

Study & Evaluation Scheme

of

Bachelor of Technology (Mechanical Engineering)

[Applicable w.e.f. Academic Session 2011-12 till revised]
(Revised & updated in August 2011)



TEERTHANKER MAHAVEER UNIVERSITY

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TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)

Delhi Road, Bagarpur, Moradabad (U.P)

Study & Evaluation Scheme of Bachelor of Technology SUMMARY

Programme	:	B.Tech. (Mechanical Engineering)
Duration	:	Four year full time (Eight Semesters)
Medium	:	English
Minimum Required Attendance	:	75 %
Credit	:	
Maximum Credit	:	254
Minimum credit required for the degree	:	246
Assessment	:	

Internal	External	Total
30	70	100

Internal Evaluation (Theory Papers)

Class Test I	Class Test II	Class Test III	Assignment(s)	Other Activity (including attendance)	Total
Best two out of the three					
10	10	10	5	5	30

Evaluation of Practical/Industrial Training/ Project

Internal	External	Total
50	50	100

Duration of Examination

External	Internal
3 hrs.	1 ½ hrs

To qualify the course a student is required to secure a minimum of 40 % marks in aggregate including the semester end examination and teachers continuous evaluation.(i.e. both internal and external).

A candidate who secures less than 40% of marks in a course shall be deemed to have failed in that course. The student should have at least 50% marks in aggregate to clear the semester. In case a student has secured more than 40% in each course, but less than 50% overall in a semester, he/she shall re-appear in courses where the marks are less than 50% to achieve the required aggregate percentage (of 50%) in the semester.

Question Paper Structure

- The question paper shall consist of eight questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 4 marks each).
- Out of the remaining seven questions, student shall be required to attempt any five questions. There will be minimum one and maximum two questions from each unit of the syllabus. The weightage of Question No. 2 to 8 shall be 10 marks each.

Study & Evaluation Scheme
Programme: B. Tech. (Computer Science & Engineering)
Semester I

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS101	Engineering Mathematics-I	3	2	-	4	30	70	100
2	EAS102	Physics	3	2	-	4	30	70	100
	EAS103	Chemistry							
3	EME101	Engineering Mechanics	3	2	-	4	30	70	100
	EME102	Manufacturing Science							
4	ECS101	Computer Basics & 'C' Programming	3	2	-	4	30	70	100
	EAS 104	Environmental Science							
5	EEE101	Basic Electrical Engineering	3	2	-	4	30	70	100
	EEC101	Basic Electronics Engineering							
6	EHM101	Foundation English-I	2	-	2	3	30	70	100
7	EAS151	Physics (Lab)	-	-	3	2	50	50	100
	EAS152	Chemistry (Lab)							
8	EME151	Engineering Mechanics(Lab)	-	-	3	2	50	50	100
	EME152	Engineering Drawing (Lab)							
9	ECS151	Computer Basics & 'C' Programming (Lab)	-	-	3	2	50	50	100
	EME153	Workshop Practice (Lab)							
10	EEE151	Basic Electrical Engineering (Lab)	-	-	3	2	50	50	100
	EEC151	Basic Electronics Engineering (Lab)							
11	EGP171	Discipline & General Proficiency	-	-	-	1	100	-	100
Total			17	10	14	32	480	620	1100

Semester II

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS201	Engineering Mathematics-II	3	2	-	4	30	70	100
2	EAS202	Physics	3	2	-	4	30	70	100
	EAS203	Chemistry							
3	EME201	Engineering Mechanics	3	2	-	4	30	70	100
	EME202	Manufacturing Science							
4	ECS201	Computer Basics & 'C' Programming	3	2	-	4	30	70	100

	EAS204	Environmental Science								
5	EEE201	Basic Electrical Engineering	3	2	-	4	30	70	100	
	EEC201	Basic Electronics Engineering								
6	EHM201	Foundation English –II	2	-	2	3	30	70	100	
7	EAS251	Physics (Lab)	-	-	3	2	50	50	100	
	EAS 252	Chemistry (Lab)								
8	EME251	Engineering Mechanics (Lab)	-	-	3	2	50	50	100	
	EME 252	Engineering Drawing (Lab)								
9	ECS251	Computer Basics & 'C' Programming (Lab)	-	-	3	2	50	50	100	
	EME 253	Workshop Practice (Lab)								
10	EEE 251	Basic Electrical Engineering (Lab)	-	-	3	2	50	50	100	
	EEC 251	Basic Electronics Engineering (Lab)								
11	EGP271	Discipline & General Proficiency	-	-	-	1	100	-	100	
		Total	17	10	14	32	480	620	1100	

Semester III

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME 301	Strength of Material	3	2	-	4	30	70	100
2	EME 302	Engineering Thermodynamics	3	2	-	4	30	70	100
3	EME 303	Machine Drawing	3	2	-	4	30	70	100
4	EME 304	Material Science	3	2	-	4	30	70	100
5	EME 305	Industrial Engineering	3	2	-	4	30	70	100
6	EHM 301	Professional Writing	2	-	2	3	30	70	100
7	EME 351	Machine Drawing Lab	-	-	4	2	50	50	100
8	EME 352	Material Science Lab	-	-	4	2	50	50	100
9	EME 353	Thermodynamics Lab	-	-	4	2	50	50	100
10	EGP371	Discipline & General Proficiency	-	-	-	1	100	0	100
		Total	17	10	14	30	430	570	1000

Semester IV

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME 401	Production Technology - I	3	2	-	4	30	70	100
2	EME 402	Measurement, Metrology & Control	3	2	-	4	30	70	100
3	EHM 403	Operation Research	3	2	-	4	30	70	100
4	EME 404	Numerical Techniques	3	2	-	4	30	70	100
5	EME 405	Fluid Mechanics	3	2	-	4	30	70	100
6	EHM 401	Technical Communication	2	-	2	3	30	70	100
7	EME 451	Production Technology-I Lab	-	-	4	2	50	50	100
8	EME 452	Measurement, Metrology & Control Lab	-	-	4	2	50	50	100
9	EME 455	Fluid Mechanics Lab	-	-	4	2	50	50	100
10	EGP471	Discipline & General Proficiency	-	-		1	100	0	100
Total			17	10	14	30	430	570	1000

Semester V

Sl. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME 501	Production Technology –II	3	2	-	4	30	70	100
2	EME 502	Metallurgy	3	2	-	4	30	70	100
3	EME 503	Theory of Machines	3	2	-	4	30	70	100
4	EME 504	Design of Machine Elements	3	2	-	4	30	70	100
5	EME 505	Heat & Mass Transfer	3	2	-	4	30	70	100
6	EHM 501	Technical Writing	2	-	2	3	30	70	100
7	EME 551	Design of Machine Elements Lab	-	-	4	2	50	50	100
8	EME 552	Production Technology Lab	-	-	4	2	50	50	100
9	EME 553	Heat & Mass Transfer Lab	-	-	4	2	50	50	100
10	EME 591	Industrial Training & Presentation	-	-	-	2	50	50	100
11	EGP571	Discipline & General Proficiency	-	-		1	100	-	100
Total			17	10	14	32	480	620	1100

Semester VI

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME 601	Refrigeration & Air Conditioning	3	2	-	4	30	70	100
2	EME 602	IC Engines	3	2	-	4	30	70	100
3	EME 603	Mechanical Vibrations	3	2	-	4	30	70	100
4	EME 604	Dynamics of Machine	3	2	-	4	30	70	100
5	EHM601	Communication Technique	2	-	2	3	30	70	100
6	EHM 602	Operations Management	3	2	-	4	30	70	100
7	EME 651	Refrigeration & Air Conditioning Lab	-	-	4	2	50	50	100
8	EME 652	Mechanical Vibrations Lab	-	-	4	2	50	50	100
9	EME653	Dynamics of Machine Lab	-	-	4	2	50	50	100
10	EGP671	Discipline & General Proficiency	-	-		1	100	-	100
Total			17	10	14	30	430	570	1000

Semester VII

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME 701	Computer Aided Design(CAD)	3	2	-	4	30	70	100
2	EME 702	Auto Mobile Engineering	3	2	-	4	30	70	100
3	EME 703	Power Plant Engineering	3	2	-	4	30	70	100
4	EHM 701	Corporate Communication	2	-	2	3	30	70	100
Lab									
5	EME 751	CAD Lab	-	-	4	2	50	50	100
6	EME 752	Auto Mobile Engineering Lab	-	-	4	2	50	50	100
Elective I# – Select any one course									
7	EME 704	Computer Aided Manufacturing (CAM)	3	2	-	4	30	70	100
	EME 705	Non Destructive Testing							
Elective I# - Lab – Same as one selected from column above									
8	EME 753	Computer Aided Manufacturing (CAM) Lab	-	-	4	2	50	50	100
	EME 754	Non Destructive Testing Lab							
Elective II – Select any one course									
9	EME 706	Engineering Materials	3	2	-	4	30	70	100
	EME 707	Hydraulics Machines							
10	EME 799	Industrial Training & Presentation			-	4	50	50	100
11	EGP 771	Discipline & General Proficiency	-	-	-	1	100	-	100
Total			17	10	14	34	480	620	1100

Lab and elective subject should be same.

Semester VIII

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME801	Mechatronics	3	2	-	4	30	70	100
2	EME802	Total Quality Management	3	2	-	4	30	70	100
3	EME803	Unconventional Manufacturing Process	3	2	-	4	30	70	100
4	EHM 801	Industrial Sociology & Professional Ethics	2	2	-	3	30	70	100
Lab									
5	EME851	Mechatronics Lab	-	-	4	2	50	50	100
6	EME852	Unconventional Manufacturing Process Lab	-	-	4	2	50	50	100
Elective I – Select any one course									
7	EME804	Energy Management Product Development & Design	3	2	-	4	30	70	100
	EME805								
Elective II – Select any one course									
8	EME 806	Environmental Protection and Management	3	2	-	4	30	70	100
	EME807	Thermal Turbo Machines							
9	EME899	Project Work	-	-	6	6	50	50	100
10	EGP 871	Discipline & General Proficiency	-	-	-	1	100	-	100
Total			17	12	15	34	450	550	1000

Semester I
ENGINEERING MATHEMATICS-I

Course Code: EAS101

L	T	P	C
3	2	0	4

Objective:

- To familiarize the basic of matrix, Differential Calculus, Multiple Integrals, and Vector Calculus.
- To solve all problems related to matrix, calculus, and vectors.

Course Contents

Unit I

Matrices: Elementary row and column transformation, Rank of matrix, Linear dependence, Consistency of linear system of equations, Characteristic equation, Caley- Hamilton Theorem, Eigen values and Eigen vectors, Diagonalisation, Complex and unitary matrices. **(Lectures 08)**

Unit II

Differential Calculus-I: Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of function of several variables **(Lectures 08)**

Unit III

Differential Calculus-II: Jacobian, Approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications). **(Lectures 08)**

Unit IV

Multiple Integrals: Double and triple integral, Change of order, Change of variables, Beta and Gamma functions, Application to area, volume, Dirichlet integral and applications. **(Lectures 08)**

Unit V

Vector Calculus: Point functions, Gradient, divergence and curl of a vector and their physical interpretations, Line, Surface and Volume integrals, Greens, Stokes and Gauss divergence theorem. **(Lectures 08)**

Text Books

1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers.
2. Prasad C., *Engineering Mathematics for Engineers*, Prasad Mudralaya
3. Das H.K., *Engineering Mathematics Vol-I*, S. Chand, New Delhi

Reference Books

1. Kreyszig E., *Advanced Engineering Mathematics*, Wiley Eastern
2. Piskunov N., *Differential & Integral Calculus*, Moscow Peace Publishers.
3. Narayan Shanti, *A Text book of Matrices*, S. Chand
4. Bali N.P., *Engineering Mathematics-I*.

*** Latest editions of all the suggested books are recommended.**

Semester I/II PHYSICS

Course Code: EAS102/EAS 202

L	T	P	C
3	2	0	4

Objective:

- To understand the fundamentals of physics like interference, diffraction, lasers etc.

Course Contents

Unit I

Relativistic Mechanics: Inertial and Non- inertial Frames, Michelson-Morley Experiment, Postulates of Special Theory of Relativity, Galilean and Lorentz Transformation, Length Contraction and Time Dilation, Addition of Velocities, Mass Energy Equivalence and Variation of Mass with Velocity. **(Lectures 08)**

Unit II

Interference: Coherent Sources, Conditions of Interference, Fresnel's Biprism Experiment, Displacement of Fringes, Interference in Thin Films, Wedge Shaped Film, Newton's Rings.

Diffraction: Single and N-Slit Diffraction, Diffraction Grating, Rayleigh's criterion of resolution, Resolving Power of Telescope, Microscope and Grating. **(Lectures 08)**

Unit III

Polarization: Phenomenon of Double Refraction, Ordinary and Extra-ordinary Rays, Nicol Prism, Production and Analysis of Plane, Circularly and Elliptically Polarized Light, Fresnel Theory, Optical Activity, Specific Rotation, Polari meter.

Laser: Principle of Laser Action, Einstein's Coefficients, Construction and Working of He-Ne and Ruby Laser. **(Lectures 08)**

Unit IV

Electromagnetic: Ampere's Law and Displacement Current, Maxwell's Equations in Integral and Differential Forms, Electromagnetic Wave Propagation in Free Space and Conducting Media, Poynting Theorem.

(Lectures 08)

Unit V

Magnetic Properties of Materials: Basic Concept of Para, Dia and Ferro-Magnetism, Langevin's Theory of Diamagnetism, Phenomenon of Hysteresis and Its Applications

X-Rays: Diffraction of X-Rays, Bragg's Law, Practical Applications of X-Rays, Compton Effect

(Lectures 08)

Text Books

1. Malik K. H., Engineering Physics, TMH
2. Subramanyam N, Optics, TMH
3. Vasudeva A S, Engineering Physics, Vol I & II S. Chand.

Reference Book

1. Gupta S. K., Engineering Physics, Krishna Prakashan.
2. Yadav V. S., Engineering Physics, TMH.
3. Mehta Neeraj, Engineering Physics Vol. I & II, PHI

* Latest editions of all the suggested books are recommended.

Semester I/II CHEMISTRY

Course Code: EAS103/EAS203

L	T	P	C
3	2	0	4

Objective:

- To understand the fundamentals of chemistry like Bonding, Pollution, Polymers, Water Chemistry, etc.

Course Contents

Unit I

Molecular theory of diatomic hetero-molecules, Band theory of bonding in metals, Hydrogen bonding.

Solid state Chemistry: Radius Ratio Rule, Space lattice (only cubes), Type of unit cell, Bragg's Law, Calculation of Density of unit cell. One & Two Dimensional solids, graphite as two dimensional solid and its conducting properties. Fullerene & its applications. **(Lectures 08)**

Unit II

Introduction of Polymers: Structures of the following polymers, viz., Natural and synthetic rubbers, Polyamide and Polyester fibres, polymethylmethacrylate, poly acrylonitrile and polystyrene. A brief account of conducting polymers (polypyrrole & polytriphenyl) & their applications. Order & Molecularity of reactions. First & Second order reactions. Energy of activation. Phase Rule: Its application to one component system (Water). Equilibrium Potential, Introduction of electrochemical cells & Types: Galvanic & Concentration cells, Electrochemical theory of corrosion & protection of corrosion. **(Lectures 08)**

Unit III

Water Chemistry: Hardness of water, softening of water by Lime Soda Process & Reverse osmosis. Treatment of boiler feed water by Calgon process, Zeolites and ion-exchange resins. Classification of fuels, Coal, Biomass & Biogas. Determination of gross and net calorific values using Bomb Calorimeter. **(Lectures 08)**

Unit IV

Environmental pollution: Types of pollution & pollutants, Air Pollution. Formation and depletion of ozone, smog and Acid rain.

Toxic chemicals in Environment: Basic concepts, Brief idea about the environmental impact of toxic chemicals specially, CO, N_xO_x , SO_x , O_3 , Pesticides, Environmental Management. **(Lectures 08)**

Unit V

Lubricants: Introduction to lubricants, Mechanism of lubrication, Classification of lubricants, Flash and fire points, Selection of lubricants. **(Lectures 08)**

Text Books

- Agarwal R. K., Engineering Chemistry, Krishna Prakashan.
- Morrison & Boyd, *Organic Chemistry*
- Lee I.D., *Inorganic Chemistry*
- Chawla Shashi, Engineering Chemistry, Dhanpat Rai Publication.

Reference Books

- Barrow, *Physical Chemistry*
- Manahan, *Environmental Chemistry*

* Latest editions of all the suggested books are recommended.

Semester I/II
ENGINEERING MECHANICS

Course Code: EME101/EME201

L	T	P	C
3	2	0	4

Objective:

- To study about mechanics, force system, torsion, beams, trusses, frames etc.

Course Contents

Unit I

Force system and Analysis: Basic concept: Laws of motion. Transfer of force to parallel position. Resultant of planer force system. Free Body Diagrams, Equilibrium and its equation.

Friction: Introduction, Laws of Coulomb, friction, Equilibrium of bodies involving dry friction-Belt Friction.

(Lectures 08)

Unit II

Structure Analysis: Beams; Introduction, Shear force and Bending Moment, shear force and Bending Moment Diagram for statically determinate beams.

Trusses: Introduction, Simple Trusses, Determination of Forces in simple trusses members, methods of joints and method of section.

(Lectures 08)

Unit III

Centroid and Moment of Inertia:

Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.

(Lectures 08)

Unit IV

Stress and Strain Analysis: Simple stress and strain; Introduction, Normal shear stresses, stress-strain diagrams for ductile and brittle materials, Elastic constants, one dimensional loading of members of varying cross sections.

(Lectures 08)

Unit V

Pure Bending of Beams: Introduction, Simple Bending theory, Stress in Beams of different cross sections.

Torsion: Introduction, Torsion of Shafts of circular section, Torque and Twist, Shear stress due to Torque.

(Lectures 08)

Text Books

1. Bansal R. K., *Engineering Mechanics*, Laxmi Publications
2. Kumar D. S., *Engineering Mechanic*,
3. Kumar K. L., Kumar V., *Engineering Mechanics*, Tata McGraw Hill Publication
4. Khurmi R. S., *Engineering Mechanics*, S. Chand Publications

Reference Books

1. Shames, *Engineering Mechanics*, Prentice Hall of India Pvt. Ltd.
2. Ryder G. H., *Strength of Materials*, MACMILLAN Publishers India Ltd.
3. Ramamruthams., *Strength of materials*, Dhanpat Rai Publications

*** Latest editions of all the suggested books are recommended.**

Semester I/II
MANUFACTURING SCIENCE

Course Code: EME102/EME202

L	T	P	C
3	2	0	4

Objective:

- To create awareness among students about manufacturing process like casting, metal forming, welding etc.

