technology by W.A.J Chapman, 1st edition, Taylor & Francis publisher, 1972
2. Metal Cutting Theory & Practice, A.Bhattacharya, New Central book Agency
3. Manufacturing Science, A.Ghosh and A.K.Mallik, 2nd Edition, East-West Press
4. Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R.4th ed., Pearson Education, 2001
5. Manufacturing Technology(Vol-2), P.N.Rao, 2rd Edition, Tata McGraw Hill, 2001.

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME403: APPLIED THERMODYNAMICS – II

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Testing and Performances of I.C. Engines: Methods of testing IC Engines- Parameters related to testing and performance of IC Engines. Combustion in IC Engines - Normal Combustion - stages of Combustion- Delay Period and its Importance- Importance of Flame Speed - Effect of Engine Variables. Abnormal Combustion- Types of Abnormal Combustion Pre-ignition and Knock. Diesel Knock, Fuel Requirements and Fuel Rating, Anti-Knock Additives.

Unit-II

Nozzles: Type of Nozzles- Air and Steam nozzles. Compressible Flow Through Nozzles- Relationship Between Area Velocity and Pressure in Nozzle Flow - Condition for Maximum Discharge- Nozzle Efficiency. Super Saturated Flow of steam in Nozzles. Diffusers and Steam Injectors.

Unit-III

Steam Turbines: Classification of Steam Turbines- Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams in Impulse and Reaction Turbines- Degree of Reaction- Condition for Maximum Efficiency of Impulse & Reaction Turbines- Effect of Friction on Turbines, Constructional Features and Governing of Turbines.

Unit-IV

Gas Turbines: Simple Gas Turbine Plant- Ideal Cycle, Closed Cycle and Open Cycle for Gas Turbines, Constant pressure cycle, constant volume cycle, Efficiency, Work Ratio and Optimum Pressure Ratio for simple Gas Turbine Cycle. Parameters of Performance- Actual Cycle, Regeneration, Inter-Cooling and Reheating, Closed and Semi-Closed Cycle.

Unit-V

Refrigeration: Bell Coleman Cycle, Vapor Compression Cycle – Effect of Suction and Condensing Temperature on Cycle Performance. Properties of Common Refrigerants,

Principles of Psychrometry and Air Conditioning – Psychrometric Terms, Psychrometric Process, Air Conditioning Systems. Basic Concepts of Cooling load Calculations.

Text Books:

1. Thermal Engineering, by M.L.Mathur and F.S.Mehta, Jain Brothers.
2. Treatise on heat engineering by P.Vasandani and D.S.Kumar, Metropolitan Co.Pvt.Ltd.

References:

1. Thermal Engineering, by R.K.Rajput., Laxmi Publications
2. Thermal Engineering by P.L.Ballaney
3. I.C.Engines, by Mathur and Mehta
4. Gas Turbines, by Cohen , Rogers and Sarvana Mutto, Addison Wesley – Long Man
5. I.C. Engines by V. Ganesan.
6. Refrigeration and Air- conditioning by C.P.Arora., Tata McGraw hill.

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME404: MECHANICS OF SOLIDS-I

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Simple Stresses and Strains: Classification of Loads, Stress, Strain, Stress and Elongation produced in a Bar due to its self weight, Tie Bar of uniform strength, Stress in a Bar due to Rotation, Elongation in case of a Taper Rod, Poisson's Ratio, Relation Between the Elastic Modulii, Stresses Induced in Compound Bars, Thermal Stress and Strain, Hoop Stress-Problems.

Unit-II

Shear Force and Bending Moment: Basic Definitions, Classification of Beams, Types of Loads, Types of Supports, S.F. and B.M. Diagrams for Cantilever, Simply Supported and Overhanging Beams for different types of Loadings, The Point of Contraflexure, General Relation between the Load, The Shearing Force and the Bending Moment-Problems.

Bending and Shear Stresses in Beams: Theory of Simple Bending (Bending equation/ Flexural Formula), Position of Neutral Axis, Section Modulus, Practical Application of Bending Equation, Shear Stresses in Beams, Variation of Shear Stress Distribution for Rectangular, Circular and I-Sections-Problems.

Unit-III

Deflection of Beams: Beam Deflection, Relation between Slope, Deflection and Radius of Curvature, Slope and Deflection at a Section, Double Integration Method, Macaulay's Method and Moment Area Method for Cantilever, Simply Supported and fixed Beams-Problems.

Energy methods: Principle of virtual work, Unit load method for calculating displacement, and Strain energy method for uniaxial stress, pure bending and shearing stresses.

Unit-IV

Complex and Principal Stresses: Introduction, Stresses on an oblique plane under Uniaxial loading, Stresses on an oblique plane under Biaxial loading, Complementary Shear Stress, Simple Shear, Pure Shear, Biaxial stresses combined with Shear stresses, Principal stresses and principal planes, Mohr's circle for Complex stresses.

Unit-V

Torsion of Circular Shafts: Shafts, Torsion of Shafts, Torsion equation, Hollow Circular Shafts, Torsional Rigidity, Power Transmitted by the Shaft, Importance of Angle of Twist and Shear Stresses in Shafts, Shafts in Series, Shafts in Parallel, comparison of Solid and Hollow Shafts, Combined Bending and Torsion.

Text Books:

1. Strength of Materials by Sadhu Singh, Khanna Publishers, New Delhi.
2. Mechanics of Materials by F.P.Beer, E.R. Johnston, Jr & John.T.. Dewolf, 3rd edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

References:

1. Strength of Materials by Timoshenko, Part-I & II , 3rd edition, CBS Publishers & Distributors, New Delhi.
2. Mechanics of Solids by Popov, 2nd Edition, Pearson Education, 2003, New Delhi.
3. Strength of Materials by R.K.Rajput, First multi colour Revised Edition 2006, S.Chand & Company Limited, New Delhi.
4. Mechanics of solids by Crandal, Dahl and Lardner.
5. Strength of materials by SS Rattan, Tata McGraw-Hill, 2nd edition, 2011.

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME405/EURIE306: ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I

D.C circuits: KCL&KVL, Super position theorem. **A.C. Circuits:** Introduction of Steady State Analysis of series A.C. Circuits, Single and balanced 3-phase Circuits. Star to delta, delta to star conversions.

Unit-II

D.C. Machines: Types of Induced E.M.Fs, Self Inductance, Mutual Inductance. Principle of operation Generator and Motor. Types of D.C.Generators and D.C. Motors. E.M.F Equation of D.C Generator, Torque Equation of D.C. Motor. Swinburne's test, load test on DC shunt motor and DC series motor.

Unit-III

Transformers: Transformer working principle, EMF equation of transformer, Transformer on load, Equivalent circuit of transformer, Voltage regulation of transformer, Losses in a transformer, Calculation of efficiency and regulation by open circuit and short circuit tests.

Unit-IV

Three phase induction motor: Construction ,types, Principle of operation, Power flow diagram, Torque, T-S characteristics, Maximum Torque , Power stages ,Losses and efficiency, load test.

Unit-V

Introduction to Electronics and Microprocessors: Semiconductor diode, Zenor diode, Transistor, Rectifiers and SCR (Elementary treatment only). Fundamentals of digital electronics, Number system and codes, Logic gates, Boolean algebra, Arithmetic-logic units, The Intel-8085 microprocessor; Architecture, Instruction set, Addressing modes.

Text Books:

1. Principles of Electrical Engineering & Electronics, V.K.Mehta (S.Chand & Company LTD) first edition 1996.
2. Degital logic & Computer Design , M.Morris Mano (Prontice, Hall of India Pvt Ltd)
3. Micro Processor Architecture of Applications with 8085/8080A, Goankan. (H.S.Poplaj, Wiley Eastern Ltd)

References:

1. A First Course in Electrical Engineering by D.P.Kothari.
2. Engineering Electronics by Ryder-McGraw Hill.
3. Micro Processors by Leventhal.

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME406/EIRME406: HYDRAULIC MACHINES & SYSTEMS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I:

Impact of jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved waves, jet striking centrally and at tip – velocity triangles at inlet and outlet – expressions for work done and efficiency – angular momentum principle.

Unit-II:

Hydraulic Turbines: Classification of turbines- Pelton wheel- Reaction turbines- Inward and outward radial flow reaction turbines- Francis turbine- Axial flow reaction turbine- Kaplan turbine- Draft tube- Types- Theory- and efficiency of draft tube. **Performance of Turbines**: Specific Speed: Determination- Significance- Unit quantities- Unit speed- Unit discharge and unit power- Characteristic curves of hydraulic turbines- Constant head curves- Constant speed curves and Iso-efficiency curves- Governing of turbines.

Unit-III:

Centrifugal Pumps: Main parts- Efficiency- Minimum speed for starting- Multi-stage centrifugal pumps- Specific speed of a centrifugal pump- Priming of a centrifugal pump- Characteristic curves- Main, Operational and constant efficiency curves- Cavitation- Effects- Cavitations in Hydraulic machines.

Unit-IV:

Reciprocating Pumps: Main parts- Classification- Velocity and acceleration variation in suction and delivery pipes due to piston acceleration- Effect of variation of velocity on friction in suction and delivery pipes- Effect of acceleration in suction and delivery pipes on indicator diagram- Effect of friction- Maximum speed of reciprocating pump- Air vessels.

Unit-V:

Hydraulic Devices – Hydraulic press - Hydraulic accumulator- Differential hydraulic accumulator- Hydraulic intensifier- Hydraulic ram- Hydraulic lift- Hydraulic crane- Fluid coupling- Hydraulic torque converter. Introduction to open and closed loop systems, Hydraulic and Pneumatic systems.

Text Books:

1. Fluid Mechanics and Hydraulic Machinery, R.K.Bansal, Laxmi publications.
2. Hydraulics and Fluid Mechanics by Modi and Seth, Standard book House

References

1. Fluid Flow Machines, by N.S.Govinda Rao, Tata McGraw Hill pub. company Ltd.
2. Fluid Mechanics and Hydraulic Machines by K.R.Arora
3. Fluid Mechanics and Hydraulic Machines by R.K.Rajput
4. Elements of Hydraulic Machines & Fluidics by Jagadish Lal

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME411: ELECTRICAL ENGINEERING LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. Study and Calibration of Wattmeter and Energy Meter.
2. Measurement of Armature Resistance, Field Resistance and Filament Resistance.
3. Verification of KCL and KVL.
4. Superposition Theorem.
5. Parameters of choke coil
6. Load test on D.C. Shunt Motor.
7. Load test on D.C.
8. Swinburne's Test.series Motor.
9. O.C. Test on D.C. separately Excited DC Generator
10. Load test on single phase transformer.
11. OC and SC Tests on Transformer.
12. 3-Phase Induction Motor load Test.

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME412: FLUID MECHANICS AND MACHINERY LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. Calibration of Venturimeter / Orificemeter
2. Calibration of Mouthpiece / Small Orifice
3. Calibration of Triangular Notch (V - Notch)
4. Resistance characteristics of pipes – friction factor
5. Impact of a jet on a circular disc
6. Performance characteristics of centrifugal pump
7. Performance characteristics of reciprocating pump
8. Performance characteristics of Pelton Wheel turbine
9. Performance characteristics of Francis turbine
10. Pressure distribution and drag characteristics of a cylinder in a wind tunnel

B.Tech. Four Year Degree
Mechanical Engineering-Fourth Semester
EURME413: MECHANICAL ENGINEERING-II LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

Cycle - I

1. Conduct a load test on Research Engine with Petrol fuel and draw various performance curves.
2. Conduct a load test on Research Engine with petro- blends and draw various performance curves
3. Conduct Morse test on high-speed four-stroke multi cylinder S.I Engine (MARUTI Make) to determine F.P and Mechanical efficiency.
4. Conduct Heat Balance sheet on high-speed four-stroke multi cylinder MARUTI SUZUKI make S.I Engine at ½ and ¾ loads.
5. Conduct an experiment on two-stage reciprocating air compressor to determine various efficiencies.

Cycle - II

6. Conduct a load test on four stroke Variable Compression Engine S.I.Engine and draw various performance curves
7. Conduct a load test on Research Engine with Bio fuel and draw various performance curves
8. Conduct a load test on Research Engine with diesel and bio fuel blends and draw various performance curves
9. Conduct a load test on computerized single cylinder four stroke diesel Engine (Kirloskar make) and draw various performance curves
10. Conduct computerized single cylinder four stroke diesel Engine (Kirloskar make)
11. Conduct an experiment on vapor compression refrigerator to determine C.O.P
12. Study of Automotive Components

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME501/EIRME405: THEORY OF MACHINES – I

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Mechanisms and machines: Introduction, mechanism and machine, rigid and resistant bodies, link, kinematic pair, degrees of freedom, classification of kinematic pairs, kinematic chain, mechanism and structure, classifications of mechanisms, equivalent mechanisms, four bar mechanism, inversions of four bar mechanism, slider crank chain and double slider crank chain.

Lower pairs: Introduction, pantograph, straight line mechanism, automobile steering gears, engine indicators, types of steering gear, Hooke's joint, double Hooke's joint.

