

Study & Evaluation Scheme

of

Bachelor of Technology (Mechanical Engineering)

[Applicable for Academic Session 2017-18]

[Approved by Hon'ble VC dated August 08, 2017]

[With revision approved by VC date July 23, 2018 & August 14, 2018, January 23, 2019 & November 29, 2019]



TEERTHANKER MAHAVEER UNIVERSITY

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TEERHANKER MAHAVEER UNIVERSITY

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

Delhi Road, Bagarpur, Moradabad (U.P)

Study & Evaluation Scheme 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	:	196
Minimum credit required for the degree	:	188
Assessment	:	

		Internal	External	Total		
		40	60	100		
Internal Evaluation (Theory Papers)	Class Test I	Class Test II	Class Test III	Assignment(s)	Attendance	Total
	Best two out of three					
	10 Marks	10 Marks	10 Marks			

		Internal	External	Total
Project Phase-I	:	100	-	100

		Internal	External	Total
Evaluation of Practical/Industrial Training/ Project Phase-II	:	50	50	100

		External	Internal
Duration of Examination	:	3 hrs.	1 $\frac{3}{2}$ hrs

(To qualify the course a student is required to secure a minimum of 45% marks in aggregate in each course including the semester-end examination and the teacher's continuous evaluation shall be essential for passing the course and earning its assigned credits. A candidate, who secures less than 45% marks in a course, shall be deemed to have failed in that course.)

Question Paper Structure

- The question paper shall consist of six questions. All six are compulsory. First question shall be of short answer type (not exceeding 50 words). Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 2 marks each).*
- Remaining questions will be one from each unit with internal choice. The student has to answer one of the two in each question. The weightage of Question No. 2 to 6 shall be 10 marks each.*
- Usually each question in the examination should be designed to have a numerical component, where part of syllabus.*

Note 1:**Evaluation Scheme for MOOC, Short Term Courses:**

University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

Keeping this in mind the Academic Council in its 10th meeting on February 13, 2016, approved the University proposal and allowed a maximum of two credits to be allocated for MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through edX, Coursera, IIRS and NPTEL could be given a maximum credit of two with 1 credit for credit with 30-60 contact hours and 2 credits for courses having more than 60 credit hours.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

1. There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
2. The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalise a list of courses to be offered with credits defined for each course and the mode of credit consideration of the student. The complete process including the approval of the Vice Chancellor shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course the approval will be valid only for the semester on offer.
3. A student can opt for a maximum of two MOOC courses for credit during the complete duration of the course other than offered under SWAYAM.
4. College can offer upto 20% credit through courses offered by SWAYAM. However, if the college is offering courses on other MOOC platforms, the total credit offered under MOOC will not exceed 20% including those offered under SWAYAM.
5. Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Co-ordinator MOOC through the Principal of the College.
6. Where the MOOC course or Add-on on courses are only offering certificate of successful completion, and credit has been assigned to the course, the University examination division will conduct a MCQ examination for the course with 50 MCQ with 100 marks to facilitate inclusion of the courses in CPI computation.

7. College will define whether the credits are regular credits or to be considered only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.
8. In case the College wants the additional course to be shown in the mark sheet as additional course completed by the students the same shall also be mentioned by the College and the student will opt for the same at the time of taking admission to the course.

Study & Evaluation Scheme

Semester I

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS116	Engineering Mathematics-I	3	1	-	4	40	60	100
2	EAS112/212	Engineering Physics-I	3	1	-	4	40	60	100
	EAS113/213	Engineering Chemistry							
3	EEE117/217	Basic Electrical Engineering	3	1	-	4	40	60	100
	EEC111/211	Basic Electronics Engineering							
4	EAS115/ BAS214/ BAS328/ BAS428	Environmental Studies	1	2	-	2	40	60	100
5	EHM199/ BHM199	English communication and soft skills – I	1	1	2	2	50	50	100
6	EAS162/262	Engineering Physics (Lab)	-	-	2	1	50	50	100
	EAS163/263	Engineering Chemistry (Lab)							
7	EEE161/261	Basic Electrical Engineering (Lab)	-	-	2	1	50	50	100
	EEC161/261	Basic Electronics Engineering (Lab)							
8	EME161/261	Engineering Drawing (Lab)	-	-	4	2	50	50	100
	EME162/262	Workshop Practice (Lab)							
9	EGP111	Discipline & General Proficiency	-	-	-	-	100	-	100
		Total	11	6	10	20	460	440	900