Course Contents

Unit I

Basic Metals & Alloys: Properties and Applications, Properties of Materials: Strength, elasticity, stiffness, malleability, ductility, brittleness, toughness, and hardness. Elementary ideas of fracture fatigue & creep.

(Lectures 08)

Unit II

Introduction to Metal Forming & Casting Process and its applications.

Metal Forming: basic metal forming operations & uses of such as: Forging, Rolling, Wire & Tube-drawing/making and Extrusion, and its products/application. Press-work, die & punch assembly, cutting and forming, its application. Hot-working versus cold-working.

Casting: Pattern & allowance. Molding sands its desirable properties. Mould making with the use of core. Gating system, Casting defects & remedies. Cupola Furnace, Die-casting and its uses.

(Lectures 08)

Unit III

Introduction to machining & Welding and its applications.

Machining: basic principles of Lathe-machine and operations performed on it. Basic description of machines and operations of Shaper-Planner, Drilling, Milling & Grinding.

Welding: Importance & basic concepts of welding, classification of welding processes, Gas-welding, types of flames. Electric-Arc welding. Resistance welding, Soldering, & Brazing and its uses.

(Lectures 08)

Unit IV

Introduction & Orthographic Projection: Graphics as a tool to communicate ideas, Lettering and Dimensioning, Construction of geometrical figures like pentagon and hexagon. Principles of orthographic projections, Principal and auxiliary planes, first and third angle projections. Projection of points, Lines and solids.

(Lectures 08)

Unit V

Principles of isometric projection, Isometric projection using box and offset methods.

(Lectures 08)

Text Books

1. Hajra & Bose, *Workshop Technology, Vol 1 & 2*, Roy Media Promoters
2. Bhatt, N.D., *Elementary Engineering Drawing*, Charohtar Publishing

Reference Books

1. Raghuvanshi, B.S., *Workshop Technology, Vol 1 & 2*, Dhanpat Rai & Sons
2. Laxmi Narayan & Vaish W, *A Text Book of Practical Geometrical Drawing*

*** Latest editions of all the suggested books are recommended.**

Semester I/II
COMPUTER BASICS & 'C' PROGRAMMING

Course Code: ECS101/ECS201

L	T	P	C
3	2	0	4

Objective:

- To know the basics of computers & C programming language.

Course Contents:

Unit I

Concepts in Computer Application: Definition of Electronic Computer, History, Generations, Characteristics and Application of Computers, Classification of Computers, Functional Component of Computer: CPU, I/O devices, Type of Memory & Memory Hierarchy, Firmware and Human ware.

Data and data types: definitions, data, data types: Integer, Character, Float, String, etc., Constants and Variable Declaration, Token, Keyboard, Identifier. **(Lectures 08)**

Unit II

Programming Language Classification & Computer Languages: Generation of Languages, Introduction to 4GLs. Translators: Assemblers, Compilers, Interpreters. Number System: Decimal, Octal, Binary and Hexadecimal & their Conversions. Various Code: BCD, ASCII and EBCDIC and Gray Code.

Operators and Expressions: Using numeric and relation operator, logical operator, bit operator, operator precedence and associativity. **(Lectures 08)**

Unit III

Internet and Web Technologies: Hypertext Markup Language, WWW, Gopher, FTP, Telnet, Web Browsers, Search Engines, Email.

Control Structure: while statement, if, else, Nested if else statement. Nested logic: for loop, do- while loop, loop inside a loop structure, Switch Statement. Use of break and default with switch.

(Lectures 08)

Unit IV

Concepts in Operating System: Elementary Concepts in Operating System, textual Vs GUI Interface.

Arrays: notation and representation, manipulating array elements, using multidimensional arrays.

(Lectures 08)

Unit V

Functions & Strings: definition, declaration, Call by Value, Call by Reference, returns values and their types. Function calls. **(Lectures 08)**

Text Books

1. Sinha P. K., Computer Fundamental
2. Yadav, DS, Foundations of IT, New Age, Delhi
3. Curtin, Information Technology: Breaking News, Tata Mc Graw Hill
4. Rajaraman, Introduction to Computers, Prentice-Hall India

Reference Books

1. Peter Nortans, Introduction to Computers, TME
2. Leon & Leon, Fundamental of Information Technology, Vikas Publishing
3. Kanter, Managing Information System,
4. CISTems, Internet: An Introduction, Tata McGraw Hill.

*** Latest editions of all the suggested books are recommended.**

Semester I/II
ENVIRONMENTAL SCIENCE

Course Code: EAS104/EAS204

L	T	P	C
3	2	0	4

Objective:

- To create awareness among students about environment protection.

Unit I

General: Definition, Scope, Segments of Environment and its Multidisciplinary Nature, Some Major Environmental Problems, Definition and Scope of Ecology. **(Lectures 08)**

Unit II

Ecology And Environment: Concept of an Ecosystem- its components and functions, Trophic Levels- Producer, Consumer and Decomposer, Energy Flow in an Ecosystem, Biogeochemical Cycles, Food Chain, Food Web and Ecological Pyramid. **(Lectures 08)**

Unit III

Air pollution: Various segments of Atmosphere and their Significance, Sources and Effects of Air Pollution, Classification of Air Pollutants, Stationary and Mobile Sources of Air Pollution, Photochemical Smog, Acid Rain, Global Warming (Greenhouse Effect), Ozone Layer - Its Depletion and Control Measures, El-Nino. **(Lectures 08)**

Unit IV

Water pollution: Water Resources of the Earth and Indian Scenario, Point and non-Point sources of Water Pollution, Treatment of Water Pollution, Eutrophication, Bio-Diversity- Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Deforestation- causes and effects, Biogeographical Classification of India. **(Lectures 08)**

Unit V

Soil pollution:-Sources and Consequences, Noise, Thermal - sources and consequences, Sustainable Development, Dams and Reservoirs- Their Benefits and Problems, Solid Wastes - Pollution, Treatment & Disposal, Environment Conservation Movement in India (Chipko Movement, Appiko Movement), Bioremediation, Biological Magnification. **(Lectures 08)**

Text Books

1. De A.K., *Environmental Chemistry*, New Age Publishers Pvt. Ltd.
2. Masters, G.M., *Introduction to Environmental Engineering and Science*, Prentice Hall India Pvt. Ltd.
3. Odum, E.P., *Fundamentals of Ecology*, W. B. Sannders Co.

Reference Books

1. Bryant,P.J., *Biodiversity and Conservation*, Hypertext Book
2. Tewari, Khulbe & Tewari, *Textbook of Environment Studies*, I.K. Publication
3. Trivedi, R.K., *Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II*, Environment Media

*** Latest editions of all the suggested books are recommended.**

Semester I/II
BASIC ELECTRICAL ENGINEERING

Course Code: EEE101/EEE201

L	T	P	C
3	2	0	4

Objective

- To understand the fundamental concept of Electrical Engineering like DC Network, AC Network, Measuring Instruments, Energy Conversion Devices etc.

Course Contents

Unit I

D.C. Network Theory: Circuit theory concepts-Mesh and node analysis. Network Theorems- Super-position theorem. Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Star Delta transformation.

(Lectures 08)

Unit II

Steady State Analysis of A.C. Circuits: Sinusoidal and phasor representation of voltage and current: single phase A.C. circuit behaviour of resistance, inductance and capacitance and their combination in series & parallel and power factor, series parallel resonance-band width and quality factor: magnetic circuit.

(Lectures 08)

Unit III

Measuring Instruments: Construction and principles of operation of voltage and current measuring instruments; introduction to power and energy meters.

Three Phase A.C. Circuits: Star-Delta connections, line and phase voltage/current relations, three phase power and its measurement.

(Lectures 08)

Unit IV

Transformer: Principles of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single phase transformer, O.C. and S.C. tests.

D.C. Machines: Principles of electromechanical energy conversion, types of D.C. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, Starter and speed control of D.C. Motors, their applications.

(Lectures 08)

Unit V

Three phase induction Motor: Principle of operation, types and methods of starting, slip-torque characteristics, applications.

Synchronous Machines: Principle of Operation of Alternator and synchronous motor

Single phase Motors: Principle of operation and methods of starting of induction motor,

(Lectures 08)

Text Books

1. V. Del Toro, *Principles of Electrical Engineering*, Prentice-Hall International.
2. W.H. Hayt & J.E. Kemmerly, *Engineering Circuit Analysis*, McGraw Hill.

Reference Books

1. Nagrath I.J., *Basic Electrical Engineering*, Tata McGraw Hill.
2. Fitzgerald A.E., D.E., Higginbotham and A Grabel, *Basic Electrical Engineering*, McGraw Hill.
3. Cotton H., *Advanced Electrical Technology*, Wheeler Publishing.

*** Latest editions of all the suggested books are recommended.**

Semester I/II

BASIC ELECTRONICS ENGINEERING

Course Code: EEC101/EEC201

L	T	P	C
3	2	0	4

Objective

- To understand the basic concept of Electronics Engineering like PN Junction, Bipolar Junction Transistor, Field Effect Transistor, Operational Amplifier etc.

Course Contents

Unit I

PN Junction: Properties of Elements, Crystal Structure, Energy band diagram, Introduction to PN-Junction, Depletion layer, V-I characteristics Diode Ratings (average current, peak-inverse voltage) p-n junction as rectifiers (half wave and full wave), filter, calculation of ripple factor and load regulation, clipping and clamping circuits. Zener diode and its application as shunt regulator. **(Lectures 08)**

Unit II

Bipolar Junction Transistor (BJT): Basic construction, transistor action, CB, CE and CC configurations, input/output characteristics, Biasing of transistors, Fixed bias, emitter bias, potential divider bias, Graphical analysis of CE amplifier, concept of Voltage gain current gain, λ -parameter model (low frequency). Computation of A_i , A_v , R_i , R_o of single transistor CE amplifier configuration. **(Lectures 08)**

Unit III

Field Effect Transistor (FET): Basic construction of JFET, Principle of working, concept of pinch-off maximum drain saturation current, input and transfer characteristics, Characteristics equation, CG, CS and CD Configuration, fixed and self biasing of JFET amplifier Introduction of MOSFET, Depletion and Enhancement type MOSFET-Construction, Operation and Characteristics. **(Lectures 08)**

Unit IV

Operational Amplifier (Op-Amp): Concept of ideal operational amplifier, ideal and practical Op-Am parameters, inverting, non-inverting and unity gain configurations. Applications of Op-Amp as adders, difference amplifiers, integrators and differentiator. **(Lectures 08)**

Unit V

Switching Theory: Number system, conversion of bases(decimal, binary, octal and hexadecimal numbers), Adder & Subtraction, BCD numbers, Seven Segment Display, Boolean Algebra, Logic gates, Concept of universal gates, Canonical forms, minimization using K-Map **(Lectures 08)**

Text Books

- Robert Boylestad *Electronic Circuit and Devices*
- Millman & Halkias, *Integrated Electronics*, McGraw Hill
- Millman & Halkias, *Electronics Devices and Circuits*, McGraw Hill
- Morris Mano M., *Digital Design*.

Reference Books

- Sedra and Smith, *Microelectronic Circuits*
- Gayakwad, R A, *Operational Amplifiers and Linear Integrated circuits*, PHI
- Chattopadhyay D and P C Rakshit, *Electronics Fundamentals and Applications*, New Age International.

*** Latest editions of all the suggested books are recommended.**

FOUNDATION ENGLISH - I

Course code: EHM101

(Common with BPH105/BED105/BAL101/AR107/BHM101/BFS106/BCA106/BBA106/ BCH106/ BFA103)

L	T	P	C
2	0	2	3

Course Contents:

Unit I

Functional Grammar: Patterns & Parts of speech Subject, Predicate, Noun, Pronoun, Adjective, Adverb, Verb, Verb phrases, Conjunction, Interjection. **(10 Hours)**

Unit II

Vocabulary: Word formation, Prefix, Suffix, Compound words, Conversion, Synonyms, Antonyms, Homophones and Homonyms, How to look up a dictionary. **(10 Hours)**

Unit III

Communication: Meaning & importance of communication, Barriers to effective communication, Channels of communication, Language as a tool of communication. **(10 Hours)**

Unit IV

Requisites of Sentence writing: Fragmented sentences, A good sentence, expletives, Garbled sentences, Rambling sentences, Loaded sentences, Parallel Comparison, Squinting construction, Loose & periodic sentences. **(10 Hours)**

Text Books:

1. Martin & Wren - *High School English Grammar & Composition*, S.Chand & Co. Delhi.
2. Lewis Norman - *Word Power made easy*, W.R.Goyal. Publication & Distributors Delhi.
3. Better Your English- A Workbook for 1st year Students- Macmillan India, New Delhi.

Reference Books:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.
2. Mohan Krishna & Banerji Meera, *Developing Communication Skills* – Macmillan India Ltd. Delhi.
3. Rosen Blum M., *How to Build Better Vocabulary* – Bloomsbury Publication. London.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

Semester I/II
PHYSICS (LAB)

Course Code: EAS151/EAS251

L	T	P	C
0	0	3	2

LIST OF EXPERIMENTS

1. To determine the wavelength of Sodium light by Newton's rings.
2. To determine the wavelength of Sodium light by Fresnel's Biprism.
3. To determine the Specific Rotation of the Cane sugar solution with the help of Polari meter.
4. To determine the wavelength of the sodium light by Michelson's interferometer.
5. To study the PN junction characteristics.
6. To determine the high resistance by Leakage method.
7. To study the energy band gap by four probe method.
8. To study the variation of magnetic field using Stewart and Gee's apparatus.
9. To determine the frequency of A.C. mains by means of a Sonometer.
10. To study the Hall Effect.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I/II
CHEMISTRY (LAB)

Course Code: EAS152/EAS252

L **T** **P** **C**
0 **0** **3** **2**

LIST OF EXPERIMENTS

1. To determine total alkalinity in the given water sample.
2. To determine the temporary and permanent hardness in water sample using EDTA as standard solution.
3. To determine the available chlorine in bleaching powder solution.
4. To determine the chloride content in the given water sample by Mohr's method.
5. To determine the pH of the given solution using pH meter and pH-metric titration.
6. To determine the Equivalent weight of Iron by the chemical displacement method.
7. To determine the Viscosity of an addition polymer like polyester by Viscometer.
8. To determine the dissolved oxygen present in a water sample.
9. To prepare the Bakelite resin polymer.
10. To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer.
11. To determine the carbon dioxide content in polluted water sample.
12. To find chemical oxygen demand of waste water sample by potassium dichromate.
13. To determine the total hardness in water sample using complexometric method.
14. To determine the iron content in the given sample using external indicator.
15. To determine the strength of given HCL solution by titrating against N/10 Standard Sodium hydroxide solution.

Note: Minimum of 10 experiments has to be completed for completion of curriculum.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I/II
ENGINEERING MECHANICS (LAB)

Course Code: EME151/EME251

L	T	P	C
0	0	3	2

(Any 10 experiments of the following or such experiments suitably designed)

LIST OF EXPERIMENTS

1. To conduct the tensile test and determine the ultimate tensile strength, percentage elongation for a steel specimen.
2. To determine the compression test and determine the ultimate compressive strength for a specimen
3. To conduct the Impact-tests (Izod / Charpy) on Impact-testing machine to find the toughness.
4. To determine the hardness of the given specimen using Vicker/ Brinell/Rockwell hardness testing machine.
5. Friction experiment(s) on inclined plane and/or on screw-jack.
6. Worm & worm-wheel experiment for load lifting.
7. Torsion of rod/wire experiment.
8. Experiment on Trusses.
9. Study of 2-stroke and 4 -stroke I.C.E. models.
10. To determine the velocity ratio, mechanical advantage & efficiency of a single purchase crab apparatus & draw a graph of load vs. effort, mechanical advantage and efficiency.
11. To determine the velocity ratio, mechanical advantage & efficiency of a double purchase crab apparatus.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I/II
ENGINEERING DRAWING (LAB)

Course Code: EME152/EME252

L T P C
0 0 3 2

Introduction: Graphics as a tool to communicate ideas, Lettering and dimensioning, Construction of geometrical figures like pentagon and hexagon.

Orthographic Projection: Principles of orthographic projections, Principal and auxiliary planes, First and Third angle projections. Projection of points. Pictorial view.

Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems.

Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other plane, Solids lying on a face or generator on a plane.

Sectioning of solids lying in various positions, True shape of the section.

Development of lateral surfaces, sheet metal drawing.

Isometric Projection: Principles of isometric projection, Isometric projection using box and offset methods.

Reference Books

1. Bhatt. N.D., *Elementary Engineering Drawing*, Charohtar Publishing.
2. Laxmi Narayan V & Vaish W., *A Text Book of Practical Geometry on Geometrical Drawing*.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I/II
COMPUTER BASICS & 'C' PROGRAMMING (LAB)

Course Code: ECS151/ECS251

L	T	P	C
0	0	3	2

Course Contents

1. WAP to calculate Sum & average of N numbers.
2. WAP to convert integer arithmetic to a given number of day and month.
3. WAP to find maximum and minimum out of 3 numbers a, b & c.
4. WAP to find factorial of positive integer.
5. WAP to find sum of series up to n number, 2+5+8+.....+n.
6. WAP to print all the number between 1 to 100 which are dividing by 7.
7. WAP to generate Fibonacci series up to n.
8. Write a function to calculate area of circle.
9. Write a recursive function to calculate factorial of given number.
10. WAP to find whether number is prime or not.
11. WAP to find that the enter character is a letter or digit.
12. WAP to find addition of two matrix of n*n order.
13. WAP to find multiplication of two matrix of n*n order.
14. WAP to add 6 digit numbers in even case & multiple 6 digit number in odd case.
15. WAP to find even or odd up to a given limit n.
16. WAP to find whether a given no is palindrome or not.
17. WAP to joining & Comparing the 2 string.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I/II
WORKSHOP PRACTICE (LAB)

Course Code: EME153/EME253

L	T	P	C
0	0	3	2

List of Experiments

Carpentry Shop:

1. Study of tools & operations and carpentry joints.
2. Simple exercise using jack plane.
3. To prepare half-lap corner joint, mortise & joints.
4. Simple exercise on woodworking lathe.

Fitting Bench Working Shop:

1. Study of tools & operations
2. Simple exercises involving fitting work.
3. Make perfect male-female joint.
4. Simple exercises involving drilling/tapping

Black Smithy Shop:

1. Study of tools & operations
2. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending & swaging.

Welding Shop:

1. Study of tools & operations of Gas welding & Arc welding
2. Simple butt and Lap welded joints.
3. Oxy-acetylene flame cutting.

Sheet-metal Shop:

1. Study of tools & operations.
2. Making Funnel complete with 'soldering'.
3. Fabrication of tool-box, tray, electric panel box etc.