Unit-II

Velocity Analysis: Introduction, absolute and relative motions, motion of a link, angular velocity of links, velocity of rubbing, slider crank mechanism, crank and slotted lever mechanism, instantaneous center method, number of instantaneous centers, Kennedy's theorem, angular velocity by instantaneous center method, centroid.

Acceleration analysis: Acceleration of a link, four bar mechanism, angular acceleration of links, acceleration of intermediate and offset points, slider crank mechanism, and Coriolis acceleration component, crank and slotter lever mechanism.

Unit-III

Cams: Introduction, types of cams, types of followers, motion of the follower,- uniform velocity, SHM uniform acceleration and retardation, profile of cams, cams with specified contours – tangent cam with roller follower and Circular arc cam with Flat-Faced follower.

Unit-IV

Gears and Gear trains: Introduction and classification of gears, gear terminology, law of gearing, velocity of sliding, forms of teeth, cycloidal profiles, involute profiles, path of contact, arc of contact, numbers of pairs of teeth in contact, interference involute gears, minimum number of teeth, interference between rack and pinion, undercutting, helical and spiral gears, velocity ratios, and centre distance of helical gears, helical gear forces and efficiency, worm and worm gears, bevel gears. Simple gear trains, compound gear trains, reverted gear train, epicyclic gear train, analysis and torques in epicyclic gear trains, sun and planet gear, differential gear.

Unit-V

Computer aided analysis of mechanism: Introduction, Four bar mechanism, slider crank mechanism, coupler curves.

Graphical and computer aided synthesis of mechanisms: Pole, Relative pole, design of mechanisms by Relative pole method, Inversion method, design of mechanisms by Inversion method, computer aided synthesis of mechanisms.

Text Books:

1. Theory of machines- S.S.Rattan, Tata Mc Graw Hill Publications.

References:

1. Theory of Machines by Thomas Bevan, Pearson education publications
2. Theory of Machines by W.G.Green., Blackie publications
3. Theory of Machines by R.S. Khurmi & J.K.Gupta, S. Chand Publications
4. Theory of Machines by P.L.Ballaney, Khanna Publications
5. Design of Machinery by R.L.Norton, Mc Graw Hill Publications.

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME502: METROLOGY AND COMPUTER AIDED INSPECTION

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Linear Measuring Instruments: Vernier height gauge, Vernier depth gauge, Depth Micrometer, Dial Gauge, Slip Gauges.

Angular Measuring Instruments: Universal Bevel Protractor, Optical Bevel Protractor, Sinebar, Angle gauges, Precision level, Autocollimator, Angle Deckor.

Unit-II

Comparators:

Characteristics of comparators, Types of comparators- Mechanical, Pneumatic, Optical and Electrical. Advantages and disadvantages of comparators.

Straightness, Flatness and Roundness Measurement:

Introduction, monochromatic light, interference of light, conditions for interference of light waves. Flatness .General description of Optical Flats. Interferometry applied to flatness Testing. N.P.L. Flatness interferometer. Straightness Measurement, Roundness Measurement- Tool Maker's Microscope

Unit-III

Limits, Fits, Tolerances & Limit Gauges: ISO system of limits, fits, tolerances as per IS 919, Hole basis system, Shaft basis system, Interchangeability, Selective assembly, Plain limit gauges; Plug gauges, Ring gauges.

Unit-IV

Metrology of Screws & Gears: Metrology for screw threads, measurement of major diameter, minor diameter, effective diameter. Measurement of spur gear pitch, backlash, tooth thickness.

Miscellaneous Gauges: Radius gauges, Screw, pitch gauges, gauges for external threads. Feeler gauges.

Unit-V

Surface Texture: Stylus instruments for Surface roughness measurement.

Advanced Techniques in Measurements: Classification of automatic inspections systems, Co-ordinate Measuring Machine, non-contact inspection techniques, Machine Vision, LASER scanning systems

Text books:

1. A Text Book of Engineering Metrology, I.C. Gupta, 7th Edition, Dhanpat Rai & Co (p) Ltd.
2. Engineering Metrology, R.K.Jain, 20th edition, Khanna Publishers.

References:

1. A.S. T.M.E. Hand Book of Industrial Metrology, Prentice Hall of India
2. Technology of the metal Trade, HFeller Appold, New Age International Publishers
3. A Textbook of Metrology, M.Mahajan, Dhanpat Rai & Co (p) Ltd
4. CAD/CAM: Computer-Aided Design and Manufacturing, M.Groover and E. Zimmers, Pearson Education
5. Engineering Metrology And Instrumentation, R.K.Rajput, S.K.Kataria & Sons Publishers
6. CAD/CAM by M.P.Groover, Prentice Hall of India.

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME503: ENGINEERING ECONOMICS AND MANAGEMENT PRINCIPLES

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Economics: Utility, Value, Wealth, Consumption, Wants – Necessaries, Comforts and Luxuries.

Demand: Laws of Demand, Elasticity of Demand – Price Elasticity of Demand, Factors affecting Elasticity of Demand.

Unit-II

Forms of Business organization: Single Trader, Partnership and Public Limited Company.

Costing: Cost Concepts, Elements of Cost, Methods of Distribution of Overhead Costs. Unit Costing, Job Costing and Process Costing.

Unit-III

Break-Even Analysis: Assumptions, Break – Even Charts, Simple problems

Depreciation: Depreciation Methods.

Unit-IV

Accounts: Preparation of Profit and Loss account and Balance sheet (Outlines only).

Principles of Organization: Types of organization – Span of management – Authority, Delegation and Decentralization - Source of Formal Authority- Difference between Authority and Power – Line and Staff Authority.

Unit-V

Principles of Management: Importance of Management – Definition of Management – Management Process- Roles of a Manager- Management, a Science or Art- Management, a Profession – Functions of Management. Leadership – Difference between a leader and a Manager – Characteristics of Leadership – Functions of a Leader.

Text Books:

1. Engineering Economics, Vol – 1, Tara Chand, Nem Chand & Bros, 13th ed.
2. Industrial Engineering and Management by O.P.Khanna, Khanna publishers Ltd

References:

1. Engineering and Managerial Economics by Maheswari, Sultan chand& Co, 19th ed.
2. A Text book of Economic Theory by Dhingra and Garg, Sultan chand& sons, 2nd ed.
3. Cost accounts by Shukla and Grewal, S.Chand& company, 14th ed.
4. Principles and Practice of Management by L.M.Prasad, Sulltan Chand & Sons

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME504: MECHANICS OF SOLIDS-II

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Stress-strain in 3-Dimension: Analysis of Stress; Introduction, Body Force, Surface Force and Stress Vector, state of stress at a point, Principal Stresses, Mohr's Circles for the three-dimensional State of Stress, The Plane State of Stress, Differential Equations of Equilibrium, Equilibrium Equations for Plane Stress State, Boundary Conditions, Equations of Equilibrium in Cylindrical Coordinates.

Analysis of Strain; Deformation, Rectangular Strain Components, The State of Strain at a Point, Strain Components, Principal Axes of Strain and Principal Strains, Plane State of Strain, Plane strain in polar coordinates, compatibility conditions.

Stress–Strain Relations for linearly elastic solids: Introduction, Generalized Statement of Hooke's Law, Stress–Strain Relations for Isotropic Materials, Modulus of Rigidity, Bulk Modulus, Young's Modulus and Poisson's Ratio, Relations between the Elastic Constants, Displacement Equations of Equilibrium.

Unit-II

Columns and Struts: Columns with one end free and the other fixed, Both ends fixed, One end fixed and other hinged, Limitation of Euler's formula, Column with initial curvature, Column carrying eccentric load, Laterally loaded columns, Empirical formulae.

Unit-III

Thin Cylinders and Spherical Shells: Stresses and strains (principal stress, principal strain, shear stress, shear strain and volumetric strain) in thin cylinders, Thin spherical shell; Wire wound cylinders

Thick cylinders: Thick cylinders subjected to internal and external pressure and compound cylinders; different stresses induced, Lame's equation, stresses due to shrink fit.

Unit-IV

Bending of Curved Bars: Stresses in bars of circular, Rectangular and Trapezoidal sections.

Stresses due to rotation: Wheel rim, Disc of uniform thickness, Disc of uniform strength.

Unit-V

Torsion of generalised element section: Introduction, Torsion of General Prismatic Bars–Solid Sections, Torsion of Circular and Elliptical Bars, Torsion of Equilateral Triangular Bar, Torsion of Rectangular Bars, Membrane Analogy, Torsion of Thin-walled Tubes, Torsion of Thin-walled Multiple-Cell Closed Sections.

Text Books:

1. Advanced Strength of materials by LS Srinath, Tata McGraw-Hill
2. Strength of materials by Dr. Sadhu Singh, Kanna Publications
3. Elements of Strength of materials by SP Timoshenko and D.H. Young, East-West press Pvt. Ltd

References:

1. Analysis of Structures, Vol. 1, 1993 edition, by Vazirani and Ratwani.
2. Mechanics of solids by Crandal, Dahl and Lardner.
3. Mechanics of Materials by Beer and Johnson, McGraw-Hill

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME505: INSTRUMENTATION AND CONTROL SYSTEMS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction to Instrumentation – Process of measurement, Static performance characteristics, Dynamic performance characteristics, Transducer elements, Intermediate elements, Indicating and Recording of elements.

Motion measurement: Relative motion measurement, Absolute motion measurement andcalibration of motion measuring devices.

Unit-II

Force measurement: Study and calibration of hydraulic load cell, pneumatic load cell and elastic force devices.

Torque and power measurement: Transmission dynamometers,Driving type dynamometers, Absorption dynamometers.

Temperature measurement: Non-electrical methods, Electrical methods and Radiation methods.

Vibration measurement: Velocity & Acceleration measurement, Vibration transducers, Signal conditioning, display and recording of elements, Vibration-meters and analyzers.

Unit-III

Control systems: Introduction, Open loop and Closed loop systems, Feedback control and its effects. Transfer function, block diagrams and signal flow graph: Impulse response and transfer functions of linear systems.

Unit-IV

Mathematical modeling of physical systems: Equations of electrical networks, Modeling of mechanical system elements, Equation of mechanical systems. State-variable analysis of linear dynamic systems, Matrix representation of state equations, State transition matrix, State transition equation, Relationship between state equations and high-order differential equations, Relationship between state equations and transfer functions, Characteristic equation, Eigen values, and Eigen vectors.

Unit-V

Time-domain analysis of control systems: Typical test signals for the response of control systems, Time domain performance of control systems- stability of control

systems, stability characteristic equation and state transition Matrix, Methods of determining stability of linear control systems, Routh-Hurwitz criterion. Introduction to Frequency-domain analysis of control systems, Bode plots and Nyquist plots.

Text Books:

1. Mechanical Measurements by R.S. Sirohi, H.C. Radhakrishnan; New Age International Ltd.
2. Automatic Control systems by Benjamin.C. Kuo, FaridGolnaraghi; Prentice Hall.

References:

1. Feedback Control of Dynamic Systems by Gene F. Franklin, J. David Powell, Abbas Emami-Naeini; Pearson Education.
2. Experimental Methods for Engineers, by J.P.Holman, McGraw-Hill.
3. Instrumentation Design Studies by E. Doeblin.
4. Mechanical and Industrial Measurements by R.K.Jain; Khanna Publishers.
5. Instrumentation, Measurement & Analysis by B.C. Nakra, K.K. Chaudhry; Tata McGraw-Hill.
6. Control systems Engineering by I. J.Nagrath and M. Gopal; New Age International

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME506: MACHINE DESIGN – I

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Mechanical engineering design: Traditional design methods. Design synthesis. Design considerations and standards. BIS designation of materials. Mechanical properties. Statistical Considerations, material selection.

Design against static & Dynamic loads: Modes of failure, Factor of safety, Axial, bending and torsional stresses, Theories of failure, Stress concentration Factors, fatigue failure. Endurance limit. Notch sensitivity. Soderberg, Goodman and modified Goodman diagrams, fatigue design under combined stresses.

Unit-II

Threaded, Riveted and welded joints: Torque requirement for bolt tightening. Eccentrically loaded bolted joints. Fluctuating loads on bolted joints. Joints with combined stresses. Riveted joints- types, failure of joints, and efficiency of joint. Welded joints-types of welded joints, strength of butt, parallel fillet and transverse fillet welded joints Stresses, joints subjected to bending and twisting moments.

Unit-III

Power transmission shafts: Design of shafts. Shafts subjected to bending, torsion and axial loading. Shafts subjected to Fluctuating loads.

Keys & Cotter joints: Types of keys, force acting on keys, Design of Keys. Types of Cotter joint-Socket & Spigot joint, Sleeve & Cotter joint, Knuckle Joint.

Unit-IV

Couplings: Types of Coupling, Design of Sleeve and Flange & Bushed pin Flexible couplings.

Flywheel: Function, turning moment diagrams, Torque analysis, Coefficient of Fluctuation of speed, Coefficient of Fluctuation of energy, Energy stored in flywheel, Stresses in rimmed flywheel, flywheel for punching machines.