Semester II

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS211	Engineering Mathematics-II	3	1	-	4	40	60	100
2	EAS212/112	Engineering Physics-I	3	1	-	4	40	60	100
	EAS213/113	Engineering Chemistry							
3	EEE217/117	Basic Electrical Engineering	3	1	-	4	40	60	100
	EEC211/111	Basic Electronics Engineering							
4	ECS212/ MCS111/ BCS111	Computer System & Programming in C++	3	-	-	3	40	60	100
5	EHM249/ BHM249	English communication and soft skills – II	1	1	2	2	40	60	100
6	EAS262/162	Engineering Physics (Lab)	-	-	2	1	50	50	100
	EAS263/163	Engineering Chemistry (Lab)							
7	EEE261/161	Basic Electrical Engineering (Lab)	-	-	2	1	50	50	100
	EEC261/161	Basic Electronics Engineering (Lab)							
8	ECS262/ MCS161/ BCS161	Computer System & Programming in C++ (Lab)	-	-	2	1	50	50	100
9	EME261/161	Engineering Drawing (Lab)	-	-	4	2	50	50	100
	EME262/162	Workshop Practice (Lab)							
10	EGP211	Discipline & General Proficiency	-	-	-	-	100	-	100
		Total	14	4	12	22	500	500	1000

Semester III

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME311	Engineering Mechanics	3	1	-	4	40	60	100
2	EME312	Engineering Thermodynamics	3	1	-	4	40	60	100
3	EME313	Material Science	3	1	-	4	40	60	100
4	EME314	Industrial Engineering	3	-	-	3	40	60	100
5	EHM311	Operations Research	3	1	-	4	40	60	100
6	EME361	Machine Drawing (Lab)	-	-	3	2	50	50	100
7	EME362	Engineering Thermodynamics (Lab)	-	-	3	2	50	50	100
8	EME363	Material Science (Lab)	-	-	3	2	50	50	100
9	EGP311	Discipline & General Proficiency	-	-	-	1	100	-	100
Total			15	4	9	26	450	450	900

Following additional Course for Lateral Entry Students with B.Sc. background to be taken in III semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	EME161/261	Engineering Drawing (Lab)	-	-	4	-	50	50	100
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Semester IV

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME411	Strength of Material	3	1	-	4	40	60	100
2	EME412	Production Technology – I	3	-	-	3	40	60	100
3	EME413	Measurement, Metrology & Control	3	1	-	4	40	60	100
4	EME414	Fluid Mechanics	3	1	-	4	40	60	100
5	EHM449/ EHM349/ BHM349	English communication and soft skills – III	1	1	2	2	40	60	100
6	EME461	Production Technology-I (Lab)	-	-	3	2	50	50	100
7	EME462	Measurement, Metrology & Control (Lab)	-	-	3	2	50	50	100
8	EME463	Fluid Mechanics (Lab)	-	-	3	2	50	50	100
9	EGP411	Discipline & General Proficiency	-	-	-	1	100	-	100
		Total	13	4	11	24	450	450	900

Following additional Courses for Lateral Entry Students with B.Sc. background to be taken in IV semester and all should pass with minimum of 45% marks for obtaining the degree: credits will not be added

1	EME162/262	Workshop Practice (Lab)	-	-	4	-	50	50	100
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Semester V

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME511	Production Technology –II	3	1	-	4	40	60	100
2	EME512	Dynamics of Machines	3	-	-	3	40	60	100
3	EME513	Heat & Mass Transfer	3	1	-	4	40	60	100
4	EME514	Automobile Engineering	3	-	-	3	40	60	100
5	ECS511/ 611/411/ MSC014/ BCS311	Database Management System	3	1	-	4	40	60	100
6	EME561	Production Technology-II (Lab)	-	-	3	2	50	50	100
7	EME562	Dynamics of Machines (Lab)	-	-	3	2	50	50	100
8	EME563	Heat & Mass Transfer (Lab)	-	-	3	2	50	50	100
9	MOOC01	MOOC Program -I (Optional)	-	-	-	1/2	-	100	100
10	EGP511	Discipline & General Proficiency	-	-	-	1	100	-	100
		Total	15	3	9	25	450	450	1000