Machine Shop:

1. Study of machine tools and operations.
2. Plane turning.
3. Step turning
4. Taper turning.
5. Threading

Foundry Shop:

1. Study of tools & operations
2. Pattern making.
3. Mould making with the use of a core.
4. Casting

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I/II
BASIC ELECTRICAL ENGINEERING (LAB)

Course Code: EEE151/EEE251

L T P C
0 0 3 2

LIST OF EXPERIMENTS

1. To study the KCL & KVL.
2. To study the Super position theorem.
3. To study the Thevenin theorem.
4. To study the Norton's theorem.
5. To study the Maximum Power theorem.
6. To determine the efficiency of single phase transformer by load test.
7. To determine the external characteristics of DC Shunt generator.
8. Speed control of D.C Shunt Motor.
9. To measure the power in a 3- ϕ system by two-wattmeter method
10. To improve the power factor in an RLC circuit using capacitor.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I/II
BASICS ELECTRONICS ENGINEERING (LAB)

Course Code: EEC151/EEC251

L T P C
0 0 3 2

LIST OF EXPERIMENTS

1. V-I characteristics of P-N junction diode.
2. Application of diode as clipper and clamper.
3. Half wave & Full wave rectifier.
4. I/P & O/P characteristics of transistor in CB configuration.
5. I/P & O/P characteristics of transistor in CE configuration.
6. Verify the truth table of half adder & full adder.
7. OP-amp as inverting & non Inverting amplifier using IC 741.
8. OP-amp as differentiator & Integrator.
9. Zener diode as a Shunt Regulator.
10. Verify the truth table of logic gates.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Semester I
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP171

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the students on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, talks by the invitees and special technical sessions organized from time to time.
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behavior in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
9. General behavior.

The above mentioned observational are an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of Cumulative Performance Index (CPI).

Semester II

ENGINEERING MATHEMATICS- II

Course Code: EAS201

L	T	P	C
3	2	0	4

Objective:

- To familiarize the basic concept of Differential Equations, Laplace Transform, Fourier series and Partial Differential Equations etc.

Course Contents

Unit I

Differential Equations: Ordinary differential equations of first order, Exact differential equations, Linear differential equations of first order, Linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solutions of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation). (Lectures 08)

Unit II

Series Solutions and Special Functions: Series solutions of ODE of 2nd order with variable coefficients with special emphasis to differential equations of Legendre, and Bessel. Legendre polynomials, Bessel's functions and their properties. (Lectures 08)

Unit III

Laplace Transform: Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step function. Dirac delta function, Laplace transform of periodic functions, Convolution theorem, Application to solve simple linear and simultaneous differential equations. (Lectures 08)

Unit IV

Fourier Series and Partial Differential Equations: Periodic functions, Trigonometric series, Fourier series of period $2p$, Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.

Introduction of partial differential equations, Linear partial differential equations with constant coefficients of 2nd order and their classifications - parabolic, elliptic and hyperbolic with illustrative examples. (Lectures 08)

Unit V

Applications of Partial Differential Equations: Method of separation of variables for solving partial differential equations, Wave equation up to two dimensions, Laplace equation in two-dimensions, Heat conduction equations up to two-dimensions, Equations of transmission Lines. (Lectures 08)

Text Books

- Grewal B.S., *Higher Engineering Engineering Mathematics*, Khanna Publishers.
- Prasad C., *Engineering Mathematics for Engineers*, Prasad Mudralaya
- Das H.K., *Engineering Engineering Mathematics Vol-II*, S. Chand, New Delhi

Reference Books

- Kreyszig E., *Advanced Engineering Engineering Mathematics*, Wiley Eastern
- Piskunov N., *Differential & Integral Calculus*, Moscow Peace Publishers.
- Narayan Shanti, *A Text book of Matrices*, S. Chand
- Bali N.P., *Engineering Engineering Mathematics-II*.

* Latest editions of all the suggested books are recommended.

FOUNDATION ENGLISH - II

Course code: EHM 201

(Common with BPH206/BBA206/BCA206/BHM201/AR207/BCH206/BFA203)

L	T	P	C
2	0	2	3

Unit I

Functional Grammar: Articles, Preposition, Tenses: Functions, Synthesis, Transformation, Spotting errors and correction of sentences. **(10 Hours)**

Unit II

Pre- Requisites of Technical written Communication: One word substitution, Spelling rules, Words often confused & misused, Phrases. **(10 Hours)**

Unit III

The Structure of sentences/ clauses: Adverb clause, Adjective clause, Noun clause. Sentences: Simple, Double, Multiple and complex, Transformation of sentences: simple to complex & vice versa, simple to compound & vice-versa, Interrogative to assertive & negative & vice-versa. **(10 Hours)**

Unit IV

Technical Communication: Nature, Origin and Development, Salient features, Scope & Significance, Forms of Technical Communication, Difference between Technical Communication & General writing, Objective Style vs. Literary Composition. **(10 Hours)**

Text-Books:

1. Wren & Martin, *High School English Grammar & Composition* – S. Chand & Co. Delhi.
2. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.
3. Mitra Barun K., *Effective Technical Communication* – O.U.P. New Delhi. 2006.
4. Better Your English- A Workbook for 1st year Students- Macmillan India, New Delhi.

Reference Books:

1. Horn A.S., *Guide to Patterns & Usage in English* – O.U.P. New Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP271

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the students on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, talks by the invitees and special technical sessions organized from time to time.
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behavior in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
9. General behavior.

The above mentioned observational are an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of Cumulative Performance Index (CPI).

Semester III

STRENGTH OF MATERIALS

Course Code: EME301

L	T	P	C
3	2	0	4

Objective: the objective is to know about various stresses, structure and designs of spring's deflection of material under load etc.

Course Contents

Unit I

Review: Review of simple and compound stresses, Mohr's Circle. 1 3-D Stress, Theory of failure, Castiglione's Theorem, Impact load: Three dimensional state of stress & strain, equilibrium equations. Generalized Hook's Law. Theories of Failure. Castigliano's Theorem. Impact load & stresses. Airy's Stress Function: Airy's stress function and its applications.

(Lectures 08)

Unit II

Stresses in Beams: Review of pure Bending. Direct and shear stresses in beams due to transverse and axial loads, composite beams. Deflection of Beams: Equation of elastic curve, cantilever and simply supported beams, Macaulys method, area moment method, fixed and continuous beams.

Torsion: Review of Torsion, combined bending & torsion of solid & hollow shafts.

(Lectures 08)

Unit III

Helical and Leaf Springs: deflection of springs by energy method, helical springs under axial load and under axial twist (respectively for circular and square cross sections) axial load and twisting moment acting simultaneously both for open and closed coiled springs, laminated springs.

Columns and Struts: Combined bending and direct stress, middle third and middle quarter rules. Struts with different end conditions. Euler's theory and experimental results, Ranking Garton Formulae, Examples of columns in mechanical equipments and machines.

(Lectures 08)

Unit IV

Thin cylinders & spheres: Hoop and axial stresses and strain. Volumetric strain. Thick cylinders: Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, Compound cylinders. Stress due to interference fits.

(Lectures 08)

Unit V

Curved Beams: Bending of beams with large initial curvature, position of neutral axis for rectangular, trapezoidal and circular cross sections, stress in crane hooks, stress in circular rings subjected to tension or compression.

Unsymmetrical Bending: Properties of beam cross-section, slope of neutral axis, stress and deflection in unsymmetrical bending, determination of shear center and flexural axis (for symmetry about both axis and about one axis) for I-section and channel-section.

(Lectures 08)

Text

Books

1. Ryder, *Strength of Materials*, Singer
2. Timoshenko and Timoshenko & Young, *Strength of Materials*,

Reference Books

1. Bear Jhonson, *Mechanics of Materials*.
2. Rajput R.K, *Strength of Materials*.
3. Ramamrutham & Narain "Strength of Materials".
4. Kazami, *Advanced Mechanics of Solids*, TMH

* Latest editions of all the suggested books are recommended.

ENGINEERING THERMODYNAMICS

Course Code: EME302

L	T	P	C
3	2	0	4

Objective: To know about basic thermodynamics and its application on industrial equipments.

Course Contents

Unit I

Review of Thermodynamics: Brief review of basic laws of thermodynamics, Helmholtz & Gibb's function, Mathematical conditions for exact differentials. Maxwell Relations, Clapeyron Equation, Joule-Thompson coefficient and Inversion curve. Coefficient of volume expansion, Adiabatic & Isothermal compressibility. Availability & Irreversibility.

(Lectures 08)

Unit II

Properties of Steam and Boilers: Properties of steam. Use of steam table & Mollier Chart. Steam generators- classifications. Working of fire-tube and water-tube boilers, boiler mountings & accessories, Draught & its calculations, air pre heater, feed water heater, super heater. Boiler efficiency, Equivalent evaporation. Boiler trial and heat balance.

(Lectures 08)

Unit III

Steam Engines: Rankine and modified Rankine cycles, working of steam engine Indicator diagram.

Steam & Gas Nozzles: Flow through nozzle, variation of velocity, area and specific volume, nozzle efficiency, Throat area. Super saturated flow.

(Lectures 08)

Unit IV

Vapor Power cycles: Effect of Pressure & temperature on Rankine cycle Reheat cycle, Regenerative cycle, feed water heaters.

Steam Turbines: Classification, impulse and reaction turbines, Staging, Stage and overall efficiency, re-heat factor, bleeding, comparison with steam engines. Governing of turbines. Velocity diagram of simple & compound

multistage impulse & reaction turbines & related calculations work done efficiencies of reaction, impulse Reaction Turbines, state point locus, Reheat factor.

(Lectures 08)

Unit V

Gas Turbine & Jet Propulsion: Gas turbine classification Brayton cycle, Principles of gas turbine, Gas turbine cycles with inter cooling, reheat & regeneration stage efficiency, polytropic efficiency. Deviation of actual cycles from ideal cycles. Introduction to the principles of jet propulsion, Turbojet & turboprop engines & their processes, Introduction to Rocket Engine.

(Lectures 08)

Text Books

1. Singh Onkar, *Applied Thermodynamics*, New Age International (P) Publishers Ltd.
2. Blallaney P.L., *Thermal Engineering*, Khanna Publisher
3. Kearton W.J., *Theory of Steam Turbine*.

Reference Books

1. Rajput R.K., *Thermal Engineering*, Laxmi Publication
2. Yahya S.M., *Turbine Compressors & Fans*, TMH
3. Ganeshan, *Gas Turbine*, Tata McGraHill Publishers.
4. Yadav R., *Heat Engines*, CPH Allahabad.
5. Nag, *Engineering Thermodynamics*.
6. Cohen & Rogers, *Gas Turbine Theory & Practice*, Addison Wesley Long man Ltd.

* Latest editions of all the suggested books are recommended.

MACHINE DRAWING

Course Code: EME303

L	T	P	C
3	2	0	4

Objective: To study various Machine drawing components.

Course Contents

Unit I

Machine Drawing Conventions: Need for drawing conventions – introduction to ISI conventions

1. Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
2. Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
3. Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centres, curved and tapered features.
4. Title boxes, their size, location and details – common abbreviations and their liberal usage
5. Types of Drawings – working drawings for machine parts. **(Lectures 08)**

Unit II

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

1. Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
2. Keys, cottered joints and knuckle joint.
3. Rivetted joints for plates. **(Lectures 08)**

Unit III

Drawing of Machine Elements and simple parts Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

1. Shaft coupling, spigot and socket pipe joint.
2. Journal, pivot and collar and foot step bearings. **(Lectures 08)**

Unit IV

Assembly Drawings: Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions. Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, piston assembly. **(Lectures 08)**

Unit V

Assembly Drawings

1. Other machine parts – Screws jacks, Machine Vices Plummer block, Tailstock.
2. Valves: Steam stop valve, spring loaded safety valve, feed check valve and air cock. **(Lectures 08)**

Text Books

1. Dhawan, Machine Drawing, S.Chand Publications.
2. Narayana K.L., Kannaiah P Venkata Reddy K., Machine Drawing, New Age, Publishers.

Reference Books

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

*** Latest editions of all the suggested books are recommended.**

MATERIAL SCIENCE

Course Code: EME304

L	T	P	C
3	2	0	4

Objective: To know about various mechanical properties of metals, testing of materials and application of materials.

Course Contents

Unit I

Introduction: Historical perspective, importance of materials. Brief review of modern & atomic concepts in Physics and Chemistry. Atomic models, Periodic table, Chemical bonds.

Crystallography and Imperfections: Concept of unit cell space lattice, Bravais lattices, common crystal structures, Atomic packing factor and density. Miller indices. X-ray crystallography techniques.

Imperfections, Defects & Dislocations in solids.

(Lectures 08)

Unit II

Mechanical properties and Testing: Stress strain diagram, Ductile & brittle material, Stress VS strength. Toughness, Hardness, Fracture, Fatigue and Creep. Testing such as Strength testing, Hardness testing, Impact testing, Fatigue testing Creep testing, Nondestructive testing (NDT).

Micro-structural Exam: Microscope principle and methods. Preparation of samples and Microstructure exam and grain size determination. Comparative study of microstructure of various metals & alloys such as Mild Steel, GI, Brass. Phase Diagram and Equilibrium Diagram: Unary and Binary diagrams, Phase rules. Types of equilibrium diagrams: Solid solution type, eutectic type and combination type. Iron-carbon equilibrium diagram.

(Lectures 08)

Unit III

Ferrous materials: Iron and steel manufacture, furnaces. Various types of carbon steels, alloy steels and cast irons, its properties and uses.

Heat Treatment: Various types of heat treatment such as Annealing, Normalizing, Quenching, Tempering and Case hardening. Time Temperature Transformation (TTT) diagrams.

Non-Ferrous metals and alloys: Non-ferrous metals such as Cu, Al, Zn, Cr, Ni etc. and its applications. Various type Brass, Bronze, bearing materials, its properties and uses. Aluminum alloys such as Duralumin. Other advanced materials/alloys.

(Lectures 08)

Unit IV

Magnetic properties: Concept of magnetism – Dia, para, ferro Hysteresis. Soft and hard magnetic materials, Magnetic storages.

Electric properties: Energy band concept of conductor, insulator and semi-conductor. Intrinsic & extrinsic semi- conductors. P-n junction and transistors. Basic devices and its application. Diffusion of Solid. Super conductivity and its applications. Messier effect. Type I & II superconductors. High Te superconductors.

(Lectures 08)

Unit V

Ceramics: Structure types and properties and applications of ceramics. Mechanical /Electrical behavior and processing of Ceramics.

Plastics: Various types of polymers/plastics and its applications. Mechanical behaviors and processing of plastics. Future of plastics.

Other materials: Brief description of other material such as optical and thermal materials concrete, Composite Materials and its uses.

Performance of materials in service: Brief theoretical consideration of Fracture, Fatigue, and Corrosion and its control. **(Lectures 08)**

Text Books

1. Callister W.D., Material Science & Engineering Addition, Wesley Publishing Co.
2. Van Vlash, Elements of Material Science & Engineering, John Wiley & Sons.
3. Dr.K.M.Gupta, Material Science in Engineering, UmeshPublications.

Reference Books

1. Raghvan, Material Science, Prentice Hall of India
2. Narula, Material Science, TMH
3. Srivastava, Srinivasan, Science of Materials Engineering Newage.

*** Latest editions of all the suggested books are recommended.**

INDUSTRIAL ENGINEERING

Course Code: EME305

L	T	P	C
3	2	0	4

Objective: To know about production, planning, techniques of production in industry.

Course Contents

Unit I

Productivity: Introduction, definition, measurement, productivity index, ways to improve productivity, Types of Production System.

Work study: Meaning and benefits of work study, time & motion study. Micro-motion study P.M.T.S. man machine Diagram flow chart. Motion economy, Method study, work measurement, work sampling, standard time. (Lectures 08)

Unit II

Plant layout and materials Handling: Plant location, type of layout, principles of facility layout principles of material handling, Material Handling equipments. Production planning and control: Objectives, Forecasting, product design and development functions, steps in PPC. Planning routine, scheduling, Dispatching & follow- up, Effectiveness of PPC, Introduction of JIT. (Lectures 08)

Unit III

Managerial Economics : Introduction, Assumptions, Time Value of money, appraised, criteria step-in BEA, purpose, costs & overheads fixed & variable costs, margin of safety, Angle of incidence profit volume graph. Replacement Analysis: Depreciation; causes, obsolescence, service life of assets, Replacement of items. Maintenance Management: Maintenance Planning & Control, Maintenance Strategy. (Lectures 08)

Unit IV

Inventory Control: Inventory, function, cost, deterministic models, Introduction to MRP, supply chain Management.

Quality Control: Introduction, process control, SQC control Charts, Single double & sequential sampling, Introduction to TQM & bench marking. (Lectures 08)

Unit V

Industrial Ownership: Proprietorship, partnership, Joint stock & co-operative stores.

Manpower Planning: Resources, Human relationship.

Organization: Principles of organization, Development of Organizational charts like line, staff, line and staff & Functional types.

Job Evaluation & Merit rating: Job analysis, Job description job simplification and job evaluation methods & description, merit rating, wage incentive plans. (Lectures 08)

Text Books

1. Koontz H. Donnel C.O., Principles of Management. An Analysis of Management Functions, Tata McGraw- Hall.
2. Moore J., Manufacturing Management”, Prentice Hall.
3. Buffam E.S., Modern Production Operations Management, Wiley Eastern.

Reference Books

1. Khanna O.P., Industrial Engg. & Management.
2. Shanker. Ravi, Industrial Engineering.
3. Mahajan, Industrial Engineering.

* Latest editions of all the suggested books are recommended.

PROFESSIONAL WRITING

Course code: EHM 301

(Common with BBA306/BCA305/BHM301/AR307/BCH306/BFA303)

L	T	P	C
2	0	2	3

Course Contents:

Unit I

Functional Grammar: Active and passive voice, Conditional sentences, Syntax, Concord, Common errors. **(10 Hours)**

Unit II

Requisites of Paragraph writing: Structure of Paragraph, Coherence & Unity, Development of paragraph, Inductive order, Deductive order, Spatial order, Linear, Chronological orders, Expository writing, and Argumentative writing, Factual description of objects, process, experiments. **(10 Hours)**

Unit III

Précis Writing: Techniques of Précis writing, Writing a précis. **(10 Hours)**

Unit IV

Comprehension skills: Role of listening, Reading comprehension; Reasons for poor comprehension, Improving comprehension skills. **(10 Hours)**

Text Books:

1. Rutherford A., *Basic Communication Skills* – Pearson Education, New Delhi.

References Books:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.
2. Mohan Krishna & Banerji Meera, *Developing Communication Skills* – Macmillan India Ltd. Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

MACHINE DRAWING (LAB)

Course Code: EME351

L	T	P	C
0	0	4	2

Course Contents

Part and Assembly drawing

Introduction, assemblies drawing of stuffing box, steam engine cross head, air valve, late tailstock, gate valve, screw jack, connecting rods, spark plug, tool post, safety valves etc. Drawing exercises.