Unit-V

Mechanical springs:

Helical springs- classification, terminology, spring materials. Spring end formation. Design of helical springs, concentric springs, and surge in spring, helical torsion springs.

Laminated springs - Protective coatings, Equalized stress in spring leaves, Nipping and shot peening. Design of leaf spring.

Note: Design data book will be permitted.

Text Book:

1. Design of Machine Elements by V.B.Bhandari, TMH Publishing Co. Ltd., NewDelhi.

References:

1. Machine Design by Jain, Khanna Publications.
2. Mechanical Engineering Design by J.E.Shigley, Tata-McGraw Hill
3. Design of Machine Elements by M.F.Spotts & T.E.Shoup, Prentice Hall Inc (Pearson Education)
4. Machine Design by R.S. Khurmi & J.K.Gupta, S. Chand Publications
5. Machine Design by Pandyah and Shah, McGraw Hill publications

B.Tech. Four Year Degree

Mechanical Engineering-Sixth Semester
EURME511: PERSONALITY DEVELOPMENT

Hours per week: 3 Cont. Evaluation: NA
Credits: NA

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME512: MECHANICS OF SOLIDS LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. To study the Stress Strain Characteristics (Tension & Compression) of Metals by using UTM.
2. To study the Stress Strain Characteristics of Metals by using Hounsefield Tensometer.
3. Determination of Compressive Strength of wood
4. Determination of hardness using different hardness testing Machines- Brinnels, Vickers, and Rockwell's.
5. Impact Test by using Izod and Charpy Methods.
6. Deflection test on Beams using UTM.
7. Tension Shear Test on MS Rods.
8. To find Stiffness and Modulus of Rigidity of steel by Conducting Compression Test on springs.
9. Torsion Test on Circular Shafts.
10. Bulking of Sand
11. Fatigue test on mild steel specimen

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME513: MANUFACTURING TECHNOLOGY –II LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. Lathe-Step turning, Chamfering, Knurling.
2. Lathe-Taper turning, Chamfering, Knurling.
3. Lathe-Thread cutting, Parting off, Chamfering, Knurling.
4. Lathe-Eccentric turning.
5. Lathe-Off set turning.
6. Measurement of cutting tool temperature in turning using thermocouple.
7. Milling- Round to Hexagonal nut cutting using Direct indexing method.
8. Milling- Spur gear cutting using Simple indexing method.
9. Milling- Spur gear cutting using Differential indexing method.
10. Shaping- Round to square cutting, V-groove cutting.
11. Shaping- Round to square cutting, Semi hexagonal cutting.
12. Planning practice and slotting practice.
13. Force measurement using dynamometers on milling, drilling, lathe machines.
14. Grinding: Grinding a single point cutting tool as per given signature.
15. Effect of speed and feed on surface grinding.

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME601/EIRME 501: THEORY OF MACHINES – II

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Static Force Analysis: Introduction, Static Equilibrium, Equilibrium of Two-force and Three-force members, Member with Two force and a torque, Force convention, Free body diagrams, Superposition.

Dynamic force Analysis: Introduction, D'Alemberts principle, Equivalent Offset inertia force, Dynamic analysis of Four bar and Single slider mechanisms, Klein's construction, velocity and acceleration of piston, Angular velocity and angular acceleration of connecting rod, Piston effort, Turning moment on crank shaft, Inertia of connecting rod, Inertia forces in reciprocating Engines(Graphical method).

Unit-II

Gyroscope: Introduction, Precessional angular motion, Gyroscopic couple, effect of gyroscopic couple on an aeroplane, effect of gyroscopic couple on a naval ship during steering, gyroscopic couple on a naval ship during pitching, Gyroscopic couple on a naval ship during rolling, stability of a four wheel drive moving in a curved path, stability of a two wheel vehicle taking a turn.

Unit-III

Governors: Introduction, types of governors, Watt governor, Porter governor, Proell governor, Hartnell governor, Wilson-Hartnell governor, Spring controlled gravity governor, Inertia governors, Sensitiveness of governor, Hunting, Isochronism, Stability, effort of governor, Power of governor, Controlling force.

Unit-IV

Balancing: Introduction, Static balancing, dynamic balancing, balancing of several masses in same planes, balancing of several masses in different planes, Balancing of Reciprocating masses, balancing of locomotives, balancing of inline engines, Balancing of V-engines.

Unit-V

Vibrations: Introduction**,** Definitions, Types of vibrations- Natural frequencies of free longitudinal vibrations of systems having single degree of freedom- Equilibrium method-Energy method and Rayleigh's method. Frequency of damped vibration with damping-magnification factor or dynamic magnifier.

Transverse and Torsional Vibrations: Natural frequency of free transverse vibrations due to point load and UDL acting over a simply supported shaft- transverse vibration for a shaft subjected to number of point loads-energy method- Dunkerley's method, critical speed of a shaft. Natural frequency of free torsional vibrations- free torsional vibrations of a single rotor system, Two rotor and three rotor system and gear system.

Text Books:

1. Theory of machines by SS Rattan, Tata Mc Graw Hill publications.

References:

1. Theory of Machines by Thomas Bevan, Pearson education publications
2. Theory of Machines by W.G.Green, Blackie publications.
3. Theory of Machines by R.S. Khurmi & J.K.Gupta, S. Chand Publications
4. Theory of Machines and Mechanisms by PL Ballaney, , Khanna Publications
5. Theory of Machines and Mechanisms by Amitaba Ghosh and Ashok kumar Mallik (EWP).
6. Design of Machinery by R.L.Norton, Mc Graw Hill Publications.

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME602: INTRODUCTION TO FINITE ELEMENT METHOD

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Fundamental Concepts: Stresses and Equilibrium, Boundary conditions, Strain-Displacement relations, Stress-Strain relations, Plane stress, Plane strain, Temperature effects, Potential energy and Equilibrium. Raleigh-Ritz method, Galerkin's method, Saint Venant's principle.

Unit-II

One-dimensional Problems: Finite element modeling, coordinates and Shape functions. Potential energy approach. Galerkin approach, Assembly of the global stiffness matrix- mass matrix and load vector, Treatment of boundary conditions, Quadratic shape functions, Temperature effects.
Trusses: Plane trusses, Three-dimensional trusses.

Unit-III

Two-dimensional Problems Using Constant Strain Triangles: Finite element modeling, Constant strain triangle, in plane and Bending, problem modeling and boundary conditions.
Axisymmetric Solids subjected to Axisymmetric Loading: Axisymmetric formulation, Finite element modeling -triangular element, Problem modeling and boundary conditions.

Unit-IV

Two-dimensional Isoparametric Elements and Numerical Integration: Four-node quadrilateral, Numerical integration, Higher-order elements.
Beams and Frames: Finite element formulation, Load vector, Boundary considerations, Shear force and bending moment, Beams on elastic supports, Plane frames.

Unit-V

Scalar field problems: Steady state heat transfer, Torsion.
Dynamic considerations: formulation, element mass matrices, evaluation of Eigen values and Eigen vectors.

Text Books:

1. Introduction to Finite Elements in Engineering by Tirupathi R. Chandrupatla, Ashok D.Belegundu, Pearson education.

References:

1. Finite element method in engineering by S.S.Rao, Elsevier Butterworth-Heinmenn publications.
2. Finite element method by JN Reddy, McGraw-Hill publications.
3. Concepts and applications of finite element analysis by Robert D. Cook, David S. Malkus, Michael E. Plesha, Rober J. Witt, Wiley India (P) Ltd.
4. Finite element method with applications in engineering by Y. M. Desai, T. I. Eldo, A. H. Shah, Pearson Eduction.
5. Finite element Analysis by P.Seshu, Prentice-Hall India Ltd.

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME603/EIRME602: HEAT AND MASS TRANSFER

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction: Basic modes of heat transfer- Rate equations- Generalized heat conduction equation in Cartesian, Cylindrical and Spherical coordinate systems. Steady state heat conduction solution for plain and composite slabs, cylinders and spheres- Critical thickness of insulation- Heat conduction through fins of uniform cross section- Fin effectiveness and efficiency.

Unsteady state Heat Transfer conduction- Transient heat conduction- Lumped system analysis, and use of Heisler charts.

Unit-II

Convection: Continuity, momentum and energy equations- Dimensional analysis- Boundary layer theory concepts- Free, and Forced convection- Approximate solution of the boundary layer equations- Laminar and turbulent heat transfer correlation- Momentum equation and velocity profiles in turbulent boundary layers- Application of dimensional analysis to free and forced convection problems- Empirical correlation.

Unit-III

Radiation: Black body radiation- radiation field, Kirchoff's laws- shape factor- Stefan Boltzman equation- Heat radiation through absorbing media- Radiant heat exchange, parallel and perpendicular surfaces- Radiation shields.

Unit-IV

Heat Exchangers: Types of heat exchangers- Parallel flow- Counter flow- Cross flow heat exchangers- Overall heat transfer coefficient- LMTD and NTU methods- Fouling in heat exchangers- Heat exchangers with phase change. Analysis of heat exchangers – design and rating of heat exchangers. Compact heat exchangers

Unit-V

Boiling and Condensation: Different regimes of boiling- Nucleate, Transition and Film boiling. Condensation: Laminar film condensation- Nusselt's theory- Condensation on vertical flat plate and horizontal tubes- Drop wise condensation.

Mass Transfer: Conservation laws and constitutive equations - Fick's law of diffusion Isothermal equi-mass - Equimolal diffusion- - diffusion of gases & Liquids- Mass transfer coefficient.

Text Books:

1. Heat Transfer, by J.P.Holman, Int.Student edition, McGraw Hill Book Company.
2. Fundamentals of Heat and Mass Transfer- Incropera and Dewitt

References:

1. Heat and Mass Transfer- Arora and Domkundwar
2. Analysis of Heat Transfer by Eckert and Drake, Intl student edition Mcgraw hill.
3. Essential of Heat Transfer by Christopher A. Long
4. Heat transfer by Sukhatme
5. Heat transfer by Yunus A Cengel

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME604: AUTOMOBILE ENGINEERING

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction: Components of an automobile-Basic engine design considerations – types of engines, square engine, wankel engine ,automotive gas turbine, electric vehicles, hybrid vehicles, fuel cell vehicle, special characteristics of sports car engines. Classification of vehicles - options of prime movers. Engine: Constructional details, types of combustion chambers for petrol and diesel engines, valves, valve arrangements and operating mechanisms, piston, types, piston rings, firing order, fly wheel.

Unit-II

Cooling system for I.C. engines: Necessity, methods of cooling, air cooling, water cooling, components of water cooling systems, coolants.

Lubrication systems: Objective of lubrication, requirements of lubricant, crankcase ventilation types of lubricant, various systems of engine lubrication, oil additives, oil pumps, oil filters.

Fuels: Types of fuels –Petrol, diesel, LPG, CNG, hydrogen, alcohol, biodiesel, Storage and handling, EURO/Bharat Stage Norms.

Unit-III

Fuel supply systems for petrol and diesel engines: Fuel pumps - Mechanical and electrical diaphragm pumps, air and fuel filters, carburetors, fuel injection systems for diesel and petrol engines, electronic fuel injection, super chargers, Turbochargers, mufflers, catalytic converter.

Electrical systems: batteries, fuel cells, types of ignition systems- battery ignition system, magneto ignition system, electronic ignition system. Charging systems- dynamo, alternator, regulator. Starting motor, introduction to various accessories, typical wiring diagram.

Unit-IV

Chassis and transmission systems: Introduction of chassis, classification, conventional construction, frameless construction, introduction to vehicle dimensions.

Transmission: Introduction to clutch, types, clutch actuating mechanisms, study of clutch components, fluid fly wheel.

Gear box: operating principle, four speed and five speed sliding mesh, constant

mesh and synchromesh type, selector mechanism, automatic transmission, overdrive, transfer box four wheel drive, torque converter, propeller shaft and differential.

Unit-V

Suspension and steering system: Suspension: Systems, springs, shock absorbers, axles - front and rear, different methods of floating rear axle, front axle and wheel alignment. Types of rims and tyres.

Steering mechanisms. Types of brakes and brake actuation mechanisms.

Text Books:

1. Automobile Engineering, Vol.-1 & 2 by Kripal Singh, Standard publisher distributors
2. Automotive Mechanics by Joseph Heitner, East-West student edition

References:

1. Automobile Mechanics by Crouse. W.H. and Angling. D.L.
2. Automobile Electrical System by Judge, A.W.
3. Automobile engineering by K.k.Ramalingam, scitech publication

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME605: METHODS ENGINEERING AND WORK DESIGN

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction to Methods Engineering and Work Design: Work of F.W. Taylor; Frank and Lillian Gilbreth and others; Productivity definition; Means of increasing productivity; Work study definition; Productivity and work study; Human factor in the application of work study.