Semester VI

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME611	Refrigeration & Air Conditioning	3	1	-	4	40	60	100
2	EME612	Mechanical Vibrations	3	-	-	3	40	60	100
3	EME613	Design of Machine Elements	3	-	-	3	40	60	100
4	EEE614/ EEE712	Non-Conventional Energy Resources	3	1	-	4	40	60	100
5	EHM611	Operations Management	3	-	-	3	40	60	100
6	EHM699/ EHM599/ BHM499	English Communication and Soft Skills-IV	1	1	2	2	50	50	100
7	EME661	Refrigeration & Air Conditioning (Lab)	-	-	3	2	50	50	100
8	EME662	Solid works (Lab)	-	-	3	2	50	50	100
9	MOOC02	MOOC Program -II (Mandatory)	-	-	-	1/2	-	100	100
10	EGP611	Discipline & General Proficiency	-	-	-	1	100	-	100
		Total	16	3	8	25/26	450	550	1000

Semester VII

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME711	Computer Aided Design (CAD)	3	-	-	3	40	60	100
2	EME712	IC Engines	3	-	-	3	40	60	100
3	Departmental Elective-I								
	EME713	Power Plant Engineering	3	1	-	4	40	60	100
	EME714	Hydraulic Machines							
4	Open Elective-I								
	FOE011	Principle of Management	3	1	-	4	40	60	100
	FOE012	Artificial Neural Network							
	FOE013	Industrial Sociology							
	FOE014	Organizational Behaviour							
	FOE015	Engineering and Managerial Economics							
FOE016	Network security & cryptography								
5	EME761	Computer Aided Design (Lab)	-	-	3	2	50	50	100
6	EME762	IC Engines (Lab)	-	-	3	2	50	50	100
7	EME792	Industrial Training & Presentation (6 weeks)	-	-	-	4	50	50	100
8	EME798	Project Work Phase-I (Synopsis, Literature Survey & Presentation & 30% Project completion)	-	-	8	4	100	-	100
9	MOOC03	MOOC Program -III (Mandatory)	-	-	-	1/2	-	100	100
10	EGP711	Discipline & General Proficiency	-	-	-	1	100	-	100
Total			12	2	14	28/29	510	490	1000

Semester VIII

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EME811	Computer Aided Manufacturing (CAM)	3	1	-	4	40	60	100
Departmental Elective-II									
2	EME812	Unconventional Manufacturing Process	3	1	-	4	40	60	100
	EME813	Mechatronics							
Open Elective-II									
3	FOE021	Machine learning & Data Analytics	3	1	-	4	40	60	100
	FOE022	Total Quality Management							
	FOE023	Entrepreneurship							
	FOE024	Big Data & Hadoop							
	FOE025	Financial Management							
4	EME861	Computer Aided Manufacturing (CAM) (Lab)	-	-	3	2	50	50	100
5	EME862	Unconventional Manufacturing Process (Lab)	-	-	3	2	50	50	100
	EME863	Mechatronics (Lab)							
6	EME898	Project Work Phase -II (100 % working condition, report analysis, plagiarism check report analysis Simulation, and Presentation)	-	-	14	7	50	50	100
7	MOOC04	MOOC Program -IV (Optional)	-	-	-	1/2	-	100	100
8	EGP811	Discipline & General Proficiency	-	-	-	1	100	-	100
Total			9	3	20	24	370	330	800

Semester I

Engineering Mathematics-I

Course Code: EAS116

L T P C
3 1 0 4

Objective:

- To familiarize the basics of matrices, differential calculus, multiple integrals and vector calculus.
- To solve all problems related to matrices, calculus and vectors.

Unit A (Unit A is for building a foundation and shall not be a part of examination)

Some general theorem on deviation-Derivative of the sum or difference of two function, Derivative of product of two functions, Derivative of quotient, Derivative of Trigonometry function, Derivative of inverse Trigonometry function, Logarithms differential, Integration of $1/x$, e^x , Integration by simple substitution. Integrals of the type $f'(x)$, $[f(x)]^n$, $\frac{f(x)}{g(x)}$, Integration of $1/x$, e^x , $\tan x$, $\cot x$, $\sec x$, $\operatorname{cosec} x$, Integration by parts, Integration using partial fractions.