Specification of Materials: Engineering materials, code designation of steels, copper and aluminium and its alloys.

Limits, Tolerance and fits: Introduction, Limit systems, tolerance, fits, Drawings and exercises

Surface Roughness: Introduction, surface roughness, machining symbols, indication of surface roughness, drawing exercises

Production Drawing: Introduction to developing and reading of production drawing of simple machine elements like helical gear, bevel gear, flange, pinion shaft, connecting rod, crankshaft, belt pulley, piston details etc. Idea about tool drawing.

Computer Aided Drafting: Introduction, input, output devices, introduction to drafting software like Auto CAD, basic commands and development of simple 2D and 3D drawings.

Reference Books

1. Narayana, Machine Drawing, New Age
2. Narayana, Production drawing , New Age
3. Rao P. Nageswara, Auto CAD 14 for Engineering Drawing, TMH.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

MATERIAL SCIENCE (LAB)

Course Code: EME352

L	T	P	C
0	0	4	2

1. Material Science Lab Experiments: (at least 5 of the following)

1. Making a plastic mould for small metallic specimen.
2. Specimen preparation for micro structural examination-cutting, grinding, polishing, etching.
3. Grain Size determination of a given specimen.
4. Comparative study of microstructures of different specimens (mild steel, gray C.I., brass, cooper etc.)
5. Heat treatment experiments such as annealing, normalizing, quenching, case hardening and comparison of hardness before and after.
6. Material identification of 50 common items kept in a box.
7. Faradays law of electrolysis experiment.
8. Study of corrosion and its effects.
9. Study of microstructure of welded component and HAZ. Macro & Micro examination.

2. Material Testing Lab Experiments: (at least 5 of the following)

1. Strength testing of a given mild steel specimen on UTM with full details and s-e plot on the machine.
2. Other tests such as shear, bend tests on UTM.
3. Impact testing on impact testing machine like Charpy, Izod or both.
4. Hardness testing of given specimen using Rockwell and Vickers/Brinell testing machines.
5. Spring index testing on spring testing machine.
6. Fatigue testing on fatigue testing machine.
7. Creep testing on creep testing machine.
8. Deflection of beam experiment, comparison of actual measurement of deflection with dial gauge to the calculated one, and or evaluation of young's modulus of beam.
9. Torsion testing of a rod on torsion testing machine.
10. Study of non-destructive testing methods like magnetic flaw detector, ultrasonic flaw detector, eddy current testing machine, dye penetrate tests.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

THERMODYNAMICS (LAB)

Course Code: EME353

L	T	P	C
0	0	4	2

LIST OF EXPERIMENTS

Experiments: Minimum 10 experiments in depth and details out of following according to theory covered in applied thermodynamics theory subject (ME-302)

1. Study of Fire Tube boiler
2. Study of water Tube boiler
3. Study & working of Refrigerator
4. Study of velocity compounded steam turbine
5. Study of pressure compounded steam turbine
6. Study of impulse & Reaction turbine
7. Study of steam Engine model.
8. Study and working of two stroke petrol Engine
9. Study and working of Four stroke petrol Engine
10. Determination of Indicated H.P. of I.C. Engine by Morse Test
11. Study of Gas Turbine Model
12. Study & working of Air conditioner
13. Prepare the energy balance for Diesel/Petrol Engine
14. Study & working of two stroke Diesel Engine
15. Study & working of four stroke Diesel Engine.
16. Study of Ignition system of I.C. Engine.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP371

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the students on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, talks by the invitees and special technical sessions organized from time to time.
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behavior in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
9. General behavior.

The above mentioned observational are an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of Cumulative Performance Index (CPI).

SEMESTER IV PRODUCTION TECHNOLOGY –I

Course Code: EME401

L	T	P	C
3	2	0	4

Objective: To know about various manufacturing processes like forming, sheet metal working, casting etc.

Course Contents

Unit I

Introduction: Importance of manufacturing. Economic & technological considerations in manufacturing. Survey of manufacturing processes. Materials & manufacturing processes for common items. Metal Forming Processes: Elastic & plastic deformation, yield criteria. Hot working vs cold working. Load required to accomplish metal forming operation. Analysis (equilibrium equation method) of forging process with sliding friction, sticking friction and mixed condition for slab and disc. Work required for forging, Hand, Power, Drop Forging. **(Lectures 08)**

Unit II

Metal Forming Processes (continued): Analysis of Wire/strip drawing and max. reduction, Tube drawing, Extrusion and its application. Conditions for Rolling force and power in rolling. Rolling mills. Design, lubrication and defects in metal forming processes. **(Lectures 08)**

Unit III

Sheet Metal working: Presses and their classification, Die & punch assembly and press work methods and processes. Cutting/Punching mechanism, Blanking vs Piercing. Compound vs Progressive die. Flat-face vs Inclined- face punch and Load(capacity) needed. Analysis of forming process like cup/deep drawing and bending. **(Lectures 08)**

Unit IV

Unconventional Metal forming processes: Unconventional metal forming processes such as explosive forming, electromagnetic, electro-hydraulic forming.
Powder Metallurgy: Powder metallurgy manufacturing process. The process, advantage and applications.
Jigs & Fixtures: Locating & clamping devices/principle. Jigs and Fixtures and its applications.
Manufacturing of Plastic components: Review of plastics, and its past, present & future uses. Injection moulding. Extrusion of plastic section. Welding of plastics. Future of plastic & its applications. Resins & Adhesives. **(Lectures 08)**

Unit V

Casting (Foundry) Basic principle & survey of casting processes. Types of patterns and allowances. Types and properties of moulding sand. Elements of mould and design considerations, gating, riser, runner, core. Solidification of casting, theory and analysis. Sand casting, defects & remedies and inspection. Cupola furnace. Die Casting centrifugal casting. Investment casting etc. **(Lectures 08)**

Text Books

1. Ghosh and Mallik, Manufacturing Science.
2. Pandey P.C., Production Engg. Science”
3. Jain R.K., Production Technology”

Reference Books

1. Rao PN., Manufacturing Technology.
2. Paul Degarmo, Materials and Manufacturing.

*** Latest editions of all the suggested books are recommended.**

MEASUREMENT, METROLOGY AND CONTROL

Course Code: EME402

L	T	P	C
3	2	0	4

Objective: To study about measurement (time related, pressure related etc), Controls loop system etc.

Course Contents

Unit I

Mechanical Measurements

Introduction: Introduction to measurement and measuring instruments, Generalised measuring system and functional elements, units of measurement, static and dynamic performance characteristics of measurement devices, calibration, concept of error, sources of error, statistical analysis of errors.

Sensors and Transducers: Types of sensors, types of transducers and their characteristics.

Signal transmission and processing Devices and systems. Signal Display & Recording Devices.

(Lectures 08)

Unit II

Time related measurements: Counters, stroboscope, frequency measurement by direct comparison.

Measurement of displacement Measurement of pressure: Gravitational, directing acting, elastic and indirect type pressure transducers. Measurement of very low pressures.

Strain measurement: Types of strain gauges and their working, strain gauge circuits, temperature compensation. Strain rosettes, calibration.

Measurements of force and torque: Different types of load cells, elastic transducers, pneumatic & hydraulic systems.

Temperature measurement: By thermometers, bimetallic, thermocouples, thermistors and pyrometers.

Vibration: Seismic instruments, vibration pick-ups and decibel meters, vibrometers accelerometers.

(Lectures 08)

Unit II

Metrology and Inspection: Standards of linear measurement, line and end standards. Limit, fits and tolerances. Interchange ability and standardisation. Linear and angular measurements devices and systems. **Comparators:** Sigma, Johansson's Microkrator. Limit gauges classification, Taylor's Principle of Gauge Design.

(Lectures 08)

Unit IV

Measurement of geometric forms like straightness, flatness, roundness. Tool makers microscope, profile project autocollimator. Interferometry: principle and use of interferometry, optical flat.

Measurement of screw threads and gears. Surface texture: quantitative evaluation of surface roughness and its measurement.

(Lectures 08)

Unit V

Controls:

Introduction: Concept of Automatic Controls – open loop & closed loop systems. Servomechanisms. Block diagrams, transfer functions. Applications of Laplace- Transform in control systems with simple examples/ numerical. Representation of control components & Systems: Translation & rotational mechanical components, series & parallel combinations, cascade system, analogous system.

Controllers: Brief introduction to Pneumatic, hydraulic and electric controllers.

(Lectures 08)

Text Books

1. Beckwith Thomas G ., Mechanical Measurements, Narosa Publishing House, N. Delhi.
2. Doeblein E.O., Measurement Systems, Application Design, McGraw Hill, 1990.
3. Kumar D.S., Mechanical Measurements and Control", Metropolitan, N. Delhi.

Reference Books

1. Gupta, I.C., Engineering Metrology , Dhanpat Rai & Sons, New Delhi, 1994
2. Sirohi., Mechanical Measurement, New Age Publishers
3. Jain, R.K., Engineering Metrology, Khanna Publishers
4. Jain, R.K., Mechanical Measurement, Khanna Publishers
5. Raven, Automatic Control Theory, McGraw Hill Publishers.
6. Nagrath and Gopal, Control System Engineering, New Age Publishers.

*** Latest editions of all the suggested books are recommended.**

OPERATION RESEARCH

Course Code: EHM 403

L	T	P	C
3	2	0	4

Objective: To know about linear programming techniques, decision theory, transportation problems, inventory modules etc.

Unit I

Operations Research:- Introduction, History of OR, Characteristics of OR, Models and Modeling in OR, Methodology of OR, Applications of OR.

Linear programming:- Applications and Model Formation, Graphical method, Simplex method, Duality in Linear Programming. **(Lectures 08)**

Unit II

Transportation Problem:- Introduction, Mathematical model of Transportation problem, the transportation Algorithm; methods for finding initial solution-North-West corner method, Least cost method, Vogel's approximation method, Test for optimality, steps of MODI method. Variations in transportation problems-Unbalanced supply and demand, Degeneracy and its resolution, Alternative optimal solution, Maximization transportation problem.

Assignment problems:-Introduction, Mathematical model of assignment problem, Hungarian method, Variations of the assignment problem-multiple optimal solutions, Maximization case, Unbalanced assignment problems. **(Lectures 08)**

Unit III

Sequencing Problem:- Introduction, Processing n jobs through two machines; Processing n jobs through three machines; Processing n jobs through m machines. Processing two jobs through m machines.

Decision theory:- Introduction; Steps of decision making process; Types of Decision-making environments; Decision-making under uncertainty-optimism criterion, Pessimism criterion, Laplace criterion, Hurwicz criterion; Regret criterion; Decision-Making Under Risk-Expected Monetary Value (EMV), Expected opportunity loss (EOL), Expected value of Perfect information (EVPI); Decision Tree analysis. **(Lectures 08)**

Unit IV

Inventory Models:- Inventory cost components, EOQ; Deterministic Inventory cost models- Inventory model with constant demand & Instantaneous supply, EOQ model with different rates of demand, EOQ model with gradual replenishment, Multi-item inventory control models with constraint, EOQ models with warehouse space constraint, investment constraint, average inventory level constraint, number of orders constraints. Selective inventory control techniques –ABC analysis, VED analysis, FSN analysis. **(Lectures 08)**

Unit V

Project Management: PERT & CPM, Network construction, Critical path analysis, program evaluation and review technique (PERT), Project Time Cost Trade-Off, Project-crashing. **(Lectures 08)**

Text book:

Operations Research, Wangner
Operations Research, S.D. Sharma
Operations Research J.K. Sharma
Operations Research, V.K. Lapoor

Reference book:

Optimization technique, Rao S. S.
Operations Research, Taha

*** Latest editions of all the suggested books are recommended.**

NUMERICAL TECHNIQUE

Course Code: EME404

L	T	P	C
3	2	0	4

Objective: To know about numerical techniques and solve the mathematical problems various methods.

Course content

Unit I

Linear Algebraic Equations: Gauss – Elimination, Gauss – Seidel, LU Decomposition.

Roots of equations: Bisection Method, False position method, Newton – Raphson Method, Muller’s method, Bairstow’s Method. **(Lectures 08)**

Unit II

Curve fitting – Least square regression: i) Linear regression, multiple linear regressions, polynomial regression. ii) Non linear regression – Gauss – Newton method, multiple non linear regression. **(Lectures 08)**

Unit III

Interpolation: Newton’s Divided Difference, Lagrange’s Inverse, Spline, Hermite Interpolation, Extrapolation technique of Richardson’s Gaunt. **(Lectures 08)**

Unit IV

Eigen Values & Eigen Vectors of Matrices – Faddeev- Laeverrier’s method, Power Method, Householder & Given’s method. Ordinary differential equations:- Euler’s method, Heun’s method, Mid – point method, Runge – Kutta methods, Multi step Methods – explicit Adams – Bashforth technique & Implicit Adams – Moulton Technique, Adaptive RK method, Embedded RK method, step size control. Higher order ODE – Shooting method. Non linear ODE – Collocation technique. **(Lectures 08)**

Unit V

Partial Differential Equations:- Solution of Parabolic and Hyperbolic equations – Implicit & Explicit Schemes, ADI methods, Non linear parabolic equations- Iteration method. Solution of elliptic equation – Jacobi method, Gauss – Seidel & SOR method. Richardson method. **(Lectures 08)**

Text Books

1. Jain Iyengar, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers.
2. Garewal B.S., Numerical Methods in Engineering and Science, Khanna.

Reference Books

1. Steven C Chapra & Raymond P Canale, Numerical Methods for Engineers, TMH,
2. Constantinides Alkis, Applied Numerical Methods, McGraw Hill.
3. Jain M.K., Numerical Solution of Differential Equations, Wiley Eastern.

*** Latest editions of all the suggested books are recommended.**

FLUID MECHANICS

Course Code: EME 405

L	T	P	C
3	2	0	4

Objective: To make the students aware about the basics of fluid mechanics

Unit I

Introduction: Fluid and continuum; Physical properties of fluids: Viscosity, compressibility, Surface Tension, Capillarity, Vapour pressure; Cavitations; Classification of fluids including rheological classification.

Fluid Statics: Pascal's Law; Pressure-density-height relationship; Measurement of pressure by manometers and mechanical gauges; Pressure on plane and curved surfaces; The Hydrostatic law; Total Pressure and Centre of pressure; Buoyancy; Stability of immersed and floating bodies. (Lectures 08)

Unit II

Laminar Flow: Equation of motion for laminar flow through pipes. Stokes law, Turbulent Flow: Equation for turbulent flow; Eddy viscosity; Mixing concept and velocity distribution in turbulent flow. Types of fluid flows; Steady and unsteady. Uniform and non-uniform, Laminar and Turbulent flows, 1,2, and 3-D flows: stream lines, Path lines and streak lines; Stream tube; Acceleration of a fluid particle along a straight and curved path; Differential and Integral form of Continuity equation; Rotation, Vortices and Circulation; Elementary explanation of Stream function and Velocity potential; Flow net characteristics.

(Lectures 08)

Unit III

Fluid Dynamics-I: Introduction to Navier - Stokes equations. Euler's equation of motion along a streamline and its integration, Bernoulli's equation and its applications; Pitot tube, Flow through Orifices, Mouthpieces, Nozzles. Notches, Wires. Free and Forced vortex motion. (Lectures 08)

Unit IV

Fluid Dynamics-II: Pipe bends problems related to combined application of energy and momentum equations. determination of coefficients of discharge, velocity and contraction and energy loss. Equation for velocity distribution over smooth and rough surfaces. Concept of equivalent length. Branched pipes; Pipes in series and parallel; Flow in sudden expansion, contraction. water hammer. (Lectures 08)

Unit V

Boundary Layer Analysis: Boundary layer thickness; Boundary layer over a flat plate; Laminar layer; Application of Von-Karman integral Momentum Equation; Turbulent boundary layer; Laminar sub-layer; Hydro-dynamically smooth and rough boundaries; Local and average friction coefficient; Total drag; Boundary layer separation and its control. (Lectures 08)

Text Books:

1. Introduction to Fluid Mechanics, R J Fox
2. Elementary Mechanics of Fluids, Hunter Rouse John Wiley and sons, Omc/1946
3. Mechanics of Fluids, L H Shames Mc Graw Hill, Internatioal student edition.

Reference Books:

1. Engineering Fluid Mechanics (Including Hydrualic Machines) Grade.R J and A G Mirajgaonkar Nemchand and Bros, Roorkee, 1983
2. Engineering Fluid Mechanics, K L Kumar
3. Fudamentals of Fluid Mecanics, Munson, Bruce R. Donald F Young and T H Okishi, Wiley Lastern
4. Fluid Mechanics and its applications, V Gupta and S K Gupta, Wiley castern ltd
5. Introduction to Fluid Mechanics and Machines, Som and Biswas, TMH
6. Fluid Mechanics and Hydraulic Machines K Banal
7. Fluid Mechanics and Fluid Machines, Modi and Seth

* Latest editions of all the suggested books are recommended.

TECHNICAL COMMUNICATION

Course code: EHM 401

(Common with BPH406/BBA406/BCA406/BHM401/BCH406/BFA403)

L	T	P	C
2	0	2	3

Course Contents:

Unit I

Communication: Objectives of Communication, Need for Communication, Types of communication, written & Verbal communication, Formal and informal communication (The grapevine), upward and downward communication. **(10 Hours)**

Unit II

Business communication: Importance of written business correspondence, General principles and essentials of good commercial correspondence, Different types of commercial correspondence & their drafting, Types of Business letters, Official letters, electronic communication process. **(10 Hours)**

Unit III

Project, Thesis and Dissertation writing: Project Report, Thesis & Dissertation writing Structure of Thesis writing. **(10 Hours)**

Unit IV

Modern Technology and Communication: Globalization of Business, Role of Information Technology, Tele- communication, Internet, Tele-conferencing and Video-conferencing. **(10 Hours)**

Text Books:

1. Mishra Sunita & Muraliksishra C., *Communication Skills for Engineers* – Pearson Education, New Delhi.
2. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.
3. Chabbra T N, *Business Communication*, Sun India Pub. New Delhi.