Unit-II

Method Study: Definition- Method study Procedure, Selection of jobs for method study, Recording Techniques-Operation Chart, Flow process Chart – Man Type, Material Type and Equipment Type, Two handed process Chart and Multiple activity Chart; Flow diagram; String diagram; Travel chart;

Unit-III

Methods and Movements at the Workplace: Principles of motion economy- related to Human Body, Tools & Equipment and Work place layout; Micro motion study; Therbligs; SIMO chart; Cyclegraph and Chronocyclegraph. Introduction to Ergonomics.

Unit-IV

Work Measurement: Definition; uses; procedure; work sampling – procedure, determination of sample size; Time study- equipment, Rating, allowances, Number of cycles to be studied and determination of standard time; Predetermined Motion Time Systems-MTM and work factor methods.

Unit-V

Job Evaluation and Merit rating: Introduction- objectives, Job Evaluation Methods-Non quantitative and quantitative. **Merit rating:** Definition, objectives; merit rating plans.

Wages and Incentives: Characteristics of a good wage or incentive system; Wage incentive schemes – Day work; Measured day work; Standard hour incentive; Piece work incentive and Group incentive;

Text Books:

1. Introduction to Work Study, ILO, Geneva, International labour office publishers, 3rd ed.
2. Motion and Time Study- Design and Measurement of Work by Ralph M. Barns, John Wiley & Sons, 7th edition.

Reference:

1. Text Book of Work Study by Dr. Suresh Dalela, Standard Publishers, 5th edition.
2. Motion and Time Study- Principles and Practices by M. E. Mundel, Prentice Hall of India, 1995.

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME606: MACHINE DESIGN – II

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Friction Clutches Function, Types, friction materials Torque transmitting capacity of disc, cone and centrifugal clutches -Uniform Wear theory and Uniform pressure theory.

Brakes: Energy equations, Block brake with short shoe and long shoe, Pivoted block brake with long shoe, Internal expanding brake, Band brake, Band and Block Brake, Disc Brake, self locking and self Energizing brakes.

Unit-II

Design of Belt drives, ropes drives and chain drives:

Belt Drives-Construction and classification, Analysis of belt tensions, Condition for Maximum power, Design of pulleys for flat belts. V-belts, Selection of V- belts, V-grooved pulleys.

Ropes drives-classification, Design of fiber and wire ropes

Chain drives- Roller chains, Geometric relationships, Polygonal effect of chain, power rating and design of Chain drives.

Unit-III

Design of Sliding contact bearings - Lubrication modes, , Bearing modulus, McKee equations, Journal bearing design, Collar and thrust bearings. Bearing Failures.

Design of Roller and ball bearings – Classification, Static and dynamic load capacity, Stribecks Equation, Equivalent bearing load, Load-life relationships, Load factor, Selection of bearings from manufacturers catalogue.

Unit-IV

Design of Gears - Classification of gears, Spur, Helical, Bevel and Worm gears, , Standard tooth systems, Spur and Helical gears- Terminology, Tooth failure, Face width and beam strength, Lewis equation, Design for dynamic and wear loads. Bevel gears- Terminology, Force analysis, Beam Strength and Wear Strength of bevel Gears. Worm gears- Terminology, proportions, Force analysis, friction in worm gears, design of worm gears.

Unit-V

Design of I.C. Engine components: cylinder and cylinder heads, piston, cross-head, connecting rod and crank shaft.

Text book:

1. Design of Machine Elements by V.B. Bhandari, TMH Co. Ltd., New Delhi.

References:

1. Machine Design by R.K. Jain, Khanna publications.
2. Machine Design by R.S. Khurmi & J.K.Gupta, S. Chand Publications
3. Machine Design by Pandyah and Shah, McGraw Hill publications
4. Mechanical Engineering Design by J.E.Shigley, Tata-McGraw Hill

Note: Design data book will be permitted.

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME611: COMPUTER AIDED PRODUCTION DRAWING LAB

Hours per week: 3 Cont. Evaluation: 100 Marks
Credits: 2

Representation of limits, fits, tolerances, surface roughness & Geometric tolerance on production drawing as per IS 8000, IS 696

Part drawings and assemble drawings.

Location theory 3-2-1 principle, types of jigs and fixtures, production drawing of jigs and fixtures

Stock strip layouts in sheet metal drawings, press tool, forging dies.

Production drawings of single point cutting tool, milling cutter, broaching tool and adopters (CNC Tooling)

CAD packages like AutoCAD/CATIA can be used for drawing practice

Text books:

1. Production Drawing, K.L.Narayana, 2nd Edition, New Age International, 2011
2. Jigs & Fixtures, P.H.Joshi, 3rd Edition, Tata McGraw Hill Education (TMH), 2010
3. Press Tools: Design and Construction, P.H. Joshi, 3rd Edition, S.Chand Publisher, 2010

References:

1. Production Technology Hand Book- HMT,
2. Metal Cutting Theory and Metal Tool Design, Arsinov.V, MIR Publishers, 1996
3. Computer Aided Manufacturing, P N Rao, Tewari,T.K. Kundra, 1st Edition, TMH, 1998
4. Tool Engineering and Design, G.R. Nagpal , 6th Edition, Khanna Publishers

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME612: METROLOGY LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. Calibration of micrometer and dial gauge by using slip gauges.
2. Measurement of angle gauges by using bevel protractor and sine bar.
3. Measurement of taper angle of V-groove by using vernier height gauge.
4. Measurement of central distance between two holes by using vernier height gauge.
5. Gear metrology to find module, addendum, dedendum, pitch circle diameter, tooth width an pressure angle of a given spur gear.
6. To check roundness and concentricity of spigot
7. To check straightness of surface plate by using spirit level and Autocollimator.
8. Study of flatness of slip gauges by using monochromatic check-lite.
9. Tool maker's microscope: To study screw thread profile (Major dia, minor dia, pitch, thread angle) and tool angles.
10. Measurement of Surface Roughness by using Stylus method.

B.Tech. Four Year Degree
Mechanical Engineering-Sixth Semester
EURME 613: NUMERICAL AND FINITE ELEMENT METHODS LAB

Periods per week: 3 Continuous evaluation: 60 Marks
Credits: 2

1. Introduction to Programming Language Software: C / C++ / MATLAB
2. Solving Nonlinear Equations - Bisection Method, Newton-Raphson Method.
3. Solving System of Linear Equations - Gauss Elimination, Gauss-Jordan, Gauss-Seidel.
4. Interpolation and Curve Fitting - Lagrangian Polynomials, Least-Square Approximation.
5. Numerical Differentiation and Integration - Trapezoidal Rule, Simpson's Rules, Gauss Quadrature.
6. Numerical Solution of Ordinary Differential equations - Euler's Method, Runge-Kutta Methods, Power Method
7. Finite Difference Solutions of Partial Differential equations - Laplace Equation, Heat Conduction Equation.
8. Finite Element Solution of Partial Differential equations using Lagrange Shape Functions - Bars.
9. Finite Element Solution of Partial Differential equations using Hermite Shape Functions - Beams.
10. Introduction to Finite Element Analysis Software: ANSYS / NISA / Nastran
    - Static Structural Analysis of 1D problems – Bars, Trusses, Beams And Frames
    - Static Structural Analysis of 2D problems – Plane Stress, Plane Strain.

B.Tech. Four Year Degree
Mechanical Engineering-Fifth Semester
EURME614: ADVANCED COMMUNICATION SKILLS AND ENGLISH LANGUAGE LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

Unit - I
Report writing: Types of reports, Writing technical reports and scientific papers, Writing a Statement of Purpose.

Unit - II
Presentation Skills: Make effective presentations, expressions which can be used in presentations, use of non-verbal communication, coping with stage fright, handling question and answer session, Audio-visual aids, PowerPoint presentations and Seminar Skills.

Unit - III
Interview Skills: planning and preparing for interviews, facing interviews confidently, use of suitable expressions during interviews.

Unit - IV
Group Discussion: objectives of a GD; Types of GDs; Initiating, continuing and concluding a GD.

Unit - V
Debate: difference between debate and group discussion, essentials of a debate, conducting a debate and Telephone Etiquette.

English Language Laboratory

Introduction to Phonetic Transcription: Phonemes: Vowels, Consonants and Diphthongs, Syllabification, Weak and Strong Forms, Word Stress.
Difficulties of Indian Speakers of English: Sound, Stress and Intonation Problems

Use of Dictionary to Develop Pronunciation: Advantages of using a dictionary, Effective use of dictionary and thesaurus.

Fluency and Continuous Speech: Problems
(Fluency Techniques, Pauses, Intonation, Styles of Speech - Formal and Informal)

Text Book:

1. Language Lab Manual, Department of English, GITAM University, 2012.
2. Jayashree Mohanraj et al., Speak Well, Orient Black Swan, 2011.

References:

1. E. Suresh Kumar et al, **A Handbook for English Language Laboratories** (With CD), Cambridge University Press India Pvt Ltd. 2009.
2. Edgar Thorpe, **Winning at Interviews**, Pearson Education, 2006.
3. Hari Mohan Prasad, **How to prepare for Group Discussions and Interviews**, Tata McGraw Hill, 2006.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME701: OPERATIONS RESEARCH

Hours per week: 3 End Examination: 60 Marks
Credits : 3 Sessionals: 40 Marks

Unit-I

Development: History, Definition, OR Models, OR Techniques and phases of implementing OR in practice

Allocation: Introduction to linear programming, formulation, graphical solution, Simplex method, artificial variable techniques, Unrestricted Variables, Duality principle, Dual Simplex method.

Unit-II

Transportation Problem: Formulation, optimal solution. Unbalanced transportation problems, Degeneracy. Formulation optimal solution, Assignment problem, traveling Salesman problem.

Unit-III

Queuing Theory: Introduction, Characteristics of Queing models, Classification of Queueing models

Sequencing: Introduction, Terminology, notations and assumptions, problems with n-jobs and two machines, optimal sequence algorithm, problems with n-jobs and three machines, problems with n-jobs and m-machines, graphic solutions.

Unit-IV

Replacement: Introduction, Replacement of items that deteriorate with time - value of money unchanging and changing, Replacement of items that fail completely.

Theory of games: Introduction, Two-person zero-sum games, The Maximin and Minimax principles, Games without saddle points - Mixed Strategies, 2xn and mx2 Games - Graphical solutions, Dominance property, Algebraic solutions to rectangular games.

Unit-V

Inventory: Introduction, inventory costs, Independent demand systems: Deterministic models - Fixed order size systems - Economic order quantity (EOQ) - Single items, back ordering, Quantity discounts (all units quantity discounts), Batch - type, production systems, Economic production quantity - Single items, Economic production quantity multiple items. Fixed order interval systems: Economic order interval (EOI) - Single items, Economic order interval (EOI) - Multiple items.

Network Models: Definitions, Minimal spanning tree algorithm, Shortest route problem, CPM and PERT.

Text Book:

1. Operation Research, by TAHA.(PHI)

References:

1. Operations Research Methods and Problems, by M.Sasiene, A.Yespal and L.Friedman.(John Wiely)
2. Operations Research., by S.D.Sharma.(Kedarnadh Ramnadh & Co.,)
3. Operations Research, by Kanthi swaroop,Gupta & Man Mohan

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME 702: CAD/CAM

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction: Fundamentals of design process, Computers in design applications, benefits of CAD, Computer configuration for CAD applications, graphics terminal.CAD software, definition of system software and application software, CAD database and structure.

Unit-II

Geometric modeling: 3D wire frame modeling, wire frame entities- definitions interpolation & approximation curves, concept of parametric and non parametric representation of curves, curve fitting techniques, definitions of cubic spline and Bezier, B-spline.

Unit-III

Surface modeling: Algebraic and geometric form, parametric space of surface, blending functions, Reparametrization of a surface patch, subdividing, cylindrical surface, ruled surface, surface of revolution, spherical surface, Composite surface, Bezier surface, B-spline surface, regenerative surface and pathological conditions.
Solid modeling: Definition of cell composition and spatial occupancy enumeration, sweep representation, constructive solid geometry, boundary representations.

Unit-IV

NC Part Programming: Introduction to NC part programming, methods- manual part programming, computer assisted part programming, advantages and limitations of programming methods. NC tooling and Automatic Tool Changers.
Introduction to Robotics: Types of robots, specifications and applications, advantages and limitations.

Unit-V

Group technology and flexible manufacturing system: Part families, parts classification and coding, production flow analysis, machine cell design, FMS workstations, Material handling and storage system, Computer control system, planning the FMS, analysis methods for flexible manufacturing system, Application of Group technology and FMS.

Computer Integrated Manufacturing: Computer Integrated Production Management Systems, computer aided process planning (CAPP), Computer aided quality control, Introduction to Concurrent Engineering.

Text Books:

1. Automation, production systems and computer Integrated manufacturing by Mickel P.Groover, 3rd edition, PHI, 2009.
2. CAD/CAM Theory and practice by Ibrahim Zeid., Tata Mcgraw Hill education private limited, 2009

References:-

1. Computer Integrated design and Manufacturing, David D Bedworth, McGraw Hill International, 1991
2. CAD/CAM Principles & Applications, P. N. Rao, 3rd edition, Tata McGraw Hill, 2010 Principles of Automation and Advanced Manufacturing Systems, Dr.K.C.Jain, Sanjay Jain, 1st Edition, Khanna Publishers.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME 703: POWER PLANT ENGINEERING

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Steam Power Plants: General layout, Power plant cycles, Coal-handling, storing, preparation and supply. Various stokers. Draft systems, chimney including calculations. Flue gas testing and indicators (mechanical, electrical and chemical). Boilers: Mountings and accessories. High pressure and high duty forced circulation boilers and modern trends in Boiler design. Boiler performance.