Course Contents-

Unit I

(Lectures 08)

Determinants- Rules of computation; Linear Equations and Cramer's rule.

Matrices: Elementary row and column transformation; Rank of matrix; Linear dependence; Consistency of linear system of equations; Characteristic equation; Cayley-Hamilton Theorem (without proof); Eigen values and Eigen vectors; Complex and Unitary matrices.

Unit II

(Lectures 08)

Differential Equation--First order first degree Differential equation: variable separable, Homogeneous method, Linear differential equation method, Exact Differential equation.

Unit III**(Lectures 08)**

Differential Calculus: Leibnitz theorem; Partial differentiation; Euler's theorem; Change of variables; Expansion of function of several variables. Jacobians, Error function.

Unit IV**(Lectures 08)**

Multiple Integrals: Double integral, Triple integral, Beta and Gamma functions; Dirichlet theorem for three variables, Liouville's Extension of Dirichlet theorem.

Unit V**(Lectures 08)****Vector Differentiation:**

Vector function, Differentiation of vectors, Formulae of Differentiation, Scalar and Vector point function, Geometrical Meaning of Gradient, Normal and Directional Derivative, Divergence of a vector function, Curl of a vector

Vector Integration:

Green's theorem, Stokes' theorem; Gauss' divergence theorem.

Text Books-

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

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

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

Semester I

Engineering Physics-I

Course Code: EAS112/212

L T P C
3 1 0 4

Objective: To understand the fundamentals of physics like interference of light, diffraction, Polarization, elements of material science, special theory of relativity etc.

Unit A (Unit A is for building a foundation and shall not be a part of examination)

Optics- Properties of light, Lens, Mirror, Focal length, Intensity, Power, Eye-piece, Work, Energy and its types, Waves, longitudinal and transverse waves, Time period, Frequency

Course Contents-

Unit-I

(08 Lectures)

Interference of Light: Introduction, Principle of Superposition, Interference due to division of wavefront: Young's double slit experiment, Theory of Fresnel's Bi-Prism, Interference due to division of amplitude: parallel thin films, Wedge shaped film, Michelson's interferometer, Newton's ring.

Unit-II

(08 Lectures)

Diffraction: Introduction, Types of Diffraction and difference between them, Condition for diffraction, difference between interference and diffraction. **Single slit diffraction:** Quantitative description of maxima and minima with intensity variation, linear and angular width of central maxima. **Resolving Power:** Rayleigh's criterion of resolution, resolving power of diffraction grating and telescope.

Unit-III

(08 Lectures)

Polarization: Introduction, production of plane polarized light by different methods, Brewster's and Malus Law. Quantitative description of double refraction, Nicol prism, Quarter & half wave plate, specific rotation, Laurent's half shade polarimeter.

Unit-IV

(08 Lectures)

Elements of Material Science: Introduction, Bonding in solids, Covalent bonding and Metallic bonding, Classification of Solids as Insulators, Semi-Conductor and Conductors, Intrinsic and Extrinsic Semiconductors, Conductivity in Semiconductors, Determination of Energy gap of Semiconductor. **Hall Effect:** Theory, Hall Coefficients and application to determine the sign of charge carrier, Concentration of charge carrier, mobility of charge carriers.

Unit-V

(08 Lectures)

Special Theory of Relativity: Introduction, Inertial and non-inertial frames of Reference, Postulates of special theory of relativity, Galilean and Lorentz Transformations, Length contraction and Time Dilation, Relativistic addition of velocities, Variation of mass with velocity, Mass-Energy equivalence.

Text Books:

1. Elements of Properties of Matter, D. S. Mathur, S. Chand & Co.
2. Engineering Physics, Bhattacharya & Tandon, Oxford University Press.
3. Optics, Ajay Ghatak, Tata Mc Graw-Hill.
4. H. K. Malik & A.K. Singh, Engineering Physics, McGraw-Hill, latest edition.

Reference Books:

1. F. A. Jenkins and H. E. White, Fundamentals of Optics, McGraw-Hill.
2. Concept of Modern Physics, Beiser, Tata McGraw-Hill.
3. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore.

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

Semester I
Engineering Chemistry

Course Code: EAS113/213

L T P C
3 1 0 4

Objective:

The basic objective of Engineering Chemistry is to educate the students about the chemical aspects of engineering and to provide leadership in advanced studies of engineering, in industry, academia and government.