Reference Books:

1. Mohan Krishna & Banerji Meera, *Developing Communication Skills* – Macmillan India Ltd. Delhi.
2. Mitra Barum K., *Effective Technical Communication* – O.U.P. New Delhi. 2006.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

PRODUCTION TECHNOLOGY-1 (LAB)

Course Code: EME451

L T P C
0 0 4 2

LIST OF EXPERIMENTS

Minimum 10 experiments

1. Design of pattern for a desired casting (containing hole)
2. Pattern making.
3. Making a mould (with core) and casting.
4. Sand testing (at least one such as grain fineness number determination)
5. Injection moulding with plastics
6. Forging- hand forging processes
7. Forging – power hammer study & operation
8. Tube bending with the use of sand and on tube bending machine.
9. Press work experiment such as blanking, washer, making etc.
10. Wire drawing/extrusion on soft material.
11. Rolling-experiment.
12. Bending & spring back.
13. Powder metallurgy experiment.
14. Jigs & Fixture experiment.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

MEASUREMENT, METROLOGY AND CONTROL (LAB)

Course Code: EME452

L	T	P	C
0	0	4	2

LIST OF EXPERIMENTS

Minimum 10 experiments

1. Study & working of simple measuring instruments. Like vernier callipers, micrometer, tachometer etc.
2. Measurement of effective diameter of a screw thread using 3 wire methods.
3. Measurement of angle using sine bar & slip gauges.
4. Study of limit gauges.
5. Study & angular measurement using level protector
6. Adjustment of spark plug gap using feeler gauges.
7. Study of dial indicator & its constructional details.
8. Use of dial indicator to check a shape run use.
9. Study and understanding of limits, fits & tolerances
10. Pressure measuring experiment
11. Temperature measurement experiment
12. Strain gauge measurement
13. Speed measurement using stroboscope
14. Flow measurement experiment
15. Vibration/work measuring experiment.
16. & 17. Experiments on Control system.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

FLUID MECHANICS (LAB)

Course Code: EME455

L **T** **P** **C**
0 **0** **4** **2**

LIST OF EXPERIMENTS

1. To measure the surface tension of a liquid.
2. To determine the meta centric height of a ship model experimentally.
3. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
4. To determine the coefficients of velocity, contraction and discharge of an orifice (or a mouth piece) of a given shape. To plot the flow net for a given model using the concept of electrical analogy.
5. To find the velocity distribution in a pipe and hence to compute the discharge by integrating the velocity profile obtained.
6. To verify the Bernoulli's theorem.
7. To calibrate an orifice meter and venturimeter and to study the variation of the coefficient of discharge with the Reynolds number.
8. To calibrate and to determine the coefficient of discharge for rectangular and triangular notches.
9. To verify Darcy's law and to find out the coefficient of permeability of the given medium.
10. To verify the momentum equation.
11. To study the boundary layer velocity profile and to determine boundary layer thickness and displacement thickness. Also to determine the exponent in the power law of velocity distribution.
12. To study the variation of friction factor, (f) for turbulent flow in smooth and rough commercial pipes.
13. To determine the loss coefficients for the various pipe fittings.
14. To study the flow behavior in a pipe bend and to calibrate the cap for discharge measurement.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP471

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code
2. Participation in Conferences /Workshops / Seminars
3. Attendance in guest lectures, talks by the invitee and special technical sessions organized from time to time..
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behaviour in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at
9. College / University and other level.
10. General behaviour

The above mentioned is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of cumulative Performance Index (CPI)

SEMESTER V PRODUCTION TECHNOLOGY –II

Course Code: EME501

L	T	P	C
3	2	0	4

Objective: The objective is to study about manufacturing tools, machinery like lathe, shaper, turner etc.

Course Contents

Unit I

A Metal Cutting and Machine Tools: Metal Cutting- Mechanics of metal cutting. Geometry of tool and nomenclature .ASA system Orthogonal vs. oblique cutting. Mechanics of chip formation, types of chips. Shear angle relationship. Merchant 's force circle diagram. Cutting forces, power required. Cutting fluids/lubricants. Tool materials. Tool wear and tool life. Machinability. Brief introduction to machine tool vibration and surface finish. **(Lectures 08)**

Unit II

Machine Tools

- (i) Lathe: Principle, types, operations, Turret/capstan, semi/Automatic, Tool layout.
- (ii) Shaper, slotter, planer: operations & drives. **(Lectures 08)**

Unit III

Machine Tools

- (i) Milling: Milling cutters, up & down milling. Dividing head & indexing. Max chip thickness & power required.
- (ii) Drilling and boring: Drilling, boring, reaming tools. Geometry of twist drills. **(Lectures 08)**

Unit IV

Grinding & Super finishing

Grinding: Grinding wheels, abrasive, cutting action. Grinding wheel specification. Grinding wheel wear – attritions wear, fracture wear. Dressing and Truing. Max chip thickness and Guest criteria. Surface and Cylindrical grinding. Centerless grinding. Super finishing: Honing, lapping, polishing. **(Lectures 08)**

Unit V

B. Metal Joining (Welding), Survey of welding and allied processes. Gas welding and cutting, process and equipment. Arc welding: Power sources and consumables. TIG & MIG processes and their parameters. Resistance welding – spot, seam projection etc. Other welding processes such as atomic hydrogen, submerged arc, electroslag, friction welding. Soldering & Brazing . Thermodynamic and Metallurgical aspects in welding and weld, Shrinkage/residual stress in welds. Distortions & Defects in welds and remedies. Weld decay in HAZ. **(Lectures 08)**

Text Books

1. Ghosh & Malik, Manufacturing Science.
2. Boothroyd, Fundamentals of Metal Cutting and Machine Tools.
3. Jain R.K., Production Technology.

Reference Books

1. H.M.T., Production Technology.
2. Pandey P.C., Production Engineering Science.
4. Juneja & Shekhon, Manufacturing Science.
5. Lind Burg., Process & Materials of Manufacturing.

*** Latest editions of all the suggested books are recommended.**

METALLURGY

Course Code: EME502

L	T	P	C
3	2	0	4

Objective: the objective is to study about metallic structure, various alloys etc. Course Contents

Unit I

Structure of Metals: Bonds in Solids – Metallic bond – crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size. Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds. **(Lectures 08)**

Unit II

Equilibrium of Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys.

Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cu-Sn and Fe-Fe₃C.

(Lectures 08)

Unit III

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe₃C system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hard enability, surface – hardening methods, Age hardening treatment, Cryogenic treatment of alloys. **(Lectures 08)**

Unit IV

Ceramic materials: Crystalline ceramics, glasses, cermets, cements, abrasive materials, nanomaterials– definition, properties and applications of the above.

Polymers: Characteristic and its applications, types of polymers

(Lectures 08)

Unit V

Powder Metallurgy

The importance of Powder Metallurgy: Various methods of producing metal powders. Characteristics of metal powders and their correlation with the various methods of production. Hazards in metals powder production. Testing and classification of powders. Treatment of metal powders prior to compacting: Mixing and conditioning of metal powders. Compacting of cold and hot pressing and their limitations. Design of dies. Rolling, slip casting, forging and extrusion of metal powders. Implosive compaction. Factors influencing the properties of compacts. Sintering: Its significance in powder metallurgy, sintering environments, importance of controlled atmosphere for sintering. Sintering equipments and their classification. Factors influencing sintering of metal powders.

Text Book

1. Sidney H. Avener., Introduction to Physical Metallurgy.
2. Donald R. Askeland/Thomson, Essential of Materials Science and Engineering.
3. Powder metallurgy – A.K. Sinha

Reference Books

1. Kodgire, Material Science and Metallurgy.
2. Rahgavan V., Elements of Material Science.
3. Vinas W.G., Mancini H.L., An Introduction to Material Science.
4. Yesudian C.D. & Harris Samuel, Material Science & Material.
5. Flinn R.A. Trojan P.K., Engineering Materials and their Applications, Jaico Books.

*** Latest editions of all the suggested books are recommended.**

THEORY OF MACHINES

Course Code: EME503

L	T	P	C
3	2	0	4

Objective: The objective is to study about kinetics, force system, mechanism etc.

Course Contents

Unit I

Introduction: Links-types, Kinematics pairs-classification, Constraints-types, Degree of Freedom, Grubler's equation, linkage mechanisms, inversions of four bar linkage, slider crank chain and double slider crank chain Velocity in Mechanisms: Velocity of point in mechanism, relative velocity method, instantaneous point in mechanism, Kennedy's theorem, instantaneous center method. (Lectures 08)

Unit II

Acceleration in Mechanisms: Acceleration diagram, Coriolis component of acceleration, Klein's construction for Slider Crank and Four Bar mechanism, Analytic method for slider crank mechanism. Mechanisms with Lower Pairs Pantograph, Exact straight line motion mechanisms – Peaucellier's, Hart and Scott Russell mechanisms, Approximate straight line motion mechanisms – Grass-Hopper, Watt and Tchebicheff mechanisms, Analysis of Hook's joint, Davis and Ackermann Steering gears. (Lectures 08)

Unit III

Kinematics Synthesis of Planar Linkages: Movability of four bar linkages, Grashoff's law, Graphical methods of synthesis – Two and Three position synthesis of four bar and slider crank mechanisms, Analytical method-Freudenstein's equation for function generation (three position). (Lectures 08)

Unit IV

CAMS: Cams and Followers – Classification & terminology, Cam profile by graphical methods for uniform velocity, simple harmonic motion and parabolic motion of followers, Analytical cam design – tangent and circular cams. (Lectures 08)

Unit V

Gears: Classification & terminology, law of gearing, tooth forms, interference, under cutting, minimum number of teeth on gear and pinion to avoid interference, simple, compound and planetary gear trains. (Lectures 08)

Text Books

1. Bevan Thomas, Theory of Machines.
2. Shigley, Theory of Machines and Mechanisms.
3. Ghosh & Mallik, Theory of Machines and Mechanisms.

Reference Books

1. Rao & Dukupati, Theory of Machines and Mechanism.
2. Bansal R.K., Theory of Machines.
3. Singh V.P., Theory of Machines.
4. Malhotra & Gupta, Theory of Machines.
5. Khurmi & Gupta, Theory of Machines.
6. Ramamurti V., Mechanics of Machines.

* Latest editions of all the suggested books are recommended.

DESIGN OF MACHINE ELEMENTS

Course Code: EME504

L	T	P	C
3	2	0	4

Objective: the objective is to study about design of machine elements like spring various welds etc.

Course Contents

Unit I

Introduction, Definition, Methods, standards in design & selection of preferred size. Selection of materials for static & fatigue loads, Materials for components subjected to creep, BIS system of designation of steels, steels, plastics & rubbers. AISI (American Iron & Steel Institution), ASTM rubber testing methods.
(Lectures 08)

Unit II

Design against static load: Modes of failure, Factor of safety, stress-strain relationship, principal stresses, theories of failure Design against fluctuating load stress concentration, stress concentration factors, Fluctuating/alternating stresses, fatigue failure, endurance limit, design for finite & infinite life, Soderberg & Goodman criteria.
(Lectures 08)

Unit III

Joints: Welded joint, screwed joints, eccentric loading of above joints, design for fatigue loading. Shaft, keys & coupling. Design against static and fatigue loads, strength & rigidity design, Selection of square & flat keys & splines, rigid & flexible couplings.
(Lectures 08)

Unit IV

Gears: Gear nomenclature, tooth profiles, systems of gear teeth, Gear materials, Design of Structure spur gear, Design consideration.

Mechanical springs: Design of Helical and leaf springs, against static & fatigue loading. Design analysis of Power Screws Form of threads, square threads, trapezoidal threads, stresses in screw, design of screw jack.
(Lectures 08)

Unit V

Introduction to Product Development & Design Process: Definition of Design, Design Process, Need Analysis, Need based developments, Design by Evolution; Technology based developments, Examples Case Studies, Brain-storming.
(Lectures 08)

Text Books

1. Bhandari, Design of M/c Elements, TMH
2. Sharma & Agarwal, Machine Design, Kataria
3. Maleev & Hartman ,M/C Design,

Reference Books

1. Shigley, Machine Design, Mcgraw Hill
2. Black & Adams, Machine Design, Mcgraw Hill.
3. Spotts, Design of Machine Elements

*** Latest editions of all the suggested books are recommended.**

HEAT & MASS TRANSFER

Course Code: EME505

L	T	P	C
3	2	0	4

Objective: the objective is to study about heat & its transfer through conduction, convection, radiation.

Course Contents

Unit I

Introduction to Heat Transfer: Concepts of the mechanisms of heat flows: conduction, convection and radiation; effect of temperature on thermal conductivity of materials; introduction to combined heat transfer mechanism.

Conduction: One-dimensional general differential heat conduction equation in the rectangular, cylindrical and spherical coordinate systems; initial and boundary conditions.

Steady State one-dimensional Heat conduction: Composite Systems in rectangular, cylindrical and spherical coordinates with and without energy generation; thermal resistance concept; Analogy between heat and electricity flow; thermal contact resistance; critical thickness of insulation. **(Lectures 08)**

Unit II

Fins of uniform cross-sectional area; errors of measurement of temperature in thermometer wells.

Transient Conduction: Transient heat conduction Lumped capacitance method, Time constant unsteady state heat conduction in one dimension only, Heisler charts. **(Lectures 08)**

Unit III

Forced Convection: Basic concepts; hydrodynamic boundary layer; thermal boundary layer, flow over a flat plate; flow across a single cylinder and a sphere; flow inside ducts; empirical heat transfer relations; relation between fluid friction and heat transfer; liquid metal heat transfer.

Natural Convection: Physical mechanism of natural convection; buoyant force; empirical heat transfer relations for natural convection over vertical planes and cylinders, horizontal plates and cylinders, and sphere. **(Lectures 08)**

Unit IV

Thermal Radiation: Basic radiation concepts; radiation properties of surfaces; black body radiation laws; shape factor; black-body radiation exchange; Radiation exchange between diffused non black bodies in an enclosure; radiation shields; solar radiation. **(Lectures 08)**

Unit V

Heat Exchanger: Types of heat exchangers; fouling factors; overall heat transfer coefficient; logarithmic mean temperature difference (LMTD) method; effectiveness-NTU method; compact heat exchangers.

Condensation And Boiling: Introduction to condensation phenomena; heat transfer relations for laminar film condensation on vertical surfaces and on a horizontal tube; Boiling modes pool boiling, curve, forced convective boiling.

Introduction To Mass Transfer: Introduction; Flick 's law of diffusion; steady state equi-molar counter diffusion; steady state diffusion through a stagnant gas film. **(Lectures 08)**

Texts Books

1. Bayazitouglu & Ozisik, Elements of Heat Transfer, McGraw-Hill Book Company.
2. Holman J.P., Heat Transfer, McGraw-Hill International .
3. Pitts & Sisson , Schaum's Outline of Heat Transfer, McGraw-Hill International.

Reference Books

1. Frank Kreith, Principles of Heat Transfer, McGraw-Hill Book co.
2. James R. Welty, Fundamentals of Momentum, Heat and Mass Transfer, John Wiley & Sons.
3. Gupta Vijay, Heat Transfer, Vijay New Age International (P) Ltd. Publishers
4. Rao Y.V.C., Heat Transfer, University Press.

*** Latest editions of all the suggested books are recommended.**

TECHNICAL WRITING

Course code: EHM 501

(Common with BPH506/BHM501)

L	T	P	C
2	0	2	3

Course Contents:

Unit I

Forms of Technical Communication: Report writing, Definition and characteristics, Steps towards report writing, Structure, style of Report writing, Types & forms of Reports, Presentation of Reports, Importance of Report writing. **(10 Hours)**

Unit II

Technical Paper writing: Definition and purpose, Essentials of a good technical paper/Article, Scientific Article writing, Difference between Technical paper/Article and scientific article, Methods of writing technical paper & Scientific article. **(10 Hours)**

Unit III

Technical Proposal: Definition and meaning of Technical Proposal, Significance of Proposal, Characteristics of a good Proposal, Format of Proposal, Uses of Proposals. **(10 Hours)**

Unit IV

Writing Skills: Reporting events, Writing newspaper reports, Essentials of essay writing –writing an essay of about 300 words on a given topic. Bio-Data Making, Writing of CV & Resumes, Difference between CV and Resume, Writing Job application etc. **(10 Hours)**

Text Books:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.

Reference Books:

1. Monippally Matthukutty M., *Business Communication Strategies* – Tata- Mc Graw Hill Publications Company, New Delhi.
2. Mohan K. & Sharma R.C., *Business Correspondence of Report Writing* –TMH, New Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

DESIGN OF MACHINE ELEMENTS (LAB)

Course Code: EME551

L	T	P	C
0	0	4	2

Course Contents

1. Computer and Language: Students are required to learn the basics of computer language such as C and C++ so that they should be able to write the computer programme (3 practical turns)
2. Writing Computer programme for conventional design: Students are required to write computer program and validate it for the design of machine components done in theory subject (5 practical turns)
3. Mini Project: Each student will be given a real life problem for the complete design of a subsystem/system using either manual calculation with the help of design handbook or through computer programme, if needed. This will be done as home assignment to be submitted at the end of the semester

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would be done by the external faculty based on the experiment conducted during the examination.

PRODUCTION TECHNOLOGY –II (LAB)

Course Code: EME552

L **T** **P** **C**
0 **0** **4** **2**

LIST OF EXPERIMENTS

10 experiments out of the following

1. Shear-angle determination (using formula) with tube cutting (for orthogonal) on lathe machine.
2. Bolt (thread) making on Lathe machine
3. Tool grinding (to provide tool angles) on tool-grinder machine.
4. Gear cutting on milling machine.
5. Machining a block on shaper machine.
6. Finishing of a surface on surface-grinding machine.
7. Drilling holes on drilling machine and study of twist-drill.
8. Study of different types of tools and its angles & materials.
9. Experiment on tool wear and tool life.
10. Experiment on jigs/Fixtures and its uses
11. Gas welding experiment
12. Arc welding experiment
13. Resistance welding experiment.
14. Soldering & Brazing experiment
15. Experiment on TIG/MIG Welding.
16. Macro and Microstructure of welding joints, Heat Affected Zone (HAZ).

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

HEAT & MASS TRANSFER (LAB)

Course Code: EME553

L	T	P	C
0	0	4	2

List of Experiments

1. Conduction – Composite wall experiment
2. Conduction – Composite cylinder experiment
3. Convection – Pool Boiling experiment
4. Convection – Experiment on heat transfer from tube-natural convection.
5. Convection – Heat Pipe experiment.
6. Convection – Heat transfer through fin-natural convection.
7. Convection – Heat transfer through tube/fin-forced convection.
8. Any experiment – Such as on Stefan's Law, on radiation determination of emissivity, etc.
9. Any experiment – Such as on solar collector, etc. on radiation
10. Heat exchanger – Parallel flow experiment
11. Heat exchanger – Counter flow experiment
12. Any other suitable exp such as on critical insulation thickness.
13. Conduction – Determination of thermal conductivity of fluids.
14. Conduction – Thermal Contact Resistance Effect.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

INDUSTRIAL TRAINING & PRESENTATION
(PRESENTATION BASED ON SURVEY CAMP DONE AFTER THE IV SEMESTER
EXAMINATION IN SUMMER)

Course Code: EME591

L	T	P	C
0	0	0	2

Guidelines

Students will undergo Industrial training of four weeks in any industry or reputed organization after the IV semester examination in summer. The evaluation of this training shall be included in the V semester evaluation.

The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the IV semester and shall be the nodal point for coordination of the training.