Unit-II

Nuclear power plants: Classification of reactors, Fuels, Fuel moderator and coolant, Control and safety rods, Special properties of structural materials required, Induced radio-activity, Gas cooled reactors, Radiation hazards and shielding, Radioactive waste disposal.

Wind Energy: Introduction ,classification , horizontal axis wind turbine (HAWT) - vertical axis wind turbine(VAWT) - rotor design considerations - blade profile - 2/3 blades and teetering – coning - upwind / downwind - power regulation - Yaw system - inverters.

Unit-III

Solar Energy: solar radiation, its measurement and prediction. Solar angles - day length, angle of incidence on tilted surface. Flat plate collectors: liquid and air type.

Hydro Electric Plants: Selection of site, Hydrology, Hydrometric survey rainfall, Catchment, Reservoir, Run-off flow and fall, Storage and pondage. Losses due to percolation, evaporation and transpiration. General layout of the plant. Different types of plants. Low, medium and high head plants and pump storage plants. Types of Spillways and Dams.

U**nit-IV**

Fuel cell: Principle of operation of an acidic fuel cell, Reusable cells, Ideal fuel cells, Other types of fuel cells, Comparison between acidic and alkaline hydrogen-oxygen fuel cells, Efficiency and EMF of fuel cells, Operating characteristics of fuel cells, Advantages of fuel cell power plants, Future potential of fuel cells.

Unit-V

Geo, OTEC -Thermal Energy Sources: Introduction –Geo thermal sources – applications for thermal and electricity generation – ocean energy - Introduction –

OTEC conversion – thermal electric power generation - energy utilization – site selection – potential Impacts.

Power Plant Economics: Capacity factor, Load factor, Diversity factor, Peak load consideration, Factors governing capacity of plants. Cost of power plant, Cost of erection. Operating and maintenance expenses, Cost of production, distribution of power and determination of rates.

Text Books:

1. A course in power plant engineering by Arora and Domkundwar, Dhanpat Rai and Co
2. A Text Book of Power Plant Engineering by R.K. Rajput.
3. Power Station Engineering and Economy, by Benhaedt G.A. Skrotzki, William A. Vopat, McGraw-Hill Book Company, Inc.
4. Heat Engineering, I.T. Shvets et al, MIR Publishers, Moscow.

References:

1. Solar Power Engineering by B.S.Magal, Tata McGraw-Hill publishing Co. New Delhi.
2. Modern Power Plant Engineering, by Joel Weisman, Roy Eckart, Prentice Hall of India Pvt.Ltd., New Delhi.
3. Fundamentals of Nuclear Power Engineering, by D.K. Singhai, Khanna Publishers, Delhi-6.
4. Power plant engineering by G.R.Nagpal

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-I
EURME721/EIRME 721: MECHANICAL VIBRATIONS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Fundamentals of Vibration: Brief history of vibration, Importance of the study of vibration, Basic concepts of vibration, Classification of vibrations, Vibration analysis procedure, Spring elements, Mass or inertia elements, Damping elements, Harmonic analysis.

Free Vibration of Single Degree Of Freedom Systems: Introduction, Free vibration of an undamped translational system, Free vibration of an undamped torsional system, Stability conditions, Raleigh's energy method, Free vibration with viscous damping, Free vibration with coulomb damping, Free vibration with hysteretic damping.

Unit-II

Harmonically Exited Vibrations: Introduction, Equation of motion, Response of an undamped system under harmonic force, Response of a damped system under harmonic force, Response of a damped system under harmonic motion of the base, Response of a damped system under rotating unbalance, Forced vibration with coulomb damping, Forced vibration with hysteresis damping.

Unit-III

Vibration Under General Forcing Conditions: Introduction, Response under a general periodic force, Response under a periodic force of irregular form, Response under a non periodic force, Convolution integral.

Two Degree of Freedom Systems: Introduction, Equation of motion for forced vibration, Free vibration analysis of an undamped system, Torsional system, Coordinate coupling and principal coordinates, Forced vibration analysis.

Unit-IV

Multidegree of Freedom Systems: Introduction, Modeling of Continuous systems as multi degree of freedom systems, Using Newton's second law to derive equations of motion, Influence coefficients, Free and Forced vibration of undamped systems, Forced vibration of viscously damped systems.

Determination Of Natural Frequencies And Mode Shapes: Introduction, Dunkerley's formula, Rayleigh's method, Holzers method, Matrix iteration method, Jacobi's method.

Unit-V

Continuous Systems: Transverse vibration of a spring or a cable, Longitudinal vibration of bar or rod, Torsional vibration of a bar or rod, Lateral vibration of beams, critical speed of rotors.

Text Book:

1. Mechanical Vibrations by S.S.Rao, Addison Wesley Publishing (or Pearson education)

References:

1. Mechanical Vibrations by G.K. Grover, Nem Chand Publishers
2. Mechanical Vibrations by W.T. Thomson, Addison-Wesley Publishing

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-I
EURME722/EIRME 722: COMPUTATIONAL FLUID DYNAMICS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I
Finite difference methods: Taylor's series – FDE formulation for 1D and 2D steady state heat transfer problems – Cartesian, cylindrical and spherical co-ordinate systems – boundary conditions – Un steady state heat conduction – Errors associated with FDE - Explicit Method – Stability criteria – Implicit Method – Crank Nickolson method – 2-D FDE formulation – ADI – ADE

Unit-II
Finite Volume Method: Formation of Basic rules for control volume approach using 1D steady heat conduction equation – Interface Thermal Conductivity - Extension of General Nodal Equation to 2D and 3D Steady heat conduction and unsteady heat conduction

UNIT-III
Incompressible Fluid Flow: Governing Equations, Stream Function - Vorticity method, Determination of pressure for viscous flow, SIMPLE Procedure of Patankar and Spalding, Computation of Boundary layer flow, Finite difference approach

Unit-IV
Convection Heat Transfer: Solution of one dimensional and two dimensional steady/unsteady convection – Diffusion, Discretization Schemes and their assessment Treatment of Boundary Conditions- Diffusion problems, Convection problems, Convection-diffusion problems

Unit-V
Turbulence Models: Algebraic Models – Turbulence models - Zero-Equation, One-Equation, Two-Equation & Stress-Equation Turbulent Models- K - ε Models, Standard and High and Low Reynolds number models.

Text Books:

1. Anderson, D. A, Tannehill, J. C., and R. H. Pletcher, R. H., Computational Fluid Mechanics and Heat Transfer, Second Edition, Taylor & Francis, 1995.
2. Versteeg, H. K. and W. Malalasekera, W., An Introduction to Computational Fluid Dynamics: The Finite Volume Method, Addison Wesley – Longman, 1995.

References:

1. Chow, C.Y, Introduction to Computational Fluid Dynamics, John Wiley, 1979.
2. Muralidhar, K., and Sundararajan, T., "Computational Fluid Flow and Heat Transfer", Narosa Publishing House, New Delhi, 1995
3. Hirsch, A.A., Introduction to Computational Fluid Dynamics, McGraw Hill, 1989.
4. Patankar, S.V., Numerical heat transfer and fluid flow, Hemispher Publishing Corporation, 1992
5. Bose, T.K., Computation Fluid Dynamics, Wiley Eastern Ltd., 1988.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-I

EURME723/EIRME 723: MANAGEMENT INFORMATION SYSTEMS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Organizations, Management and the Networked Enterprise: Managing the Digital Firm: Necessity of Information Systems (IS) - The New Role of IS in Organizations - New Opportunities with Technology for IS. IS in the Enterprise: Major types, functional perspective and enterprise applications. IS, organizations, management and strategy.

Unit-II

Information Technology Infrastructure: Categories of computer systems, types of software, managing hardware and software assets. Managing data resources: Telecommunications and Networks.

Unit-III

Management and Organizational Support Systems for the Digital Firm: Managing knowledge for the digital firm: Information and Knowledge Work Systems – Artificial Intelligence - Other Intelligence Techniques. MIS and Decision Support System (DSS).

Unit-IV

Building Information Systems in the Digital Firm: Redesigning the organization with IS: Systems as planned organizational change – Business Process Reengineering (BPR) and process improvement. Understanding the business value of systems.

Unit -V

Managing Change: Importance of change management in IS success and failure – Managing implementation.

Text Book:

1. Management Information Systems - Managing the Digital Firm. K.C.Laudon and J.P.Laudon, 8th Edition. PHI, 2004.

References:

1. An introduction to Data Base Management System by Data, C.J., Narosa Publication House, New Delhi, 1985.
2. Information Systems for modern Management by Murdic, Ross and Clagget, PHI, 1985.
3. Management Information Systems – Conceptual Foundations by Davis Gordon, McGraw Hill, 1993.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-I
EURME724/EIRME 724: CNC & APT

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction to Automation: Types of Automation, Numerical Control, Basic Components of NC, Types of NC Systems. Introduction CNC, DNC machines.

NC Machine tools: Nomenclature of NC machine axes, Types of NC machine tools, Machining centers, Automatic tool changers (ATC), Turning centers.

Unit-II

Machine Control Unit & Tooling: Functions of MCU, NC Actuation Systems (NCAS), Part program to command signal, MCU Organization, Computerized Numerical Control, Transducers for NC machine tools, Tooling for NC machining centers and NC turning machines, Tool presetting.

Unit-III

Manual Part Programming: Part program instruction formats, information codes: preparatory function, miscellaneous functions, tool code and tool length offset, interpolations, canned cycles. Manual part programming for milling operations, turning operations, parametric sub routines.

Unit-IV

Computer aided part programming: NC languages: APT, NELAPT, EXAPT, GNC, VNC, pre-processor, post- processor.

Unit-V

APT programming: APT language structure, APT geometry: Definition of point, time, vector, circle, plane, patterns and matrices. APT motion commands: set-up commands, point-to-point motion commands, continuous path motion commands. Post-processor commands, complication and control commands. Macro sub routines. Part programming preparation for typical examples.

Text Books:

1. CAD/CAM Principles & Applications, P. N. Rao, 3rd edition, Tata McGraw Hill, 2010
2. Automation, Production systems & Computer-Integrated Manufacturing, M.P.Groover, 3rd Edition, PHI Learning.

References:

1 Numerical Control of Machine Tools, Dr. Koren and Benuri, 3rd Edition, Khanna publications

2 Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R.Schmid, 4th edition, Pearson Education, 2001

3 CNC Programming Hand Book: A comprehensive guide to practical CNC programming, Peter Smid, 3rd Edition, Industrial Press Inc., New York, 2003

4 CNC Programming: Priciples & Applications, Mike Mattson, 2nd edition, DELMAR Cengage Learning, Canada, 2010

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-I
EURME 725/EIRME 725: APPLIED MATERIALS SCIENCE

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I
Plastic deformation: Mechanism of plastic deformation, role of dislocations, slip and twinning, Strain hardening and re-crystallisation. Elementary treatment of fracture and fatigue of metals.

Unit-II
Creep: Creep stages, mechanisms, metals for high temperature applications, behaviour of metals at low temperatures, concept of Null Ductility Transition Temperature.

Unit-III
Wear resistance improvement on surfaces: Wear, wear mechanisms, wear testing, Hardfacing, Friction Stir Processing, electroplating, surface coatings – CVD, magnetic sputtering, Plasma spray, thermal spray, HVOF.

Unit-IV
Nanomaterials: Definition, classification of nanomaterials, synthesis of nanomaterials, nanocoatings, nano fluids.
Composite Materials: Classification based on matrix, classification of composites. Basics of mechanics of composites – Rule of mixtures - Iso-stress and Iso-strain conditions. Concepts of hybrid composites and nano composites.

Unit-V
Material Characterization: Metallography – procedure to study the microstructure of given metals/alloys, various etchants used in metallography. Principle of operation of optical microscope, SEM-EDX, XRD, TEM and EPMA

Text Books:

1. Physical Metallurgy by S.H.Avner, Tata McGraw-Hill Second edition 1997.
2. Callister's Materials Science and Engineering, Adapted by R. Balasubramaniam, Wiley India Edition, 2007.
3. Principles and applications of Tribology, by Bharat Bhushan, John Wiley and Sons, 1999.