Course Contents:

UNIT I

(Lecture 08)

Water and Its Industrial Applications: Sources, Impurities, Hardness and its units, Industrial water, characteristics, softening of water by various methods (External and Internal treatment), Boiler trouble causes effects and remedies, Characteristic of municipal water and its treatment, Numerical problem based on water softening method like lime soda, calgon etc.

UNIT II

(Lecture 08)

Fuels and Combustion: Fossil fuel and classification, calorific value, determination of calorific value by Bomb and Jumker's calorimeter, proximate and ultimate analysis of coal and their significance, calorific value computation based on ultimate analysis data, Combustion and its related numerical problems carbonization manufacturing of coke, and recovery of byproduct, knocking relationship between knocking and structure and hydrocarbon, improvement ant knocking characteristic IC Engine fuels, Diesel Engine fuels, Cetane Number.

UNIT III

(Lecture 08)

Lubricants: Introduction, mechanism of lubrication, classification of lubricant, properties and testing of lubricating Oil Numerical problem based on testing methods. **Cement and Refractories:** Manufacture, IS code, Setting and hardening of cement, Portland cement Plaster of Paris, **Refractories.** Introduction, classification and properties of refractories.

UNIT IV

(Lecture 08)

Polymers: Introduction, types and classification of polymerization, reaction mechanism, Natural and synthetic rubber, Vulcanization of rubber, preparation, properties and uses of the following Polythene, PVC, PMMA, Teflon, Polyacrylonitrile, PVA, Nylon 6, Terylene, Phenol Formaldehyde, Urea Formaldehyde Resin, Glyptal, Silicones Resin, Polyurethanes, Butyl Rubber, Neoprene, Buna N, Buna S.

UNIT V

(Lecture 08)

A. Instrumental Techniques in chemical analysis: Introduction, Principle, Instrumentation and application of IR, NMR, UV, Visible, Gas Chromatography, Lambert and Beer's Law.

B. Water Analysis Techniques: Alkalinity, Hardness (Complexometric), Chlorides, Free Chlorine, DO, BOD, and COD, Numerical Problem Based on above techniques.

Text Books:

1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.
2. Lee I.D., Inorganic Chemistry.
3. Chawla Shashi, Engineering Chemistry, Dhanpat Rai Publication.

Reference Books:

1. Morrison & Boyd, Organic Chemistry, Prentice Hall
2. Barrow Gordon M., Physical Chemistry, McGraw-Hill.
3. Manahan Stanley E., Environmental Chemistry, CRC Press.

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

Semester I

Basic Electrical Engineering

Course Code: EEE117/217

L T P C

3 1 0 4

Objective- To understand the fundamental concept of Electrical Engineering like D.C. Network, A.C. Network, Measuring Instruments, Energy Conversion Devices etc.

Course Contents-

Unit I (Lectures 10)

D.C. Network Theory: Passive, active, bilateral, unilateral, linear, nonlinear element, Circuit theory concepts-Mesh and node analysis; Voltage and current division, source transformation, Network Theorems- Superposition theorem, Thevenin's theorem, Norton's theorem, and Maximum Power Transfer theorem, Star-delta & delta-star conversion.

Unit II (Lectures 10)

Steady State Analysis of A.C. Circuits: Sinusoidal and phasor representation of voltage and Current; Single phase A.C. circuit behavior of resistance, inductance and capacitance and their Combination in series & parallel; Power factor; Series and parallel resonance; Band width and Quality factor.

Unit III (Lectures 06)

Basics of Measuring Instruments: Introduction to voltmeter, ammeter, Wattmeter & Energy meter.

Unit IV (Lectures 06)

Single phase Transformer: Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and losses.

Unit V (Lectures 08)

Three Phase A.C. Circuits: Line and phase voltage/current relations; three phase power, power measurement using two wattmeter method. Introduction to earthing and electrical safety.

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.
3. Nagrath I.J., Basic Electrical Engineering, Tata McGraw Hill.

Reference Books-

1. Fitzgerald A.E & Higginbotham., D.E., Basic Electrical Engineering, McGraw Hill.
2. 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
Basic Electronics Engineering

Course Code: EEC111/211

L T P C
3 1 0 4

Objective- To understand the basic concept of Electronics Engineering like p-n Junction, Bipolar Junction Transistor, Field Effect Transistor, Operational Amplifier and switching theory.