Students will also be required to prepare an exhaustive technical report of the training during the V semester which will be duly signed by the officer under whom training was taken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in- charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Director of the college.

The student at the end of the V semester will present his report about the training before a committee constituted by the Director of the College which would be comprised of at least three members - Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately to the Director in a sealed envelope.

The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.

Not more than three students would form a group for such industrial training/ project submission. The marking shall be as follows.

Internal: 50 marks

By the Faculty Guide –25 marks

By Committee appointed by the Director – 25 marks

External: 50 marks

By Officer-in-charge trainee in industry – 25 marks

By External examiner appointed by the University – 25 marks

SEMESTER VI
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP571

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code
2. Participation in Conferences /Workshops / Seminars
3. Attendance in guest lectures, talks by the invitee and special technical sessions organized from time to time..
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behaviour in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
9. General behaviour

The above mentioned is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of cumulative Performance Index (CPI)

REFRIGERATION & AIR CONDITIONING

Course Code: EME601

L	T	P	C
3	2	0	4

Objective: To study about working of refrigeration system, and air conditioner. etc.

Course Contents

Unit I

Refrigeration: Introduction to refrigeration system, Methods of refrigeration, Carnot refrigeration cycle, Unit of refrigeration, Refrigeration effect & C.O.P.

Air Refrigeration cycle: Open and closed air refrigeration cycles, Reversed Carnot cycle, Bell Coleman or Reversed Joule air refrigeration cycle, Aircraft refrigeration system, Classification of aircraft refrigeration system. Boot strap refrigeration, Regenerative, Reduced ambient, Dry air rated temperature (DART).

(Lectures 08)

Unit II

Vapour Compression System: Single stage system, Analysis of vapour compression cycle, use of T-S and P- H charts, Effect of change in suction and discharge pressures on C.O.P, Effect of sub cooling of condensate & superheating of refrigerant vapour on C.O.P of the cycle, Actual vapour compression refrigeration cycle, Multistage vapour compression system requirement, Removal of flash gas, Intercooling, Different configuration of multistage system, Cascade system.

(Lectures 08)

Unit III

Vapour Absorption system; Working Principal of vapour absorption refrigeration system, Comparison between absorption & compression systems, Elementary idea of refrigerant absorbent mixtures, Temperature– concentration diagram & Enthalpy – concentration diagram , Adiabatic mixing of two streams, Ammonia – Water vapour absorption system, Lithium- Bromide water vapour absorption system, and its comparison. Refrigerants: Classification, Nomenclature, Desirable properties of refrigerants, Common refrigerants, Secondary refrigerants and CFC free refrigerants.

(Lectures 08)

Unit IV

Air Conditioning: Introduction to air conditioning, Psychometric properties and their definitions, Psychometric chart, Different Psychometric processes, Thermal analysis of human body Effective temperature and comfort chart, Cooling and heating load calculations, Selection of inside & outside design conditions, Heat transfer through walls & roofs, Infiltration & ventilation, Internal heat gain, Sensible heat factor (SHF), By pass factor, Grand Sensible heat factor (GSHF), Apparatus dew point (ADP).

(Lectures 08)

Unit V

Refrigeration Equipment & Application: Elementary knowledge of refrigeration & air conditioning equipments e.g. compressors, condensers, evaporators & expansion devices, Air washers, Cooling, towers & humidifying efficiency, Food preservation, cold storage, Refrigerates Freezers, Ice plant, Water coolers, Elementary knowledge of transmission and distribution of air through ducts and fans, Basic difference between comfort and industrial air conditioning.

(Lectures 08)

Text Books

1. Prasad Manohar, Refrigeration and Air Conditioning, New Age International
2. Arora C.P., Refrigeration and Air Conditioning.
3. Arora & Domkundwar , Refrigeration and Air Conditioning.

Reference Books

1. Stoecker & Jones, Refrigeration and Air Conditioning.
2. Roy J. Dossat, Refrigeration and Air Conditioning.
3. Baloney P.L., Refrigeration and Air Conditioning.
4. Kuhen, Ramsey & Thelked, Thermal Environment Engg.

*** Latest editions of all the suggested books are recommended.**

I C ENGINES

Course Code: EME602

L	T	P	C
3	2	0	4

Objective: the objective is to study about engines (two stroke & four stroke), ignition & injection system etc.

Course Contents

Unit I

Introduction to I.C Engines: Engine classification, Air standard cycles, Otto, Diesel, Stirling, Ericsson cycles, Actual cycle analysis, Two and four stroke engines, SI and CI engines, Valve timing diagram, Rotary engines, stratified charge engine.

Fuels: Fuels for SI and CI engine, important qualities of SI engine fuels, Rating of SI engine fuels, Important qualities of CI engine fuels, Dopes, Additives, Gaseous fuels, LPG, CNG, Biogas, Producer gas, Alternative fuels for IC engines. **(Lectures 08)**

Unit II

SI Engines: Carburetion, Mixture requirements, Carburetor types Theory of carburetor, MPFI.

Combustion in SI engine, Flame speed, Ignition delay, Abnormal combustion and its control, combustion chamber design for SI engines. Ignition system requirements, Magneto and battery ignition systems, ignition timing and spark plug, Electronic ignition. **(Lectures 08)**

Unit III

CI Engine: Fuel injection in CI engines, Requirements, Types of injection systems, Fuel pumps, Fuel injectors, Injection timings. Combustion in CI engines, Ignition delay, Knock and its control, Combustion chamber design of CI engines. Scavenging in 2 Stroke engines, pollution and its control.

(Lectures 08)

Unit IV

Engine Cooling: Different cooling systems, Radiators and cooling fans. **Lubrication:** Engine friction, Lubrication principle, Type of lubrication, Lubrication oils, Crankcase ventilation.

Supercharging: Effect of altitude on power output, Types of supercharging. **Testing and Performance:** Performance parameters, Basic measurements, Blow by measurement, Testing of SI and CI engines.

(Lectures 08)

Unit V

Compressors: Classification, Reciprocating compressors, Single and multi stage, Inter cooling, volumetric efficiency. Rotary compressors, Classification, Centrifugal compressor, Elementary theory, Vector diagram efficiencies, Elementary analysis of axial compressors, Surging and stalling, Roots blower, Vaned compressor, Performance analysis. **(Lectures 08)**

Text Books

1. Obert E.F., I.C Engine Analysis & Practice
2. Ganeshan, I.C Engine, Tata Mc Graw Hill Publishers.
3. Mathur & Sharma, A Course in International Combustion Engines, Dhanpat Rai & Sons.

Reference Books

1. Chlumsky, Reciprocating and Rotary Compressors, SNTI Publications Czechoslovakia.
2. Yadav R., I.C Engine, Central Publishing House, Allahabad

* Latest editions of all the suggested books are recommended.

MECHANICAL VIBRATIONS

Course Code: EME603

L	T	P	C
3	2	0	4

Objective: To study about vibration, degree of freedom etc.

Course Contents

Unit I

Introduction: Periodic motion, harmonic motion, superposition of simple harmonic motions, beats, fourier analysis.

Single Degree Freedom System: Free vibration, Natural frequency, Equivalent Systems, Energy method for determining natural frequency, Response to an initial disturbance, Torsional vibrations, Damped vibrations, Damping models – Structural, Coulomb and Viscous damping, Vibrations of system with viscous damping, Logarithmic decrement, viscous dampers. **(Lectures 08)**

Unit II

Single Degree Freedom: Forced Vibration Forced vibration, Harmonic Excitation with viscous damping, Steady state vibrations, Forced vibrations with rotating and reciprocating unbalance, Support excitation, Vibration isolation, Transmissibility, Vibration measuring instruments- Displacement, Velocity, Acceleration and Frequency measuring instrument. **(Lectures 08)**

Unit III

Two Degree Freedom System: Introduction, Principal modes, Double pendulum, Torsional system with damping, Coupled System, Un-damped dynamic, vibration absorbers, Centrifugal pendulum absorber, Dry friction damper, Un-tuned viscous damper. **(Lectures 08)**

Unit IV

Multi-degree Freedom System: Exact Analysis: Un-damped free and forced vibrations of multi-degree system, Influence numbers, Reciprocal Theorem, Torsional vibration of multi rotor system, Vibration of geared system, Principal coordinates, Continuous systems- Longitudinal vibration of bars, Torsional vibrations of Circular shafts, Lateral vibration of beams. **(Lectures 08)**

Unit V

Multi-degree Freedom System: Numerical Analysis: Rayleigh's, Dunkerley's, Holzer's and Stodola's methods, Rayleigh – Ritz method. Critical Speed of Shafts: Shafts with one disc with and without damping, Multi-disc shafts, Secondary critical speed. **(Lectures 08)**

Text Books

1. Srinivasan P., Mechanical Vibration, TMH
2. Grover G.K., Mechanical Vibration, Jain Bros. Roorkee.
3. Thomson W.T., Mechanical Vibration.

Reference Books

1. Tse, Morse & Hinkle, Mechanical Vibration – Theory & Application, Prentice Hall.
2. Rao J.S. & Gupta K., Introduction Course on Theory and Practice of Mech. Vibration, New Age Publishers.
3. Rama Murthy V., Mechanical Vibration Practice with Basic Theory, Narosa Publishers.

*** Latest editions of all the suggested books are recommended.**

DYNAMICS OF MACHINE

Course Code: EME604

L	T	P	C
3	2	0	4

Objective: To study about of balancing of machines, brakes etc.

Course Contents

Unit I

Force Analysis, Turning Moment & Fly wheel: Static force analysis of linkages, Equivalent offset inertia force, Dynamic analysis of slider crank & Bar mechanism. Piston and Crank effort, Inertia, Torque, Turning moment diagrams, Fluctuation of energy, Flywheel. **(Lectures 08)**

Unit II

Balancing of machines: Static and dynamic balancing, Balancing of rotating and reciprocating masses, Primary and secondary forces and couples. **(Lectures 08)**

Unit III

Friction: Pivot and collar friction, Friction circle, Single plate, Multi-plate and Cone clutches, Michelle & Kingsbury thrust bearing and rolling contact bearing, Belts and pulleys, Flat and V-belts, Design and selection. Brakes and Dynamometers (Mechanical Type): External and internal shoe brakes, Band and Block brakes, Hydraulic brakes, Absorption and Transmission dynamometers. **(Lectures 08)**

Unit IV

Governors: Dead weight and spring loaded governors, Sensitivity, Stability, Hunting, Isochronism, Effort and Power, Friction and Insensitivity, Introduction to inertia governors. **(Lectures 08)**

Unit V

Gyroscopic Motion: Principles, Gyroscopic acceleration, Gyroscopic couple and Reaction. Effect of gyroscopic couple upon the stability of aero planes, ship, two & four wheelers. Mechanical Vibration: Single degree free & forced, Un-damped & Damped vibrations, Critical speeds. **(Lectures 08)**

Text Books

1. Bevan Thomas, Theory of Machine, ELBS Publishers
2. Ratan S.S., Theory of Machine, TMH.

Reference Books

1. Mabie , Mechanisms & Dynamics of Machines.
2. Shiglay, Theory of Machine & Mechanism.
3. Bansal R.K., Theory of Machine, Laxmi Publication.
4. Ambekar A.K., Mechanisms and Machine Theory, Jain Bros.
5. Green W.T., Theory of Machines.
6. Rao & Dukhipati, Mechanisms and Machine Theory, New Age.
7. Ghosh & Mallik, Theory of Machine & Mechanism.
8. Ballaney P.L., Theory of Machines, Khanna Publication.

*** Latest editions of all the suggested books are recommended.**

COMMUNICATION TECHNIQUE

Course code: EHM601

(Common with BPH606/BBA603/BCA604/BCH606/BHM601)

L	T	P	C
2	0	2	3

Course Contents:

Unit I

Oral Communication: Principles of effective oral communication, Features, Vitals of communication, Interpersonal communication, Persuasive communication. **(10 Hours)**

Unit II

Presentation Strategies: Purpose, Audience & Locale, Organizing contents, Preparing outlines. Audio-Visual aids, Body Language, Voice dynamics. **(10 Hours)**

Unit III

Listening Skills: The Listening process, Hearing & listening, Types of listening, Listening with a purpose, Barriers to listening, Telephonic conversation. **(10 Hours)**

Unit IV

Speaking Skills: Improving voice & speech, Art of public speaking, Using visual aids, Job interview being interviewed by the media, Dealing with the boss. Dealing with subordinates, How to run a meeting. **(10 Hours)**

Text Book:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.

Reference Books:

1. Ruther Ford A., *Basic Communication Skills* – Pearson Education, New Delhi.
2. Mitra Barum K., *Effective Technical Communication* – O.U.P. New Delhi. 2006.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

OPERATIONS MANAGEMENT

Course Code: EHM 602

L	T	P	C
3	2	0	4

Objective: To learn about operations management like planning, scheduling, forecasting etc.

Course Contents

Unit I

Operations Management – An overview, Definition of production and operations management, Transformation process model: Inputs, process and outputs; Classification of operations; Responsibilities of Operations Manager, Production Cycle, New Product Development, Product Design, Process types in manufacturing: project, jobbing, batch, line, mass, continuous; Process types in services: professional services, services shops, mass services. **(Lectures 08)**

Unit II

Forecasting Methods & Aggregate Planning: Forecasting as a planning tool, Time horizon in forecasting, characteristics of forecasts, subjective and objective forecasting methods, casual methods, time series methods, methods for forecasting stationery series, exponential smoothing, Measurement of errors, Monitoring and Controlling forecasting models.

The aggregate planning problem, Aggregate planning techniques, evaluation of chase strategy & constant work force plan, solution of aggregate problem. **(Lectures 08)**

Unit III

Inventory Control & MRP: Inventory Management – Objectives, Factors, Process, relevant costs, the EOQ model Selective Inventory control techniques- ABC, VED, SED, FSN analysis. Introduction to JIT.

MRP: Overveiw, Process, use of MRP in real world. **(Lectures 08)**

Unit IV

Operation Scheduling: Characteristics of job shop scheduling problems, comparison of specific sequencing rules- FCFS, SPT, EDD, critical ratio. Theory of sequencing for single machine- with rules such as SPT, EDD, and minimum number of tardy jobs (NT). Sequencing algorithms for multiple machines- n jobs x 2 machines, extension to 3 machines, 2 job flow shop problem. **(Lectures 08)**

Unit V

Facility Location & Layout: Factors affecting location decisions, Techniques for locating new facilities, subjective, Semi quantitative & quantitative techniques, centre of gravity problem. The facility layout principles, systematic layout planning procedure, Types of layout, activity relationship chart, from/to chart. Line balancing. **(Lectures 08)**

Text Books

1. Adam Jr Everetl E. R J – Production and Operations Management (Prentice-Hall, 2000, 5th Edition)
2. Ashwathappa K.& Bhatt K Sridhar, Production and Operations Management, Himalaya Publication
3. Mahadevan B., Operations Management Theory and Practice, Pearson Education,
4. Richard B Chase, Operations Management, TMH

Reference Books

1. Kachru Upendra, Production and Operations Management, Text and Cases, Excel Books
2. Gaither Norman & Greg Fraizer ,Operations Management, Thomson South Western
3. Chary - Production and Operations Management (Tata McGraw-Hill, 1997, 9th Edition)
4. Bedi Kanishka - Production & Operations Management (Oxford University Press, 2nd

*** Latest editions of all the suggested books are recommended.**

REFRIGERATION & AIR CONDITIONING (LAB)

Course Code: EME651

L	T	P	C
0	0	4	2

LIST OF EXPERIMENTS

1. Experiment on refrigeration test rig and calculation of various performance parameters.
2. To study different types of expansion devices used in refrigeration system.
3. To study different types of evaporators used in refrigeration systems.
4. To study basic components of air-conditioning system.
5. Experiment on air-conditioning test rig & calculation of various performance parameters.
6. To study air washers.
7. Study of window air conditioner.
8. Study & determination of volumetric efficiency of compressor.
9. Visit of a central air conditioning plant.
10. Visit of cold storage.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

MECHANICAL VIBRATIONS (LAB)

Course Code: EME652

L **T** **P** **C**
0 **0** **4** **2**

LIST OF EXPERIMENTS

Note: Ten experiments out of the following are to be conducted.

1. Study of simple linkage models/mechanisms
2. Study of inversions of four bar linkage
3. Study of inversions of single/double slider crank mechanisms
4. Experiment on longitudinal vibration
5. Experiment on transverse vibration
6. Experiments on dead weight type governor
7. Experiment on spring controlled governor
8. Experiment on critical speed of shaft
9. Experiment on gyroscope
10. Experiment on static/dynamic balancing
11. Experiment on Brake.
12. Experiment on clutch.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

DYNAMICS OF MACHINES (LAB)

Course Code: EME653

L T P C
0 0 4 2

List of Experiments

Note: Ten experiments out of the following are to be conducted

1. Study of simple linkers/models/mechanisms.
2. Experiment On Velocity acceleration.
3. Experiment On cam.
4. Experiment On Governor.
5. Experiment On critical speed of shaft (whirling of shaft)
6. Experiment On Gyroscope
7. Experiment On Balancing (static & dynamic)
8. Experiment On 4-bar mechanism
9. Experiment On Gears (tooth profile, interference etc.)
10. Experiment On Gear trains.
11. Experiment On Brakes
12. Experiment On clutch
13. Experiment On synthesis of planner linkages
14. Experiment On Mechanism
15. Experiment On Vibration (spring)
16. Experiment On Vibration (beam)
17. Experiment On Vibration (Torsional)
18. Experiment On Engine

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP671

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code
2. Participation in Conferences /Workshops / Seminars
3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time..
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behaviour in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
9. General behaviour

The above mentioned is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of cumulative Performance Index (CPI)

Semester VII

COMPUTER AIDED DESIGN (CAD)

Course Code: EME 701

L	T	P	C
3	2	0	4

Objective: To study about techniques of solving problems using C, C++, etc.

Course Contents

Unit I

Introduction and Review of Computer Programming: Introduction to CAD/CAE, Element of CAD, Concepts of integrated CAD/CAM, CAD Engineering applications, its importance & necessity. Review of C, C++, statements such as if else for while & switch, functions, pointer-notations, structure & class, concept of OOP.

Computer Graphics –I: Computer systems, Graphics input devices- cursor control devices, Digitizers, Scanners, speech oriented devices and touch panels, Graphics display devices – CRT, colour CRT monitors, DVST, Flat- panel display, Graphics output Devices. **(Lectures 08)**

Unit II

Computer Graphics-II: Graphics software, Graphics functions, output primitives- Bresenham's line drawing and Mid-point circle algorithms.

Geometric Transformations: Word/device co-ordinate representations, 2D and 3D geometric transformations, Matrix representation-translation, scaling, shearing, rotation and reflection, composite transformations, concatenation, rotation about arbitrary axis. Exercise and programs.