4. Text book of Nanoscience and Nanotechnology- BS Murty, P Shankar, Baldev Raj, BB Rath and James Murday, University Press-IIM, Metallurgy and Materials Science, 2012

References:

1. Structure and properties of Materials by R.M.Rose, L.A.Shepard and J.Wulff, Vol.1,4 John Willey (1966)
2. Essentials of Material Science by A.G.Guy, McGraw-Hill, 1976.
3. Mechanical Metallurgy by George E Dieter adapted by David Bacon, McGraw-Hill Book Company, 1988.
4. Advances in Nanocomposites - Synthesis, Characterization and Industrial Applications, Boreddy Reddy, InTech PUBLISHERS, 2011.
5. Nanofluids: science and technology, Sarit K. Das Wiley-Interscience, 2008.
6. NANO: The Essentials by T. Pradeep, McGraw-Hill Professional, 2007.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-I
EURME 726/ EIRME 726: STATISTICAL QUALITY CONTROL

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Basic concepts of Quality: The meaning of quality, various approaches, quality control and inspection, Concepts of quality assurance systems, Statistical quality control (SQC), Basic statistical concepts.

Unit-II

Control Charts for Variables: Concept of variation, the general theory of control chart (variability, variations due to assignable causes, chance variations), Definition of control chart, control limits, X and R Charts, simple problems.

Unit-III

Control Charts for Attributes: Concepts of attributes, attribute data, practical limitations of the control charts for variables, control charts for defects, control limits, C chart, P chart, simple problems.

Unit-IV

Acceptance Sampling: Concepts of acceptance sampling, sampling methods, the Operating Characteristic (OC) curve, sampling plans, single, double and multiple sampling plans, Simple problems.

Unit-V

Total Quality Management: Philosophy of TQM, Customer focus, Organization, Top management commitment, Team work, Quality philosophies of Deming, Crossby and Muller.
Quality Circles. Introduction to ISO-9000.

Text Book:

1. Statistical Quality Control by M. Mahajan,Dhanpat Rai& Co.,2007

References:

1. Total Quality Management, Rose, J.E., Kogan Page Ltd., 1993
2. The Essence of Total Quality Management by John Bank, PHI, 1993.
3. Beyond Total Quality Management by Greg Bounds, Lyle Yorks et al, McGraw Hill, 1994.
4. The Asian Productivity Organization by Takashi Osada, 1991.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-II
EURME731/EIRME 731: REFRIGERATION AND AIR CONDITIONING

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction to Refrigeration: Necessity and applications – Unit of refrigeration and C.O.P – Mechanical Refrigerations – Types of ideal cycle of refrigeration.

Air Refrigeration: Bell Coleman cycle and Brayton Cycle, Open and Dense air systems – Actual air refrigeration system – Refrigeration needs of Air crafts air systems – Actual air refrigeration system – Refrigeration needs of Air crafts – Application of Air Refrigeration, Justification – Types of systems.

Unit-II

Vapour compression refrigeration: working principle and essential components of the plant – simple vapour compression refrigeration cycle – COP – Representation of cycle on T-S,

P-H and H-S charts – effect of sub cooling and super heating – cycle analysis – Actual cycle influence of various parameters on system performance – Use of P-H charts.

Refrigerants – Desirable properties – common refrigerants used – Nomenclature.

Unit-III

Vapour Absorption System: Calculation of max COP – description and working of NH_3 – water system – Li – Br system. Principle of operation three Fluid absorption system, salient features – Electrolux refrigerator.

Unit-IV

Non conventional refrigeration system: Thermo electric refrigeration – advantages, disadvantages, applications. Vortex tube refrigeration: construction & working, advantages, disadvantages, applications. Pulse tube refrigeration: construction & working, advantages, disadvantages, applications.

Unit-V

Introduction to air Conditioning: Psychometric Properties & Process – sensible and latent heat loads – characterization and SHF – Need for Ventilation, infiltration – concepts of RSHF, ASHF, ESHF and ADP. Concept of human comfort and effective temperature – comfort Air conditioning - industrial air conditioning and

Requirements – Air conditioning load calculations.

Air Conditioning systems - classification of equipment , cooling , heating humidification and dehumidification, filters, grills and registers, deodourants, fans and blowers. Heat pump – Heat sources – different heat pump circuits – Application.

Text books:

1. Refrigeration and Air Conditioning by Manohar Prasad , New Age
2. Refrigeration and Air Conditioning by CP Arora , Tata McGraw Hill
3. A course in Refrigeration and Air Conditioning by CP Arora & Domukundwar , Dhanpatrai & sons

Reference:

1. Principles of Refrigerations by Dossat, Willey Eastern

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-II
EURME732/ EIRME 732: INVENTORY CONTROL

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I
Introduction to Inventory Control, Importance of Inventory Management Functions and Objectives of Inventory Control. Inventory decisions, Classification of Inventory Models, Various Cost Parameters in Inventory Control

Unit-II
Static Inventory Models under Risk Applications of Static Inventory Model in Business Environment

Unit-III
Dynamic Inventory Models, Christmas tree and News Paper Boy Problem

Unit-IV
Inventory Control Systems: Q, –P Systems, S-s Policy. Selective Inventory control: Control of Inventory through ABC Analysis, VED, FSN and other Control Measures

Unit-V
Quantity discounts, multiple items and Models with limitation on Capital Investment, Carrying Cost and Floor Area. Concept of Materials Management: Introduction to MRP and Just-In-Time Techniques

Text Book:
1. Inventory Control Theory & Practice by Starr & Miller.

Reference:
1. Operations Research by S.D.Sharma

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester – Dept. Elective-II
EURME 733/EIRME 733: MODERN MANUFACTURING METHODS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Adaptive Control: Definition of Adaptive Control, Classification of Adaptive Control, Adaptive Control Constraint, Adaptive Optimization , Adaptive Controlled optimization for Machining Process.

Unit-II

Lean, Agile and JIT Manufacturing: Introduction to Lean manufacturing, types of wastes in lean manufacturing, comparison lean and Agile manufacturing, Comparison of lean and agile. JIT Approach, Introduction, Definition, Elements of JIT, How JIT works, Effects of JIT production, Plant layout for JIT, Product Design for JIT, Steps in implementation of JIT, Benefits of JIT.

Unit-III

Rapid Prototyping: Definition- basic steps in rapid prototyping- various techniques in Rapid prototyping, applications of rapid prototyping. Nano Manufacturing: approaches for synthesis of nano materials, Characteristics of Nano particles.

Unit-IV

Production Support Machines and Systems: Introduction ,working principle of various production systems like Automatic Conveyor systems, Automated Guided Vehicles, Rail Guided Vehicles, Industrial Robots.

Unit-V

Manufacturing system Simulation: Introduction, Some definitions for simulation, types of simulation, need for simulation, Simulation structure and elements of simulation, simulation methodology, cycle diagrams.

Text books:

1. Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R.Schmid, 4th edition, Pearson Education, 2001
2. Computer aided Design and Manufacturing by Sadhu Singh, 5th Ed., Khanna Publishers.

References:

1. Computer Integrated design and Manufacturing, David D Bedworth, McGraw Hill International, 1991
2. CAD/CAM Principles & Applications, P. N. Rao, 3rd ed., Tata McGraw Hill, 2010
3. Modern Manufacturing Methods, P.C.Pandey, H.S.Shan,1st ed, Tata McGraw Hill, 2008
4. Production and Operation Management by R.Pannerselvam, 2nd Ed. PHI , India, 2006
5. Principles of Automation and Advanced Manufacturing Systems, Dr.K.C.Jain, Sanjay Jain, 1st Ed., Khanna Publishers.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
Dept. Elective-II
EURME 734/EIRME 734: SUPPLY CHAIN MANAGEMENT

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction to Supply Chain Management (SCM): Concept of supply management and SCM, Importance of supply chain flows, Core competency, Value chain, Elements of supply chain efficiency, Key issues in SCM, Decision phases, Supply chain integration, Process view of a supply chain, Competitive Strategy and supply chain strategies, Uncertainties in supply chain, Supply chain drivers.

Unit-II

Inventory Management: Introduction, Selective control techniques, Cost involved in inventory system, Single stage inventory control, Economic lot size models, application to economic production quantity, Effect of demand uncertainty, Single period models, Initial inventory, Multiple order opportunities, Deterministic Models, Quantity discounts. Periodic and Quantity review policies, Mathematical modelling under known stock out costs and service levels, Joint replenishment for multiple items, Inventory system constraints, Working capital restrictions, and storage space restrictions.

Unit-III

Designing Supply Chain Network: Introduction, Network design, factors influencing network design, Data collection, Data aggregation, Transportation rates, Warehouse costs, Capacities and locations, Models and data validation, Key features of a network configuration, Impact of uncertainty on network design, Network design in uncertain environment, Value of information: Bullwhip effect, Information sharing, Information and supply chain trade-offs, Distribution strategies, Direct shipment distribution strategies, transshipment and selecting appropriate strategies.

Unit-IV

Supply Chain Integration: Introduction, Push, Pull and Push-pull supply chains, identifying appropriate supply chain strategy. Sourcing and procurement, Outsourcing benefits, Importance of suppliers, Evaluating a potential supplier, Supply contracts, Competitive bidding and Negotiation. Purchasing, Objectives of purchasing , Relations with other departments, Centralized and Decentralized purchasing, Purchasing procedure, Types of orders, Tender buying, E-procurement, Role of E business in supply chains.

Unit-V

Issues in Supply Chain Management: Introduction, Risk management, Managing global risk, Issues in international supply chain, regional differences in logistics. Local issues in supply chain, issues in natural disaster and other calamities, issues for SMEs, Organized retail in India, Reverse logistics.

Text Books:

1. Designing & Managing the Supply Chain: Concepts, Strategies & Case Studies, Simchi-Levi, D. Kaminsky, P.Simchi-Levi, E. and Ravi Shankar. Third Edition, Tata McGraw-Hill, Third Edition, 2008.
2. Supply Chain Management: Strategy, Planning & Operations, Chopra, S. and Meindl, P. Second Edition, Pearson Education (Singapore) Pte. Ltd. 2004.

References:

1. Purchasing & Supply Chain Management, Doebler, D.W. and Burt, D.N. Text and Cases, McGraw-Hill Publishing Company Ltd., New Delhi, 1996
2. Principles of Inventory & Materials Management, Tersine, R.J Prentice Hall Inc., New Jersey

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME 711: HEAT AND MASS TRANSFER LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. To determine the temperature distribution and overall thermal conductance across the width of composite wall.
2. Determine the thermal conductivity of a metal rod.
3. Determine the heat transfer coefficient for a vertical cylinder in natural convection.
4. Determine the heat transfer coefficient in forced convection of air in a horizontal tube.
5. Determine the emmisivity of the test plate surface.
6. Determine the efficiency of a pin-fin in natural convection.
7. Determine the efficiency of a pin-fin in forced convection.
8. Determine the effectiveness of a parallel flow heat exchanger.
9. Determine the effectiveness of a counter flow heat exchanger.
10. Determine the heat transfer coefficients on film and drop wise condensation apparatus.
11. Determine the heat transfer rate and effectiveness of computer controlled heat exchanger in parallel and counter flow.
12. Determine the thermal conductivity of a given circular slab specimen.
13. Determine the thermal conductivity of a given liquid sample.
14. Demonstration of heat pipe apparatus.
15. Determine the effectiveness of COMPACT heat exchanger.
16. To study the pool boiling phenomenon and different regimes of pool boiling.
17. Determine the heat transfer coefficient of the fluidized bed heat exchanger.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME 712: CAD/CAM Lab

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. Introduction to Modeling packages - ProEngineer, Ideas, Catia, Uni Graphics, Solid Works.
2. 2D-Modeling of simple objects
3. 3D-Modeling of simple objects
4. Preparation of manual part programme for turning, drilling and milling
5. To Generate NC programme using Master CAM/Edgecam simulation software for a turning Job using Lathe Version.
6. Step turning, taper turning, drilling
7. Thread cutting, grooving,
8. To Generate NC programme using Master CAM/Edge CAM simulation software for a 3-axis machining Milling Version.
9. Face milling, pocketing , drilling, contouring
10. Gear cutting.
11. Machining of one job on CNC Lathe.
12. Machining of one job on CNC Drilling.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME 713: INDUSTRIAL ENGINEERING LAB

Hours per week: 3 Cont. Evaluation: 60 Marks
Credits: 2

1. Two handed process charts for Bolt, Washer and nut assembly.
2. Multiple activity chart using an electric toaster.
3. Stop watch time study for the assembly of electric plug and determine observed time, normal time and standard time.
4. Cycle time using PMTS.
5. Time study using pin board apparatus
6. To conduct physiological test on bicycle Ergometer and to identify the changes in heart beat rate, oxygen consumption rate during working and recovery method
7. Physiological test on tread mill and to identify the changes in heart beat rate, oxygen consumption rate and energies expenditure during working and recovery periods.
8. To show that the sample means from a normal universe follow a normal distribution.
9. To draw the control chart for fraction defective P-chart for a given lot of Plastic Balls.
10. X & R Chart to determine the process capability for the measurement of smaller diameter of a given set of stepped pins.
11. Control Chart for number of defects.
12. Operating characteristic curves for a single sample attributes plan of a given lot of plastic balls sand to compare the actual O.C curve with theoretical O.C curve.