Course Contents

UNIT I

(Lectures 08)

p-n Junction: Energy band diagram in materials, Intrinsic & Extrinsic Semiconductor, Introduction to PN-Junction, Depletion layer, V-I characteristics, p-n junction as rectifiers (half wave and full wave), calculation of ripple factor of rectifiers, clipping and clamping circuits, Zener diode and its application as shunt regulator.

UNIT II

(Lectures 08)

Bipolar Junction Transistor (BJT): Basic construction, transistor action; CB, CE and CC configurations, input/output characteristics, Relation between α , β & γ , Biasing of transistors: Fixed bias, emitter bias, potential divider bias.

UNIT III

(Lectures 08)

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

UNIT IV

(Lectures 08)

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

UNIT V

(Lectures 08)

Switching Theory: Number system, conversion of bases (decimal, binary, octal and hexadecimal numbers), Addition & Subtraction, BCD numbers, Boolean algebra, De Morgan's Theorems, Logic gates and truth table- AND, OR & NOT, Seven segment display & K map.

Text Books-

1. Robert Boylestad & Louis Nashelsky, Electronic Circuit and Devices, Pearson India.
2. Millman & Halkias, Integrated Electronics, McGraw Hill.
3. Millman & Halkias, Electronics Devices and Circuits, McGraw Hill.
4. Morris Mano M., Digital Design, Prentice Hall.

Reference Books-

1. Sedra and Smith, Microelectronic Circuits, Oxford University Press.
2. Gayakwad, R A, Operational Amplifiers and Linear Integrated circuits, Prentice Hall of India Pvt. Ltd.
3. Chattopadhyay D and P C Rakshit, Electronics Fundamentals and Applications, New Age International.

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

Semester I

Environmental Studies

Course Code: EAS115/BAS214/BAS328/BAS428

L T P C
1 2 0 2

Objective: To create awareness among students about environment protection.

Course Content:

Unit I

(Lectures 08)

Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem- its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.

Unit II

(Lectures 08)

Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; Land degradation, Soil erosion & desertification. **Deforestation:** Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. **Energy Resources:** Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies.

Biodiversity: Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India

Unit III

(Lectures 08)

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies

Unit IV

(Lectures 08)

Environmental policies & practices: Climate change & Global Warming (Greenhouse Effect), Ozone Layer - Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context

Unit V

(Lectures 08)

Human Communities & Environment:

Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case study

Field Work:

1. Visit to an area to document environmental assets; river/forest/flora-fauna etc.
2. Visit to a local polluted site: urban/ rural/industrial/agricultural.
3. Study of common plants, insects, birds & basic principles of identification.
4. Study of simple ecosystem; pond, river etc.

Text Books:

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

Reference Books:

1. “Biodiversity and Conservation”, Bryant, P. J., Hypertext Book
2. “Textbook of Environment Studies”, Tewari, Khulbe & Tewari, I.K. Publication

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

Semester I

English Communication and Soft Skills – I

Course Code: EHM199/BHM199

L T P C

1 1 2 2

Objectives:

1. To remove the phobia of conversing in English.
2. To make the learners enable to express themselves among peers & teachers.
3. To enable learners, improve their vocabulary.
4. To introduce them with basic communicative skills in real life situations

Course Contents:

Unit – I Fear of Failure, Reasons of Fear of Failure & How to overcome it (12 hours)

- Self-Introduction
- Identifying strengths and weakness
- Fear of Failure: Signs of Fear of Failure, Reasons of Fear of Failure, Strategies to overcome Fear of Failure
- Positive Attitude
- Motivation
- Building Self Confidence

Unit – II Confidence, Presentability, Etiquettes & Manners (10 hours)

- Body Language: Facial Expression, Eye Contact, Gesture, Posture, Tips to have appropriate body language
- Grooming & Dressing Sense
- Etiquette & Manners: Social Etiquettes, Telephonic Etiquettes, Dining Etiquettes, Etiquettes to handle cultural differences, Etiquettes of Effective Conversation.
- Problem Sounds (s-sh,j-z,v-b)

Unit – III Conversation Practice, commonly made mistake & Initiating a conversation (10 hours)

- Vocabulary of commonly used words (50 Words)
- Conversation Practice: At College, At Bank, At Ticket Counter (Railway Station & Movie Theatre)
- How to initiate a conversation
- Commonly made mistakes in conversation
- Basic of Communication: 7Cs of Communication

Unit – IV Application writing (08 hours)

- Format & Style of Application Writing
- Practice of Application writing on common issues.