(Lectures 08)

Unit III

Plane Curves: Curve representation, Interpolations Vs approximation, Parametric Continuity conditions, Spline Curves- Hermite spline, Bezier spline and B- spline Curves and its Properties.

3-D Graphics: Polygon surfaces – Polygon mesh representations, Quadric and Superquadric surfaces and Blobby objects, Fractals. Solid modeling- wire mesh and sweep representation, constructive solid geometry, Boolean operations, Boundary representations. Colour models.

(Lectures 08)

Unit IV

Computer Aided Design of Machine Elements and other Systems: CAD of machine elements such as shaft, springs, bearings and problems from other systems such as heat exchanger, inventory control etc. Writing Computer program in C, Drafting/Design of software such as Auto-CAD and Pro-E.

(Lectures 08)

Unit V

Numerical Methods: Introduction, Errors in numbers, Binary, octal and Hexadecimal number representation. Root- finding & Optimisation. Interactive methods- Bisection method, Regula-Falsi method, Newton Raphson method, Interpolation- Lagrange and Newton's interpolation, Curve fitting- Least Square method, Numerical differentiation- interpolation methods, Numerical integration- Trapezoidal and Simpson Method.

Finite Element Methods: Introduction and Application of FEM, Stiffness Matrix/ Displacement Matrix, One/Two Dimensional bar & beam element (as spring system) analysis. **(Lectures 08)**

Text Books

1. Hearn & Baker, Computer Graphics, Prentice hall
2. Srivastava. R.K., Computer Aided Design.

Reference Books

1. Foley, Van Dam, Feiner, Computer Graphics –Theory & Practice, Pearson Education.
2. Zeid Ibrahim, CAD/CAM Theory and Practice, Mc Graw Hill International.
3. Rao & Dukkipati , Computer Aided Analysis & Design of Machine Elements.
4. Rogers & Adams, Mathematical Elements for Computer Graphics, Mc Graw Hill
5. Groover & Zimmers , CAD/CAM , Prentice Hall of India Pvt Ltd
6. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall.

*** Latest editions of all the suggested books are recommended.**

AUTOMOBILE ENGINEERING

Course Code: EME702

L	T	P	C
3	2	0	4

Objective: To study about automobiles, working of their components, accessories, gear mechanism, power transmission etc.

Course Content

Unit I

Power Unit and Gear Box: Principles of Design of main components. Valve mechanism. Power and Torque characteristics. Rolling, air and gradient Resistance. Tractive effort. Gear Box. Gear ratio determination. Design of Gear box. **(Lectures 08)**

Unit II

Transmission System: Requirements. Clutches. Toque converters. Over Drive and free wheel, Universal joint. Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle. Castor Angle, wheel camber & Toe in Toe out etc. Steering geometry. Ackerman mechanism, Under-steer and Over-steer. **(Lectures 08)**

Unit III

Braking System: General requirements, Road, tyre adhesion, weight transfer, Braking ratio. Mechanical brakes, Hydraulic brakes. Vacuum and air brakes. Thermal aspects. Chassis and Suspension System: Loads on the frame. Strength and stiffness. Various suspension systems. **(Lectures 08)**

Unit IV

Electrical System: Types of starting motors, generator & regulators, lighting system, Ignition system, Horn, Battery etc.
Fuel Supply System: Diesel & Petrol vehicle system such as Fuel Injection Pump, Injector & Fuel Pump, Carburetor etc. MPFI. **(Lectures 08)**

Unit V

Automobile Air Conditioning: Requirements, Cooling & heating systems, Cooling & Lubrication System: Different type of cooling system and lubrication system. Maintenance system: Preventive maintenance, break down maintenance, and over hauling system. **(Lectures 08)**

Text Books

1. Hietner, Automotive Engineering.
2. Singh. Kripal , Automobile Engineering.

Reference Books

1. Narang, Automobile Engineering.
2. Crouse, Automotive Mechanics.
3. Newton & Steeds, Automobile Engineering.

* Latest editions of all the suggested books are recommended.

POWER PLANT ENGINEERING

Course Code: EME 703

L	T	P	C
3	2	0	4

Objective: the objective is to study about power plants like nuclear, hydroelectric, steam, diesel etc.

Course Content

Unit I

Introduction: Power and energy, sources of energy, review of thermodynamic cycles related to power plants, fuels and combustion, calculations.

Variable Load problem: Industrial production and power generation compared, ideal and realised load curves, terms and factors. Effect of variable load on power plant operation, methods of meeting the variable load problem. Power plant economics and selection: Effect of plant type on costs, rates, fixed elements, energy elements, customer elements and investor's profit; depreciation and replacement, theory of rates. Economics of plant selection, other considerations in plant selection. **(Lectures 08)**

Unit II

Steam power plant: Powerplant boilers including critical and super critical boilers. Fluidized bed boilers, boilers mountings and accessories. General layout of steam power plant. Different systems such as fuel handling system, pulverizers and coal burners, combustion system, draft, ash handling system, feed water treatment and condenser and cooling system, turbine auxiliary systems such as governing, feed heating, reheating, flange heating and gland leakage. Operation and maintenance of steam power plant, heat balance and efficiency. **(Lectures 08)**

Unit III

Diesel power plant: General layout, performance of diesel engine, fuel system, lubrication system, air intake and admission system, supercharging system, exhaust system, diesel plant operation and efficiency, heat balance.

Gas turbine power plant: Elements of gas turbine power plants, Gas turbine fuels, cogeneration, auxiliary systems such as fuel, controls and lubrication, operation and maintenance, Combined cycle power plants. **(Lectures 08)**

Unit IV

Nuclear power plant: Principles of nuclear energy, basic components of nuclear reactions, nuclear power station.

Hydro electric station: Principles of working, applications, site selection, classification and arrangements, hydro- electric plants, run off size of plant and choice of units, operation and maintenance, hydro systems, interconnected systems.

Non Conventional Power Plants: Introduction to non-conventional power plants (Solar, wind, geothermal, tidal) etc. **(Lectures 08)**

Unit V

Electrical system: Generators and generator cooling, transformers and their cooling, bus bar, etc.

Instrumentation Purpose, classification, selection and application, recorders and their use, listing of various control rooms. Pollution: Pollution due to power generation. **(Lectures 08)**

Text Books

1. Verma Mahesh, Power Plant Engineering, Metropolitan Book Company Pvt. Ltd. New Delhi.
2. El-Vakil, Power Plant Technology, McGraw Hill.

Reference Books

1. Nag, P.K., Power Plant Engineering, Tata McGraw Hill.
2. Yadav R., Steam & Gas Turbines & Power Plant Engineering, Central Publishers.

*** Latest editions of all the suggested books are recommended.**

CORPORATE COMMUNICATION

Course code: EHM701
(Common with BPH707)

L	T	P	C
2	0	2	3

Course Contents:

Unit I

Corporate behavior, Corporate expectation, Office etiquettes, Telephonic conversation & etiquette.
(10 Hours)

Unit II

Communication: Press communication, press-note, notification, e-mail, inviting tenders, writing advertisements, writing notices, Agenda for the meeting, writing minutes of the meeting.
(10 Hours)

Unit III

Interview skills: Concept & Process, Preparing for the Interview, Dressing sense, Self-awareness – Meaning & scope, Self- image, self-concept, self confidence.
(10 Hours)

Unit IV

Group Discussion (G.D), Tips and Style.
(10 Hours)

Recommended Books:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.
2. Newstrom John W., *Organizational Behaviour: Human Behaviour at work* – Tata McGraw Hill.
3. Luthans Fred, *Organizational Behaviour* – Tata McGraw Hill.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

* Latest editions of all the suggested books are recommended.

CAD (LAB)

Course Code: EME751

L T P C
0 0 4 2

LIST OF EXPERIMENTS

1. Line drawing or Circle drawing algorithm experiment: writing the program and running it on computer.
2. Transformations algorithm experiment for translation/rotation/scaling: writing program and running it on computer.
3. Design problem experiment: writing the program for design of machine element or other system and running it on computer.
4. Optimization problem experiment: writing a program for optimizing a function and running it on computer.
5. Auto CAD experiment: understanding and use of Auto CAD commands.
6. Writing a small program for FEM for 2 spring system and running it. Or using a FEM package.
7. Use of Graphic software standards packages e.g. GKs /PHICS/GL etc.
8. Use of pro Engineer/Ideas etc.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

AUTOMOBILE ENGINEERING (LAB)

Course Code: EME752

L	T	P	C
0	0	4	2

LIST OF EXPERIMENTS

Any 10 experiments to be conducted by a student

1. Study & experiment on braking system.
2. Study & experiment on fuel supply system.
3. Study & experiment on ignition system.
4. Study & experiment on steering system.
5. Study & experiment on transmission system.
6. Study & experiment on suspension system.
7. Study safety aspect of automobile design.
8. Study & experiment on Lighting or lubrication system.
9. Study & experiment on lubrication and cooling system.
10. Comparative study features of common small cars (such as fiat, Ambassador, Maruti, Matiz, Santro, Indica and its variations) available in India.
11. Comparative study & technical features of common scooters & motorcycles available in India. Case study/term paper.
12. Comparative Study & Technical features of common heavy vehicles available in India. Case study/term paper.
13. Engine tuning and carburetor servicing experiment.
14. Experiment & study of MPFI system.
15. Experiment on fuel consumption measurement.
16. Review experiment on IC Engines & modern trends.
17. Visit of an Automobile factory.
18. Study & experiment of main gear box and differential gear box.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

COMPUTER AIDED MANUFACTURING (CAM)

Course Code: EME 704

L	T	P	C
3	2	0	4

Course Content:

Objective: To know about automation, numerical control (NC) machines and computer aided manufacturing systems.

Unit- I

Automation

Introduction to CAM; Automated Manufacturing system; Need of automation, Basic elements of automation, Levels of automation, Automation Strategies, Advantages & disadvantages of automation, Historical development and future trends.

Features of NC Machines, Fundamental of Numerical Control, elements of NC machine tools, classification of NC machine tools, Advantages, suitability and limitations of NC machine tools, Application of NC system, Methods for improving Accuracy considering the factors such as tool deflection and chatter and Productivity. **(Lectures 08)**

Unit II

NC Part Programming

(a) Manual (word address format) programming. Examples Drilling, Turning and Milling; Canned cycles, Subroutine, and Macro.

(b) APT programming. Geometry, Motion and Additional statements, Macro- statement. **(Lectures 08)**

Unit III

System Devices: Introduction to DC motors, stepping motors, feedback devices such as encoder, counting devices, digital to analog converter and vice versa.

Interpolators: Digital differential Integrator-Principle of operation, exponential deceleration; DDA Hardware Interpolator- Linear, Circular; DDA Software Interpolator.

Control of NC Systems, Open and closed loops. Control of point to point systems- Incremental open loop control, Incremental close loop, Absolute close loop; Control loop in contouring systems; Adaptive control. **(Lectures 08)**

Unit IV

Computer Integrated Manufacturing system: Group Technology, Flexible Manufacturing System, CIM, CAD/CAM, Computer aided process planning-Retrieval and Generative, Concept of Mechatronics, Computer aided Inspection. **(Lectures 08)**

Unit V

Robotics- Types and generations of Robots, Structure and operation of Robot, Robot applications.

Economics, Robot programming methods. VAL and AML with examples.

Intelligent Manufacturing: Introduction to Artificial Intelligence for Intelligent manufacturing.

(Lectures 08)

Text Books

1. Groover Mikell P., Automation, Production Systems and Computer Integrated Manufacturing
2. Kundra & Rao, Computer Aided Manufacturing
3. Kore, Computer Control of Manufacturing Systems

References Books

1. Martin S.J., NC Machine Tools.
2. Koren, NC Machines
3. Groover, CAD/CAM

*** Latest editions of all the suggested books are recommended.**

NON DESTRUCTIVE TESTING

Course Code: EME705

L	T	P	C
3	2	0	4

Course Contents

Unit I

Introduction: Scope and advantages of N.D.T. some common NDT methods used since ages – visual inspection, Ringing test, and chalk – test (oil-whiting test) their effectiveness in detecting surface cracks, bond strength and surface defects. **(Lectures 08)**

Unit II

Common NDT methods: Dye – penetrate tests – principle, scope, equipment and techniques. Zygo testing. Magnetic Particle Tests- Scope of test, Principle equipment and technique. DC and AC magnetization, use of dry and wet powders magna glow testing. Interpretations of results. **(Lectures 08)**

Unit III

Radiographic Methods: X-ray radiography – principle, equipment and methodology. Interpretation of radiographs, Limitations Gama ray radiography. Principle, equipment, source of radioactive material and technique. Precautions against radiation hazards, Advantage over x-ray radiography methods. **(Lectures 08)**

Unit IV

Ultrasonic Testing Methods: Introduction, Principle of Operation – piezoelectricity. Ultrasonic probes, cathode ray oscilloscope techniques and advantages limitation and typical applications. **(Lectures 08)**

Unit V

Testing of castings, forgings & weldments: Application of NDT methods in inspection of castings, forgings and welded structures with illustrative examples. Case studies. Sample-testing in the lab. **(Lectures 08)**

Text Book

1. Halmsha P., Non-Destructive Testing

Reference Book

1. Metals Handbook, Nondestructive Inspection and Quality Control.

*** Latest editions of all the suggested books are recommended.**

CAM (LAB)

Course Code: EME753

L	T	P	C
0	0	4	2

LIST OF EXPERIMENTS

1. Writing a part-programming (in word address format or in APT) for a job for drilling operation (point-to-point) and running on NC machine.
2. Writing a part programming (in word address format or in APT) for a job for milling operation (contouring) and running on NC machine
3. Experiment on Robots and its programs
4. Experiment on Transfer line/Material handling.
5. Experiment on difference between ordinary machine and NC machine, study or retrofitting.
6. Experiment on study of system devices such as motors and feed-back devices.
7. Experiment on Mechatronics & controls.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

NON DESTRUCTIVE TESTING LAB

Course Code: EME 754

L T P C
0 0 4 2

LIST OF EXPERIMENTS

1. Experiment on Visual inspection Ringing test chalk test (oil whitening test).
2. Experiment on Die penetrate test (liquid penetrate inspection),
3. Experiments on Magnetic particle Inspection
4. Experiment on Ultrasonic testing methods
5. Experiment on Eddy Current Inspection

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

ENGINEERING MATERIALS

Course Code: EME 706

L	T	P	C
3	2	0	4

Objectives: To study the properties of various engineering materials.

Course Content:

Unit I

Ferrous Materials, their Properties and Applications: Plain carbon steels, their properties and application: plain carbon steels, effects of alloying elements in plain carbon steels. Alloy steels, tools steels, stainless steels, low and high temperature resisting steels, high strength steels, selections, specifications, form and availability of steel. Cast irons-white, grey, modular malleable and alloy cast irons. Recognized patterns of distribution of graphite flakes in grey cast iron. **(Lectures 08)**

Unit II

Heat Treatment of Steels: TTT diagrams, annealing, normalizing, hardening and tempering of steel. Austempering and martempering of steel. Hardenability, Jominy end quench test. Grain size and its determination. Effect of grain on the properties of steel. Surface hardening of steel: Carbonising, nitriding, carbo-nitriding, cyaniding, flues and induction hardening microscopic determination of case depth and depth of hardening. **(Lectures 08)**

Unit III

Nonferrous materials, their properties and application, brasses, bronzes, cupro-nickel alloys, aluminum, magnesium and titanium alloys, bearing materials, selection, specific form and availability. Heat treatment of nonferrous materials – solutionizing and precipitations hardening. **(Lectures 08)**

Unit IV

Composites Polymer – polymer, metal-metal, ceramic –ceramic, ceramic-polymer, metal-ceramic, metal polymer composites. Dispersion reinforced, particle reinforced, laminated and fibre reinforced composites. **(Lectures 08)**

Unit V

Elastomers and Miscellaneous: Types, properties and identifications of different types of rubbers vulcanization, fabrication and forming techniques of rubber. Introduction of plastics and ceramics – types, application and process. Smart materials-introduction and types. Selection of materials and factors effecting deflection, Selection process and systematic evaluation. **(Lectures 08)**

Text Books

1. Kenneth G.Budinski & Michael K.Budinski, Engineering Materials, Prentice-Hall of India

References Books

1. William D Callister, Material Science and Engineering, John Wiley and Sons .
2. Raghavan.V., Materials Science and Engineering, Prentice Hall of India Pvt. Ltd.
3. Sydney H.Avner , Introduction to Physical Metallurgy, McGraw-Hill Book Company.

HYDRAULIC MACHINES

Course Code : EME 707

L	T	P	C
3	2	0	4

Objectives: To gain knowledge about hydraulic machines.

Unit I

Impact of jet: Impulse momentum equation, force generation due to impact of jet, Impact of jet on fixed flat plate (vertical, inclined), Impact of jet on moving flat plates (vertical, inclined). Impact of jet on curved fixed and moving vanes. **(Lectures 08)**

Note - Simple Numerical on work done and efficiency.

Unit II

Water Turbines: Layout of hydroelectric power plant and features of Hydroelectric power plant. Classification and selection of hydraulic turbines on the basis of head and discharge available, Construction and working principle of Impulse and Reaction (Pelton, Francis and Kaplan turbine). Velocity diagrams, work done, efficiencies and its calculation.

Unit III

Centrifugal Pump: Construction, principle of working and applications, Types of casings and impellers. Manometric head, Velocity diagram, Work done, Manometric efficiency, Mechanical efficiency Overall efficiency, Discharge of centrifugal pump, NPSH, Performance Characteristics of centrifugal pumps, Concept of multistaging of centrifugal pump, Priming and cavitation

Note: - Numerical on calculations of overall efficiency, manometric efficiency and Power required for driving pump.

Unit IV

Reciprocating Pump: Construction, working principle and applications of single and double acting reciprocating pumps. Concept of Slip, Negative slip, Use of Air Vessel, Indicator diagram with effect of acceleration head & frictional head (no derivations), Discharge of reciprocating pump, Power required to drive reciprocating pump, Separation and maximum speed of operation.

Note: - No Numerical treatment.

Unit V

Pumping devices and hydraulic devices, construction and working of following: air lift pump, jet pump, rotary pumps- external gear pump, internal gear pump, lobe pump, vane pump, hydraulic press, hydraulic accumulator, hydraulic intensifier.

Note: no numerical treatment.

Text Books:

1. Fluid Mechanics and hydraulic machines by R.K.Bansal
2. Fluid Machinery by Jagadish lal

Reference Books:

1. Fluid Mechanics and hydraulic machines by P.N. Modi & Seth

*** Latest editions of all the suggested books are recommended.**

INDUSTRIAL TRAINING & PRESENTATION
(PRESENTATION BASED ON INDUSTRIAL TRAINING DONE AFTER THE VI SEMESTER
EXAMINATION IN SUMMER)

Course Code: EME791

L	T	P	C
0	0	0	4

Guidelines

Students will undergo Industrial training of six weeks in any industry or reputed organization after the VI semester examination in summer. The evaluation of this training shall be included in the VII semester evaluation.