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME 714: INDUSTRIAL TRAINING

Hours per week: 3 Cont. Evaluation:100 Marks
Credits: 2

B.Tech. Four Year Degree
Mechanical Engineering-Seventh Semester
EURME 715: PROJECT WORK

Hours per week: 18 Cont. Evaluation:50 Marks
Credits: 3 End Examination: 50 Marks

1. Fabrication of models, machines, prototypes based on new ideas, robots and machines based on hitech systems. Experimental set ups, energy audit/ conservation studies of a departmental or a section in an organization/plant. Fabrication of testing equipment, renovation of machines, etc. Above work to be taken up individually or in groups. The group shall not be more than 4 students. A detail report on the work done shall include project specifications, design procedure, drawings, process sheets, assembly procedure, test results, costing etc.
   Guidelines for project report:
   a) Report shall be typed or printed
   b) Figures and tables shall be on separate pages and attached at respective positions.
   c) Project title and approval sheet shall be attached at the beginning of the report followed by index and synopsis of the project.
   d) Reference shall be mentioned at the end of the followed by appendices (if any)
   e) When a group of students is doing a project, names of all the students shall be included on every certified report copy.
   f) Each group of students shall submit two copies of reports to the institute and one copy for each individual student.
   g) In case of sponsored projects, the students shall obtain certificate from sponsor and attach it to the report.

   OR

2. Computer based design/analysis or modeling/simulation of products (s) mechanism (s) or system (s) and its validation or comparison with available bench marks/results. Oral shall be based on the project done by the students, jointly conducted by an internal and an external examiners appointed, at the end of Part

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
EURME801: PRODUCTION PLANNING AND CONTROL

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction: Objectives of production planning and control, definitions, functions of production planning and control, organization of production planning and control department, internal organization of department.

Forecasting: Forecasting models, Aggregate production planning, master production scheduling, materials requirements planning.

Unit-II

Inventory Control: Objectives, scope of the problem, economic and social complications of inventory management, control systems approach, limitations of inventory control. Functions of inventory, demand and production characteristics. Measures of inventory performance.

Systematic control of inventory: Fixed order quantity systems, fixed interval systems, (s, S) systems, classification of items in inventory. Computer based inventory control systems.

Unit-III

Cost factor: The importance of costs, elements of costs, principles of cost determination and accounting systems, production and inventory cost factors, other costs to the firm.

Economic quantities of manufacture or purchase: Lot size problems, finite production rates in manufacturing, quantity discounts.

Uncertainty: Effects of uncertainty, demand and supply, safety stock, role of forecasting in production and inventory control. uncertainty in production cycling

Unit-IV

Production planning: Scope of planning, types of production planning, demand analysis, seasonal and non-seasonal demand. Planning procedures. Setting the production rate. Short term and long term planning - make and buy decisions, product design and process selection, manufacturing planning.

Unit-V

Production control: Control objectives, problems in production control, types of production and production control systems, controlling production, routing,

scheduling and dispatching. Lay out of the physical system, design of a production planning and control systems. Application of computers in production planning and control.

Text Book:

1. Production planning and inventory control - Magee and Boodman.

References:

1. Production control - John E Biegal.
2. Production forecasting, planning and control - EH Mac Niece.
3. Elements of production planning and control - Samuel Eilon.
4. Production Planning and Inventory Control – Seetharama L Narasimhan, Dennis W, McLeavey, Peter J Billington.
5. Industrial Engineering and Management – O P Khanna.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester – Dept. Elective-III
EURME 841/EIRME 841: MECHATRONICS

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction: Multi disciplinary Scenario, Origins, Evolution of Mechatronics, An overview of Mechatronics, Introduction to Manufacturing, Design.

System modeling: Introduction, system modeling, mechanical system - translational mechanical system with spring, damper and mass, Rotational mechanical system with spring, damper and mass; electrical system- modeling electric motor, fluid system, thermal systems, modeling pneumatic actuator.

Unit-II

Sensors and Transducers: Introduction and background, difference between transducer and sensor, transducers types, transduction principle, photoelectric transducers, thermistors, thermo devices, thermo couple, inductive transducers, capacitive transducers, pyroelectric transducers, piezoelectric transducers, Hall-effect transducers, Fibre optic transducers.

Unit-III

Actuators: Introduction, actuator types and application areas, mechanical actuation systems, Electrical actuating systems - DC motors, AC motors, stepped motor, solid state switches, solenoids; Fluid power actuators, piezoelectric actuators.

Unit-IV

Digital logic: Digital logic, number systems, logic gates, Boolean algebra, karnaugh maps, application of logic gates, sequential logic.

Unit-V

Advanced Applications in Mechatronics: Sensors for condition monitoring, mechatronic control in automated manufacturing, artificial intelligence in mechatronics, fuzzy logic applications in mechatronics, microsensors in mechatronics.

Text book:

1. Mechatronics system design by Devdas Shetty and Richard A. Kolk, PWS publishing company.

References:

1. Mechatronics : Principles, concepts and applications by Nitaigour Premchand Mahalik, Tata – Mc Graw Hill Publishing Company Ltd.
2. Mechatronics by Bolton, Pearson Education.
3. Mechatronics by Bardley D.A, Dawson D, Buru N.C and Loader A.J. Chapman and Hall

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Dept. Elective-III
EURME 842/EIRME 842: RENEWABLE ENERGY SOURCES

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I
Introduction: Role and potential of new and renewable sources
Solar Energy: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Solar Energy Storage: Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications, solar heating/ cooling techniques, solar distillation and drying, photovoltaic energy conversion.

Unit-II
Wind Energy: Sources and potentials, Classification of wind mills, horizontal and vertical axis wind mills,various designs of rotors, site evaluation, wind turbine subsystems-rotors,drive trains,yaw control systems, electrical systems.
Bio Gas: Properties, principles of production, classification- fixed dome-floating type, comparison, site selection, water removing device, environmental effect. Plant models in India – floating gas holder-KVIC, fixed dome-janata type, pragati model, deenbandhu model, constraints for implementation.

Unit-III
Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India. OTEC: Principles, utilization, setting of OTEC plants, thermodynamic cycles.

Unit-IV
Tidal and Wave Energy: Potential and conversion techniques, Tidal barrage, modes of operation-ebb generation- flood generation-two way generation.
Fuel cells: Principle of fuel cells, Faraday's laws, thermodynamic aspects. Performance limiting factors of fuel cells-reactivity-invariance,electrode losses-chemical polarization-concentration polarization-resistance po;arization, types of fuel cells-hydrogen-oxygen fuel cells-biochemical cells-regenerative cells

Unit-V
Direct Energy Conversion: Need for DEC, Carnot cycle, limitations. Principles of DEC. Thermoelectric generators, Seebeck, Peltier and Joule Thompson effects,

figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects.

Text Books:

1. Renewable Energy Sources by john Twidell and Anthony D Weir. 2nd edition,2005
2. Non- Conventional Energy sources by G.D.Rai.-Khanna publication ,New delhi-2007

References:

1. Solar energy by Sukhatme.
2. Non- Conventional Energy by Ashok V.Desai, Wiley Eastern.New Delhi,1990
3. Non- Conventional Energy systems by K.M.Mittal, Wheeler.-1997
4. Renewable Energy technologies by R.Ramesh and K.Uday Kumar, Narosa.
5. Solar power engineering by B.S.Mangal, 1st edition-TMH,1990
6. Principles of Solar energy by Frank Kreith and John F.Kreider.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Dept. Elective-III
EURME 843/EIRME 843: TOTAL QUALITY MANAGEMENT

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I
Introduction to TQM: Fundamentals of quality thinking and TQM. Understanding variation. Control charts and statistical analysis.

Unit-II
Concepts of TQM: Philosophy of TQM, Customer focus, Organization, Top management commitment, Team work, Quality philosophies of Deming, Crossby and Muller.

Unit-III
TQM process: QC tools, Problem solving methodologies, New management tools, Work habits, Quality Circles, Bench marking, Strategic quality planning.

Unit-IV
TQM Systems: Quality policy deployment, Quality function deployment, Standardization, Designing for quality, Manufacturing for quality.

Unit-V
Quality System: Need for ISO 9000 system, Advantages, Clauses of ISO 9000, Implementation of ISO 9000, Quality costs, Quality auditing, Case studies.

Text Book:

1. Total Quality Management, Rose, J.E., Kogan Page Ltd., 1993

References:

1. The Essence of Total Quality Management by John Bank, PHI, 1993.
2. Beyond Total Quality Management by Greg Bounds, Lyle Yorks et al, McGraw Hill, 1994.
3. The Asian Productivity Organization by Takashi Osada, 1991.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Dept. Elective-III
EURME 844/EIRME 844: ADVANCES IN MANUFACTURING TECHNOLOGY

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Advanced Forming techniques: High energy rate forming, forming under hydro static pressure, forming with superimposed vibrations, forming by exploiting special material properties, tools for metal forming, Electromagnetic forming, hydro static extrusion process, thermo – mechanical treatment.

Unit-II

Advanced Casting techniques: Foundry mechanization Ceramic mould casting-solid ceramic moulding, plaster mould casting, vacuum moulding, cavity less casting. Casting design considerations, analysis of defects in castings- diagnosis and rectification. Mechanisation and Automation in Foundries, Use of robots in foundry shop.

Unit-III

Advanced Welding techniques: Electron Beam Welding, Laser Beam welding, Plasma Arc Welding, Explosive welding, Diffusion welding. Inspection of welds, Destructive and non destructive testing.

Unit-IV

Heat Treatment & Surface Treatment of castings, forgings, welded joints and powdered components. Surface coatings.

Unit-V

Introduction to recent trends in manufacturing- Just in time, rapid prototyping, concurrent engineering, re-engineering concept, agile manufacturing, Lean production.

Text books:

1. Welding & welding Technology, Richard Little, 1st edition, Tata McGraw Hill, 2001.
2. Principles of Metal Casting, Phillip C Rosenthal, 2nd Edition, TMH, 2001.
3. Welding Engineering Technology, Dr. R. S. Parmar, 2nd Edition, Khanna publications
4. Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R.Schmid, 4th edition, Pearson Education, 2012.

References:

1. Hand Book on Metal forming, KURT Lange, McGraw Hill, 1985
2. Tool and Manufacturing Engineers Hand Book, Society of Manufacturing engineers, 1992
3. Modern Welding by Althouse ,Turnquist, Bowditch, Goodheart-Willcox Publisher, 2004
4. Heat Treatment, T.V.Rajan, C.P. Sarma, PHI Learning, 2006
5. Mechanical Metallurgy, George Dieter, Tata McGraw Hill, 2010
6. Principles of Foundry Technology, P.L.Jain, 5th Edition, Tata McGraw Hill, 2009

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester – Dept. Elective-III
EURME 845/EIRME 845: ENGINEERING OPTIMIZATION

Hours per week: 3 End Examination: 60 Marks
Credits: 3 Sessionals: 40 Marks

Unit-I

Introduction to optimization: Introduction, engineering applications of optimization, statement of an optimization problem-design vector, design constraints, constraint surface, objective function, classification of optimization problems, optimization techniques.

Classical optimization techniques: Introduction, single variable optimization, multi variable optimization with no constraints, multi variable optimization with equality and inequality constraints-Kuhn-tucker conditions, constraint qualification.

Unit-II

Non-linear programming I: Introduction, unimodal function, elimination methods-unrestricted search, exhaustive search, dichotomous search, interval halving method, Fibonacci method, golden section method, interpolation method, cubic interpolation method, direct root methods-Newton method, secant method.

Unit-III

Non linear programming II: Introduction, classification of unconstrained minimization methods, random search methods, univariate method, pattern directions, Hooke and Jeeves method, Powell's method, indirect search methods- steepest descent method (Cauchy's).

Unit-IV

Non linear programming III : Introduction, Characteristics of a constrained problem, Direct methods- Random search methods, Complex method, Sequential linear programming, Basic approach in the methods of feasible directions, Indirect methods-Transformation techniques, Basic approach of the penalty function method.

Unit-V

Integer Programming : Introduction, Graphical Representation, Gomory's cutting plane method, Balas algorithm for zero-one programming, Integer Non linear Programming - Integer Polynomial programming, Branch-and- bound method, generalized penalty function method.

Text books:

1. Engineering optimization theory and practice by S.S.Rao. John Wiley & Sons. 4th ed. 2009.
2. **References:**
   1. Optimization Design by Kalyan moy Deb
   2. Operations Research by S.D.Sharma.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Inter Dept. Elective-I
EURME 852/EIRME 852: DATABASE MANAGEMENT SYSTEMS

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I
Introduction to DBMS – Overview, File system vs DBMS, Advantages of DBMS, Storage data, queries, Transaction Management, DBMS Structure

Unit-II
E-R model Entities, Attributes and Entity sets, Relation ship and Relation ship sets, Features of ER model, Conceptual database design with ER model.