Reference Books:

- Mitra, Barun. K. “*Personality Development and Soft skills*” New Delhi: Oxford University Press.

- Kumar, Sanjay. & Pushp Lata. “Communication Skills” New Delhi: Oxford University Press.
- Carnegie Dale. “How to win Friends and Influence People” New York: Simon & Schuster.
- Harris, Thomas. A. “I am ok, You are ok” New York: Harper and Row.
- Coleman, Daniel. “Emotional Intelligence” Bantam Book.

Methodology:

1. Language Lab software.
2. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion.
3. Conversational Practice will be effectively carried out by Face to Face & Via Media (Telephone, Audio-Video Clips)
4. Modern Teaching tools (PPT Presentation, Tongue-Twisters & Motivational videos with sub-titles) will be utilized.

Note:

- 2 words per class will be taught with meaning, usage & correct pronunciation to ensure progressive learning.
- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
50 Marks		50 Marks		100
40 Marks (Progressive Evaluation) After each unit-completion: Assignments / oral Presentation	10 Marks (Attendance)	25 Marks Midway external assessment (Viva)*	25 Marks (External Viva) **	

Note: Midway external assessment of 25 marks will be submitted and considered with external evaluation with a total of 50 marks.

***Parameters of Midway external assessment (Viva)**

Content	Dressing sense & Grooming	Confidence	Pronunciation	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

Note: To take corrective actions, midway assessment will be conducted by 2-member committee of Director’s nominee (not by the faculty teaching English courses) and average of the two would be the 25 marks obtained by the students after two units are completed.

****Parameters of External Viva**

Content	Dressing sense & Grooming	Confidence	Pronunciation	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

Note: External Viva will be conducted by 3-member committee comprising

- a) Faculty teaching the class
- b) English faculty from other college of the University (As approved by VC).
- c) T&P officer of other colleges of the University (As approved by VC).

Each member will evaluate on a scale of 25 marks and the average of three would be the 25 marks obtained by the students.

Semester I
Engineering Physics (Lab)

Course Code: EAS162/262

L T P C
0 0 2 1

LIST OF EXPERIMENTS:

Note: Select any ten experiments from the following list.

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light by Michelson-Morley experiment.
3. To determine the wavelength of monochromatic light by Fresnel's Bi-prism.
4. To determine the Planck's constant using LEDs of different colours.
5. To determine the specific rotation of cane sugar solution using Polarimeter.
6. To verify Stefan's Law by electrical method.
7. To study the Hall Effect and determine Hall coefficient and mobility of a given semiconductor material using Hall-effect set up.
8. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.
9. To compare Illuminating Powers by a Photometer.
10. To determine the frequency of A.C. mains by means of a Sonometer.
11. To determine refractive index of a prism material by spectrometer.
12. To determine the Flashing & Quenching of Neon bulb.
13. Determination of Cauchy's constant by using spectrometer.
14. To study the PN junction characteristics.
15. To determine the resolving power and dispersive power by a prism.
16. To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode.
17. Study the characteristics of LDR.
18. To study the characteristics of a photo-cell.

Books:

1. B.Sc. Practical Physics, Gupta and Kumar, Pragati Prakashan.
2. B.Sc. Practical Physics, C.L. Arora, S. Chand & Company Pvt. Ltd.

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

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester I
Engineering Chemistry (Lab)

Course Code: EAS163/263

L T P C
0 0 2 1

LIST OF EXPERIMENTS

Note: Select any ten experiments from the following list.

1. Determination of Total Hardness of a given water sample.
2. Determination of mixed alkalinity (a) Hydroxyl & Carbonate (b) Carbonate & Bicarbonate
3. To determine the pH of the given solution using pH meter and pH-metric titration.
4. Determination of dissolved oxygen content of given water sample.
5. To find chemical oxygen demand of waste water sample by potassium dichromate
6. Determination of free chlorine in a given water sample.
7. To determine the chloride content in the given water sample by Mohr's method.
8. To prepare the Bakelite resin polymer.
9. To determine the concentration of unknown sample of iron spectrophotometrically.
10. To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer.
11. To determine the flash & fire point of a given lubricating oil.
12. Determination of calorific value of a solid or liquid fuel.
13. Determination of calorific value of a gaseous fuel.
14. Determination of % of O₂, CO₂, % CO in flue gas sample using Orsat apparatus.
15. Proximate analysis of coal sample.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I
Basic Electrical Engineering (Lab)

Course Code: EEE161/261

L T P C
0 0 2 1

List of Experiments-

Note: Select any ten experiments from the following list.