The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the VI semester and shall be the nodal point for coordination of the training.

Students will also be required to prepare an exhaustive technical report of the training during the VII semester which will be duly signed by the officer under whom training was taken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in- charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Director of the college.

The student at the end of the VII semester will present his report about the training before a committee constituted by the Director of the College which would be comprised of at least three members - Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately to the Director in a sealed envelope.

The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.

Not more than three students would form a group for such industrial training/ project submission. The marking shall be as follows.

Internal: 50 marks

By the Faculty Guide – 25 marks

By Committee appointed by the Director – 25 marks

External: 50 marks

By Officer-in-charge trainee in industry – 25 marks

By External examiner appointed by the University – 25 marks

DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP771

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code
2. Participation in Conferences /Workshops / Seminars
3. Attendance in guest lectures, talks by invitees and special technical sessions organized from time to time..
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behaviour in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
9. General behaviour

The above mentioned is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of cumulative Performance Index (CPI)

Semester VIII MECHATRONICS

Course Code: EME801

L	T	P	C
3	2	0	4

Objective: the objective is to know about robots, mechanical systems, interfacing etc.

Course Contents

Unit I

Introduction: Definition – Trends - Control Methods: Standalone, PC Based (Real Time Operating Graphical User Interface, Simulation) - Applications: SPM, Robot, CNC, FMS, CIM. **(Lectures 08)**

Unit II

Signal Conditioning: Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , speed channels Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps – Software - Digital Signal Processing – Low pass , high pass , notch filtering. **(Lectures 08)**

Unit III

Precision Mechanical Systems: Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection. **(Lectures 08)**

Unit IV

Electronic Interface Subsystems: TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , reset able fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets. **(Lectures 08)**

Unit V

Electromechanical Drives: Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives , PWM's - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation. **(Lectures 08)**

Text Books

1. Bolton W., Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering, Pearson Education Press.
2. Singh M.D., Joshi J.G., Mechatronics, PHI.

Reference Books

1. Newton C Braga, Mechatronics Source Book, Thomson Publications, Chennai.
2. Shanmugam N. & Anuradha, Mechatronics, Agencies Publishers.
3. Devdas Shetty, Richard & Thomson , Mechatronics System Design.

*** Latest editions of all the suggested books are recommended.**

TOTAL QUALITY MANAGEMENT (TQM)

Course Code: EME802

L	T	P	C
3	2	0	4

Objective: The objective is to study about quality concepts, management policies, control charts etc.
Course Contents

Unit I

Quality Concepts: Introduction; Meaning; Quality characteristics of goods and services Evolution of Quality control, concept change, TQM Modern concept, Basic concepts of quality, dimensions of quality, Juran's quality trilogy, Deming's 14 principles, PDCA cycle, Total quality management (TQM) models.

(Lectures 08)

Unit II

Quality Management: Organization structure and design, Quality function, decentralization, Designing and fitting organization for different types products and company, Human Factor in Quality: Attitude of top management, co-operation, of groups, operators attitude, responsibility, causes of operators error and corrective methods. Quality circles.

(Lectures 08)

Unit III

Quality improvement and cost reduction- 7QC tools and 7 new QC tools, Economics of quality value and contribution, Quality cost, optimizing quality cost, Quality assurance.

(Lectures 08)

Unit IV

Control Charts: Theory of control charts, control charts construction, construction of Mean & Range charts, Fraction defective chart and number of defective charts. Attributes Control Charts: Defects, construction and analysis of c-chart.

(Lectures 08)

Unit V

ISO-9000, Six sigma and TPM: ISO 9000 series, concept of Six Sigma and its application, Total Productive Maintenance (TPM).

(Lectures 08)

Text Books

1. Sharma D.D Total Quality Management, S.Chand
2. LaI H., Total Quality Management, Wiley Eastern Limited.
3. Greg Bounds, Beyond Total Quality Management, McGraw Hill.

Reference Books

1. Menon, H.G., TQM in New Product Manufacturing, McGraw Hill 1992.

*** Latest editions of all the suggested books are recommended.**

UNCONVENTIONAL MANUFACTURING PROCESSES

Course Code: EME803

L	T	P	C
3	2	0	4

Objective: To study about laser beam machining, Electron beam machining, Ultrasonic machining etc.

Course Contents

Unit I

Introduction: Limitations of conventional manufacturing processes, need of unconventional manufacturing processes and its classification. **(Lectures 08)**

Unit II

Unconventional Machining Process: Principles, working and applications of unconventional machining process such as Electro-Discharge machining, Electro-chemical machining, ultrasonic machining, Abrasive jet machining etc. **(Lectures 08)**

Unit III

Principles, working and application of unconventional machining processes such as laser beam machining, Electron beam machining, Ultrasonic machining etc. **(Lectures 08)**

Unit IV

Unconventional welding processes: Explosive welding, Cladding etc. Under water welding, Metalizing, Plasma arc welding/cutting etc. **(Lectures 08)**

Unit V

Unconventional Forming processes: Principles, working and applications of High energy forming processes such as Explosive Forming, Electromagnetic forming, Electro-Discharge forming, water hammer forming, explosive compaction etc. **(Lectures 08)**

Text Books

1. Pandey P.C., Modern Machining Processes

Reference Book

1. Jain V.K., Unconventional Machining

*** Latest editions of all the suggested books are recommended.**

INDUSTRIAL SOCIOLOGY & PROFESSIONAL ETHICS

Course code: EHM 801

L	T	P	C
2	2	0	3

(INDUSTRIAL SOCIOLOGY)

Course Contents:

Unit I

Sociology in the industrial Perspective: Concept of Sociology, Sociology as a Science, Sociology of work & industry, Perspectives for sociological analysis of work, Class- Conflict in Industry, Social impact of industrialization, Corporate skills in the fast growing multinational set up.

(10 Hours)

Unit II

Work experience in Industry: The concept of alienation, Work satisfaction, Technology & work experience, Social background of workers, Work orientations, Stress & anxiety of the worker, Work & Leisure, Unemployment, Conflicts in the work place.

(10 Hours)

Reference Books:

1. Miller & Form, *Industrial Sociology*, London Harper & Row.
2. Sheth N.R., *Social Frame Work of Indian Factory*, O.U.P. Bombay.
3. Gisbert P., *Fundamentals of Industrial Sociology*, O.U.P. New Delhi.
4. Watson Tony J., *Sociology: Work & Industry*, New York. Routledge.

(PROFESSIONAL ETHICS)

Course Contents:

Unit III

General and Applied Ethics- Ethics and the professions – Standard of right and wrong, problems of Ethical Certainty, Significance of professional Ethics for Engineers, New Technology and Ethics, Applied Ethics - Cases in professional Engineering Practice, Principles of business ethics, Individual in the organization.

(10 Hours)

Unit IV

Ethical Leadership: Decision making, corporate culture and reputation management, corporate social responsibility and social reporting.

(10 Hours)

Reference Books:

1. Fleddermann Charles, *Engineering Ethics*, Upper Saddle River- N.J. Prentice Hall.
2. Parsons Richard D., *The Ethics of Professional Practice*- Allyn & Bacon, London.
3. Schinzingler, Roland & Mike W. Martin, *Introduction to Engineering Ethics*- Boston, McGraw Hill.
4. Govindarajan - *Engineering Ethics*- Prentice Hall (India) New Delhi.
5. Bhatia S.K. - *Business Ethics & Management Values*- Deep & Deep Publication. N.Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

*** Latest editions of all the suggested books are recommended.**

MECHATRONICS (LAB)

Course Code: EME851

L	T	P	C
0	0	4	2

LIST OF EXPERIMENT

1. Speed measurement using Inductive pickup/Proximity sensor
2. Measurement to temperature using thermocouple, thermistor and RTD
3. Measurement of displacement using LVDT & Capacitive transducer
4. Position and velocity measurement using encoders
5. Study of specifications of CNC Milling Machines and Lathes.
6. MILLING. Programming, simulation of machining using the following features.
 - (a) Linear and Circular interpolation
 - (b) Pocker milling, slotting, peck drilling and other fixed cycles.
7. CNC LATHE: Programming, simulation and machining using the following features: (a) Straight and step turning
 - (b) Taper turning and thread cutting
 - (c) Machining and internal surfaces.
8. Linear actuation of hydraulic cylinder with counter and speed control.
9. Hydrometer rotation with timer and speed control.
10. Sequential operation of pneumatic cylinders.
11. Speed control of DC motor using PLC.
12. Testing of Relays using PLC.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

UNCONVENTIONAL MANUFACTURING PROCESS (LAB)

Course Code: EME852

L T P C
0 0 4 2

LIST OF EXPERIMENTS

1. Study of Model Abrasive jet machining.
2. Study of Model Laser beam machining.
3. Study of Model Plasma arc welding/cutting.
4. Study of Model Explosive Forming.
5. Study of Model water hammer forming.
6. Study of Model Photo- Lithography process for electronic-device manufacturing.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

ENERGY MANAGEMENT

Course Code: EME804

L	T	P	C
3	2	0	4

Objective: The objective is to study about Energy conservation.

Course Contents

Unit I

Introduction to energy, Sources of energy, Forms of energy, Energy reserves, renewable energy sources, Units of energy and the laws of thermodynamics,, Energy consumption and GDP, energy database , Energy demand analysis, Costs of exploration and utilization of depletable resources, energy pricing, National energy plan. **(Lectures 08)**

Unit II

Energy audit concepts, Energy audit based on 1st law and 2nd law of thermodynamics, Mass and Energy balances, Availability analysis, Evaluation of energy conserving opportunities, Economic analysis and life cycle costing. **(Lectures 08)**

Unit III

Energy conservation areas, Energy transmission and storage, Plant wide energy optimization Models, Data base for energy management, Energy conservation through controls, Computer aided energy management, Program organization and methodology. **(Lectures 08)**

Unit IV

Electrical energy conservation in building lighting, heating, ventilating and air conditioning, Energy efficient motor, power factor improvement in power systems, Energy audit of Combustion process, Boilers, Turbines, compressors, Pumps, Heat exchangers, Condensers, Use of industrial, wastes. **(Lectures 08)**

Unit IV

Energy environment interaction, Environmental issues, Global warming, Carbon dioxide emissions, Depletion of ozone layer, Government's regulations, Energy economy interaction. **(Lectures 08)**

Text Books

1. Clive Beggs, Energy Management and Convection, Butterwoth- Heinemann Elsevier Science.
2. Rajan, Optimising Energy Efficiency in the Industry, Tata Mc Graw Hill Publishers.
3. Capehart C.L., Guide to energy Management, By, Fairmont Press.
4. Abbasi & Abbasi, Renewable Energy Sources and their Environment Impact, Prentice Hall of India.
5. Cutter, Environmental Risks and Hazards, Prentice Hall of India.

Reference Books

1. Eydeland Alexander, Energy and Power Risk Management: New Developments in Modeling, Pricing and Hedging, John Wiley & Sons.
2. Turner. Wayne C., Energy Management Handbook
3. Kenneth Wark, Thermodynamics, Tata Mc Graw Hill Publishers.
4. Szargut Jan, Energy Analysis of Thermal, Chemical and Metallurgical Process, David R. Morris, Frank

*** Latest editions of all the suggested books are recommended.**

PRODUCT DEVELOPMENT & DESIGN

Course Code: EME805

L	T	P	C
3	2	0	4

Objective: To study about Product design procedure, Scope, and its terminology

Course Contents

Unit I

Product, Definition, Scope, Terminology. Design definitions, old and new design methods, Design by evolution, Examples such as evolution of sewing m/c, bicycle, safety razor etc., Need based developments, Technology based developments. Physical reliability & Economic feasibility of design concepts. **(Lectures 08)**

Unit II

Morphology of design, Divergent, transformation and convergent phases of product design, identification of need, Analysis of need. Design for what? Design criteria, functional, aesthetics, ergonomics, form, shape, size, colour. Mental blocks, Removal blocks, Ideation techniques, Creativity, Check list. **(Lectures 08)**

Unit III

Transformations, Brainstorming & Syntetics, Morphological techniques. Utility concept, Utility value, Utility index, Decision making under Multiple criteria. Economic aspects, Fixed and variable costs, Break-even analysis. **(Lectures 08)**

Unit IV

Reliability considerations, Bath tub curve, Reliability of systems in series and parallel, Failure rate, MTTF and MTBF, Optimum spares from Reliability considerations. Design of display and controls, Man-machine interface, Compatibility of displays and controls. Ergonomic aspects, Anthropometric data and its importance in design. Application of Computers in Product development & design. **(Lectures 08)**

Unit V

Existing techniques such as work-study, SQC etc. which could be used to improve method & quality of product. Innovation versus Invention. Technological Forecasting. Use of Standards for Design. **(Lectures 08)**

Text Books

1. Chitab A.K. & Gupta R.C., Product Design & Manufacturing -, PHI (EEE).
2. Crewford R.P. The Technology of Creation Thinking, Prentice Hall
3. Walls Grohem, The Art of Thought , Bruce &Co., New York
4. Starr M.K. ,Product Design & Decision Theory, Prentice Hall

References Books

1. Cain C .D., Engg . Product Design, Bussiness Books.
2. Mayall W .H., Industrial Design for Engineers, Itiffe.
3. Mccormick E.J., Human Factor Engg. -, Mc GrowHill.
4. Beakley G.C., Engineering: An Introduction to Creative Profession, Macmillan.

*** Latest editions of all the suggested books are recommended.**

ENVIRONMENTAL PROTECTION AND MANAGEMENT

Course Code: EME806

L	T	P	C
3	2	0	4

Objective: The objective is to study about Toxic Materials and its environmental & health effects etc.
Course Contents

Unit I

Introduction, Importance of environmental protection for engineering & Scientists Chemistry of hazardous materials. (Lectures 08)

Unit II

Toxic Materials and its environmental & health effects. (Lectures 08)

Unit III

Fundamentals of environmental laws. Laws related to Air pollution, water pollution, toxic substance control, safe drinking-water, occupational safety & health & noise control. (Lectures 08)

Unit IV

Environmental hazards and their control, General principle of Hazards Control. Hazard & its control from: Chemicals, noise & vibration, radiation, hazardous waste, heat & cold, fire, tools & machines, Personal- protective-equipment (Lectures 08)

Unit V

Environmental impact assessment, rationale for assessing impact, Phases of environmental impact assessment. Air and water quality managements. (Lectures 08)

Text Books

1. Walter E. Westman Ecology, Impact Assessment & Environmental Planning, Johuwilly & jons U.S.A.
2. Carson Tom Hand Book on Hazardous Materials Management, Inptitude of Hazardous materials management, USA.

Reference Books

3. Gordon Arbuckle J. Environmental Law Handbook, Government Institutes Inc. Rockville, M.D., USA.
4. Roger L.Brauer, Safety & Health for Engineers, Van Nostrance Reinhold – Newyork, USA.
5. Stanley E. Manehan, Environmental Chemistry, Books/Cole Publishing Company Motherly, California.
6. Paul R. Portney, Public Policies for Environmental Protection- Resources for the Future. Washington D.C.

*** Latest editions of all the suggested books are recommended.**

THERMAL TURBO MACHINES

Course Code: EME807

L	T	P	C
3	2	0	4

Unit I

Brief history of turbo machinery, introduction to blowers, pumps, compressors, steam & gas turbines, turbojet, Review of laws of thermodynamics & SFEE in reference to turbo machinery, Energy transfer in turbo machines, Euler's equation, Velocity diagrams for axial & radial turbo machinery and pumps. Definition of various efficiencies, Introduction to blowers, pumps, compressors, steam & gas turbines turbojet. **(Lectures 08)**

Unit II

Centrifugal compressors- Principle of operation, work done and pressure rise, Diffuser, state losses, slip factors, Performance, characteristics. Axial flow compressor- basic operation, Elementary theory, Factors affecting stage pressure ratio, Blockage in compressor annulus, Degree of reaction, 3-D flow, Design process, blade design, calculation of stage performance. Supersonic & transonic stages, Performance. **(Lectures 08)**

Unit III

Axial flow turbines-Elementary theory of axial flow turbine, Vortex theory, Choice of blade profile, pitch and chord, Estimation of stage performance. **(Lectures 08)**

Unit IV

Steam turbines- Constructional details, working of steam turbine. Pumps: Pumps, main components, indicator diagram and modification due to piston acceleration, performance and characteristics, axial flow pumps. Radial flow turbines: Single velocity triangle Enthalpy- Entropy diagram, State losses, performance, Characteristics. **(Lectures 08)**

Unit V

Gas Turbine Starting & Control Systems: Starting ignition system, combustion system types, safety limits & control. Turbine Blade coding: Cooling techniques, types. Mechanical Design consideration: Overall design choices, Material selection, Design with traditional materials. **(Lectures 08)**

Text Books

1. Gohen & Rogers, Gas Turbine Theory, Addison Wesley Longman Ltd.
2. David Gordon Wilson, Design of High Efficiency Turbo Machinery and Gas Turbines, Prentice Hall International.

Reference Book

1. Yahya.S.M., Turbomachinery.
2. Yahya S.M., Turbine, Compressors and Fans, Tata Mc Graw Hill.
3. Ganeshan , Gas Turbine, Tata Mc Graw Hill.

*** Latest editions of all the suggested books are recommended.**

PROJECT WORK

Course Code: EME899

L	T	P	C
0	0	6	6

Guidelines

Students should devote themselves to make a project which preferably should be a working model of their thoughts based on their subject of choice.

The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the VI semester.

The project shall be finalized by the students before the start of the VII semester and shall be completed and submitted at least one month before the last teaching day of the VIII semester, date of which shall be notified in the academic calendar.

The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII and each internal assessment shall be for 25 marks. The student shall present the final project live as also using overheads project or power point presentation on LCD to the internal committee as also the external examiner.

The evaluation committee shall consist of faculty members constituted by the college which would be comprised of at-least three members - the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director.

Not more than three students would form a group for such industrial training/ project submission. The marking shall be as follows.

Internal: 50 marks

By the Faculty Guide -25 marks

By Committee appointed by the Director –25 marks

External: 50 marks

By External examiner appointed by the University – 50 marks

DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP 871

L	T	P	C
0	0	0	1

Guidelines

There shall be continuous evaluation of the students on the following broad parameters:

1. Observance of dress code.
2. Participation in Conferences /Workshops / Seminars.
3. Attendance in guest lectures, talks by the invitees and special technical sessions organized from time to time.
4. Participation in community projects including NCC and NSS.
5. Exhibiting team spirit in different activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University.
7. Behavior in hostel mess and hostel.
8. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
9. General behavior.

The above mentioned observational are an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation.

There shall be no external examination for this course; however the marks shall be included for calculation of Cumulative Performance Index (CPI).