Unit-III
Relational model – integrity constraints over relations and enforcement, Querying relation data, Logical database design, views, destroying/altering tables and views.Relational algebra and calculus

Unit-IV
SQL – Basic SQL, Query, union, interest, except, Nested Queries, Aggregated Operation, Null values, Embedded SQL, cursors, ODBC and JDBC, Triggers and Active database, designing active databases

Unit-V
Transaction management, concurrency control & crash recovery – Transaction concept, transactions and schedules, concurrent execution of transactions, lock – based concurrency control, crash recovery.
Case Study: Oracle0i (SQL, PL/SQL & Triggers)

Text Books:
1. Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke McGraw-Hill
2. Data System Concepts – H.F.Korth and A.Silberschatz McGraw-Hill

Reference:
1. Fundamentals of Database System – R.El. Masri and S.B.Navathe

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Inter Dept. Elective-I
EURME 853/EIRME 853: SOFTWARE ENGINEERING

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I
Introduction - Software problem-Software Engineering Problem-Software Engineering Approach

Unit-II
Software Process-Software Process-Characteristics of Software Process-Software Development Process – Project management process – Software Configuration Management Process – Process Management Process.

Unit-III
Software Requirements Analysis & specification – Software Requirements – Problem Analysis – Requirements Specifications – Validation – Metrics

Unit-IV
Planning a Software Project – Cost Estimation – Project Scheduling – Staffing & personnel Planning – Software Configuration Management plans – Quality Assurance Plans

Unit-V
Function Oriented Design – Design Principles – Module Level Concepts – Design Notation and Specifications – Structured Design Methodologies – Verification – Metrics
Testing – Testing Fundamentals – Functional Testing – Structural Testing – Testing Procedure

Text Book:
1. An Integrated Approach to Software Engineering by Pankaj Jalot – Narosa Publishers

Reference:
1. Software Engineering a practitioner's approach by Pressman

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Inter Dept. Elective-I
EURME 856/EIRME 856: ARTIFICIAL INTELLIGENCE

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I
Introduction to Artificial Intelligence, Artifical Intelligence Problems, Artificial Intelligence Techniques, problems, problem space and search-defining the problem as a state space search, Production System, Problem Characteristics.
Heuristic Search Technologies Generate & Test Hill Climbing, Best First search, Problem reduction, Constraint satisfaction, Means Endo Analysis

Unit-II
Knowledge Representation Knowledge using predicate logic representing simple facts in logic, representing instance and is relationship, computable functions and predicates resolution.

Unit-III
Representing Knowledge Using Rules: Procedural Vs Declarative knowledge, Logic programming, Forward Vs backward Reasoning, Matching, Control Knowledge.

Unit-IV
Symbolic Reasoning under uncertainty – Introduction to Non-monotonic Reasoning, logics for Non-monotonic Reasoning, Implementation: depth first search – Dependency – Directed Backtracking. Justification – based truth maintenance, logic based truth maintenance systems Statistical Reasoning

Unit-V
Probability and bayes theorem, Certainity factors and rule – base systems beyesian networks, dempst6er – Shaffer theory.
Wek & Strong Slot and Filler Structures Sematic nets, Frames, Conceptual dependencies, Scripts

Text Book:
1. Artificial Intelligence – Rich E & Knight K TMH 1991

Reference:
1. Artificial Intelligence structures and strategies complex problem solving – George F-Lugar Pearson Education.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester - Inter Dept. Elective-I
EURME 8511/EIRME 8511: NEURAL NETWORKS & FUZZY LOGIC

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I

Fundamentals of artificial Neural Networks: Biological neurons and their artificial models, Neural processing, learning and Adaptation, Neural Network Learning Rules – Hebbian, perceptron, delta, widrow – hoff, correlation, winner – take –all, outstar learning rules.

Unit-II

Single Layer Perceptions: Multi player Feed forward Networks-Error back propagation training algorithm, problems with back propagation, Boltzmann training, Cauchy training, Combined back propagation/Cauchy training.

Unit-III

Hopfield networks: Recurrent and Bi-directional Associative Memories, Counter Propagation Network, Artificial Resonance Theory (art).

Unit-IV

Applications of Neural networks: Handwritten digit and character recognition, Traveling salesman problem, Neuro controller – inverted pendulum controller, cerebellar model articulation controller, Robot kinematics, Expert systems for Medical Diagnosis.

Unit-V

Introduction to fuzzy set theory: classical set Vs fuzzy set, properties of fuzzy sets, operations on fuzzy sets – union, intersection, complement, T-norm and co T-norm.

Fuzzy relations: Operations on fuzzy relations, cylindrical extensions Inference rules, compositional rule of inference.

Text Books:

1. Introduction to artificial Neural System, S.M.Zurada, Jaico Publishing, House,(1992)

References:

2. Neural Computing – Theory and Practice, Philip D.Wesserman, Van Nostrand Rein hold, New York (1989)
3. Neural Networks and Fuzzy Systems, Bart Kosko, Prentice Hall, NJ, (1992)
4. Fuzzy sets, Uncertainty, and Information, G.J.Klir, T.A.Folger, Prentice Hall of India, New Delhi 1988
5. An Introduction to Fuzzy Control, D.Driankov, H.Hellen Doorn, M.Reinfrank,Narosa Publishing House New Delhi 1993.
6. Essential of Fuzzy Modeling and Control, R.K.Yager, D.P.Filev, John Wiley & Sons, Inc, NY 1994.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Inter Dept. Elective-I
EURME 8518/ EIRME 8518: DATA STRUCTURES

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I

Introduction to data types, Data structures and abstract data type (ADT), Complexity analysis of algorithms; List, Stack, Queue and Recursion.

Unit-II

Tree-Terminology, tree as ADT and data structure, Binary tree, BST, AVL trees, B Trees, Bit vector and link list implementation of a set, sets with MERGE and FIND operation, Implementation of dictionary, hash table, priority queue.

Unit-III

Graph – Definition and representation, directed graph, single source shortest path, all pair shortest path, directed acyclic graph (DAG), minimum cost spanning tree, traversal, articulation point and bi connected components.

Unit-IV

Sorting and searching – Bubble sort, Insertion sort, Quick sort, merge sort, heap sort, binary search.

Unit-V

Issues in memory management, storage allocation, garbage collection, compaction.

Text Book:

1. Fundamentals of Data Structures by E. Horowitz, S. Sahni, Galgotia Publishers.

References:

1. Data structures using C/C++ by Tanenbaum, A.S., Langsam, Y and Augenstein, M..J., PHI
2. Data Structures by V. Aho, J.D. Ullman, Addision Wesley.
3. The art of Computer Programming by D. E. Knuth, Narosa Publishers. (Vol.1)
5. Algorithms, Data Structures, Programs by N. Wirth, Prentice Hall India

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Inter Dept. Elective-I
EURME 862/EIRME 862: OPERATING SYSTEMS

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I

Operating systems: Introduction, fundamentals, definition, Types of O.S, Batch Processing Systems, multiprogramming catch systems, time sharing systems, distributed systems, real time systems, services, system calls, system programs.

Unit-II

Process management , Process concept, Process scheduling, operations on processes, cooperating processes, threads, inter-process communications. CPU Scheduling - Scheduling algorithms, multiple processor and real time scheduling. Process synchronization –Critical lsection problems, semaphores.

Unit-III

Leadlocks, Characterization, handling, Prevention, Avoidance, Detection & Recovery.

Unit-IV

Storage management: Memory management – swapping, paging, segmentation, segmentation& paging. Virtual memory – What is virtual memory? Demand Paging, Page Relacement, frames, thrashing demand segmentation.

Unit-V

Case study: UNIX, Fundamental Concepts in UNIX, MS-DOS, Fundamental Concepts in MS-DOS.

Text Book:

1. Applied Operating Systems Concepts – Avil Silberschatz &j Peter Galvin, Grey Gagne

Reference:

1. Modern Operating Systems – Andrew S. Tanenbaum, PHI

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Inter Dept. Elective-I
EURME 863/EIRME 863: WEB TECHNOLOGY

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I
Introduction to Web Technology: Internet, WWW, Web Browsers, Web Servers, URL.

Unit-II
Introduction to HTML & DHTML: Syntax, Forms, Cascade Style Sheets.

Unit-III
The Basic of java Script, Perl, Primitives, Operator and Expression. Dynamic Document with Java Script.

Unit-IV
Introduction to Java Servelets Programming., Introduction to Applet Programming.

Unit-V
Structure of Web Application, Deploying Web Application.

Text Book:

1. Programming the World Wide Web by Robert W Sebesta

References:

1. Professional Java Servelets 2.3 by John Bell Wrox Publical
2. Beginners PHP, Apache, MY Sql, Web Development, by Michael Glass Wrox.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester – Inter Dept. Elective-II
EURME 8620/EIRME 8620: DATA MINING

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I

Introduction to Database systems: Advantages & disadvantages of DBMS, structure of DBMS, ER-model, relational model, SQL (structured query language)

Unit-II

Introduction to Data Mining: What is Data Mining? Data Mining on what kind of data, Data Mining functionalities, classifications of Data Mining systems, major issues in Data Mining.

Data Mining functionalities: Concept description, characterization and comparision, analytical characterization, mining comparision, mining descriptive statistical measures in large databases.

Unit-III

Data Warehouse and OLAP technology for Data Mining: What is Data ware house? A multi dimensional data model, data ware house architecture.

Mining association rules in large databases: Association rule mining, apriori algorithm, multi level association rules, association mining to correlation analysis, constraint based association mining.

Unit-IV

Classification and prediction: What is classification? What is prediction? Classification by decision tree induction, Bayesian classification, Classification by back propagation.

Prediction: Linear and multiple regression, non linear regression classifier accuracy.

Unit-V

Cluster analysis: What is cluster analysis? Types of data in cluster analysis, categorization of clustering methods (1) Partitioning methods(2) Hierarchical method(3) Density based method (4) grid based method (5) model based cluster methods

Text book:

1. Data Mining by Jiawei Han & Micheline Kamber, Morgan Kaufmann publishers, 2001 ISBN -81-7867-023-2.

References:

1. Advanced Data Mining by Margret H –Dunham, Pearson edn
2. Data Mining by Sushmita Mitra and Tinku Acharys, Wiley publishers.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
Inter Dept. Elective-II
EURME 8621/EIRME 8621: MICRO PROCESSORS APLLICATION IN MECHANICAL ENGINEERING

Hours per week: 4 End Examination: 60 Marks
Credits: 4 Sessionals: 40 Marks

Unit-I
Introduction to semiconductor memories Ram/ROM/PROM/EPROM/EAPROM/static and dynamic RAMs.

Unit-II
8 bit Microstructure (mCS-51 family-8051 as typical example), architecture, Instructional set, features, Special stress on bit manipulation. RS-232C serial interface. ADC/DAC : Basic of ADC/DAC (Block level)

Unit-III
Study of PC based data acquisition cards. Multiplexing of i/p of A/D , scanning rates , using software for acquisition, manipulation and plotting of results like temperature monitoring along with pressure output relay driving capacity etc.

Unit-IV
Study of PLC application in details : Ladder diagram development in detail . Application of PLC to CNC machine , boiler , cooling equipment as case studies . Furnaces.

Unit-V
Study or microprocessor based smart instruments, smart control valves and control systems. Explanation of smart features for two or three types of equipment like weighing machine , pH transmitter, differential pressure transmitter etc. (Note : it is necessary to demonstrate some of the concepts mentioned above)

References:

1. Intel Manuals
2. K .J. Ayala, The 8051 Microcontroller: Architecture, programming and application, Penram International Published, India.
3. S.Y. Boyer, SCADA , ISA Publications
4. John Webb, PLC, Otter.
5. B .E. Noltingk, Instrumentation's Reference Book, Butterworth International Edition.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
EURME 811: PROJECT WORK

Hours per week: 12 End Examination: 50 Marks
Credits: 6 Sessionals: 50 Marks

1. Fabrication of models ,machines, prototypes based on new ideas, robots and machines based on hitech systems. Experimental set ups, energy audit/ conservation studies of a departmental or a section in an organization/plant. Fabrication of testing equipment, renovation of machines, etc. Above work to be taken up individually or in groups. The group shall not be more than 4 students. A detail report on the work done shall include project specifications, design procedure, drawings, process sheets, assembly procedure, test results, costing etc.

   Guidelines for project report:
   a) Report shall be typed or printed
   b) Figures and tables shall be on separate pages and attached at respective positions.
   c) Project title and approval sheet shall be attached at the beginning of the report followed by index and synopsis of the project.
   d) Reference shall be mentioned at the end of the followed by appendices (if any)
   e) When a group of students is doing a project, names of all the students shall be included on every certified report copy.
   f) Each group of students shall submit two copies of reports to the institute and one copy for each individual students.
   g) In case of sponsored projects, the students shall obtain certificate from sponsor and attach it to the report.

OR

2. Computerbased design/analysis or modeling/simulation of products (s) mechanism (s) or system (s) and its validation or comparison with available bench marks/results. Oral shall be based on the project done by the students, jointly conducted by an internal and an external examiners appointed, at the end of Part II.

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
EURME 812: Innovative/Creative Lab

Credits: 2 End Examination: 100 Marks

B.Tech. Four Year Degree
Mechanical Engineering-Eighth Semester
EURME 813: Comprehensive Viva-Voce

Credits: 2 End Examination: 100 Marks