1. To verify the Kirchhoff's current and voltage laws.
2. To study multimeter.
3. To verify the Superposition theorem.
4. To verify the Thevenin's theorem.
5. To verify the Norton's theorem.
6. To verify the maximum power transfer theorem.
7. To verify current division and voltage division rule.
8. To measure energy by a single-phase energy meter.
9. To measure the power factor in an RLC by varying the capacitance
10. To determine resonance frequency, quality factor, bandwidth in series resonance.
11. To measure the power in a 3-phase system by two-wattmeter method
12. To measure speed for speed control of D.C. Shunt Motor.
13. To determine the efficiency of single-phase transformer by load test.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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.

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester I
Basic Electronics Engineering (Lab)

Course Code: EEC161/261

L T P C
0 0 2 1

List of Experiments:

Note: Minimum eight experiments should be performed-

1. To study the V-I characteristics of p-n junction diode.
2. To study the diode as clipper and clamper.
3. To study the half-wave rectifier using silicon diode.
4. To study the full-wave rectifier using silicon diode.
5. To study the Zener diode as a shunt regulator.
6. To study transistor in Common Base configuration & plot its input/output characteristics.
7. To study the operational amplifier in inverting & non-inverting modes using IC 741.
8. To study the operational amplifier as differentiator & integrator.
9. To study various logic gates & verify their truth tables.
10. To study half adder/full adder & verify their truth tables.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I Engineering Drawing (Lab)

Course Code: EME161/261

L T P C
0 0 4 2

LIST OF EXPERIMENTS- [All to be performed]

1. To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per the standard dimensions.
2. To draw the types of lines and conventions of different materials.
3. To draw and study dimensioning and Tolerance.
4. To construction geometrical figures of Pentagon and Hexagon
5. To draw the projection of points and lines
6. To draw the Orthographic Projection of given object in First Angle
7. To draw the Orthographic Projection of given object in Third Angle
8. To draw the sectional view of a given object
9. To draw the development of the lateral surface of given object
10. To draw the isometric projection of the given orthographic projection.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the drawing sheet by the students and a Viva taken by the faculty concerned. The marks shall be given on the drawing sheet & regard maintained by the faculty.

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

Drawing Sheet (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Note: The drawing sheet could be manual or in Auto CAD.

Semester I Workshop Practice (Lab)

Course Code: EME162/262

L T P C
0 0 4 2

List of Experiments:

(Perform any ten experiments selecting at least one from each shop.)

Carpentry Shop:

1. To prepare half-lap corner joint.
2. To prepare mortise & tenon joint.
3. To prepare a cylindrical pattern on woodworking lathe.

Fitting Bench Working Shop:

1. To prepare a V-joint fitting
2. To prepare a U-joint fitting
3. To prepare a internal thread in a plate with the help of tapping process

Black Smithy Shop:

1. To prepare a square rod from given circular rod
2. To prepare a square U- shape from given circular rod

Welding Shop:

1. To prepare a butt and Lap welded joints using arc welding machine.
2. To prepare a Lap welded joint Gas welding equipment.
3. To prepare a Lap welded joint using spot welding machine.

Sheet-metal Shop:

1. To make round duct of GI sheet using 'soldering' process.
2. To prepare a tray of GI by fabrication

Machine Shop:

1. To study the working of basic machine tools like Lathe m/c, Shaper m/c, Drilling m/c and Grinding m/c.
2. To perform the following operations on Centre Lathe:
Turning, Step turning, Taper turning, Facing, Grooving and Knurling
3. To perform the operations of drilling of making the holes on the given metallic work-piece (M.S.) by use of drilling machine.

Foundry Shop:

1. To prepare core as per given size.
2. To prepare a mould for given casting.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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.

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP111

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester II

Engineering Mathematics- II

Course Code: EAS211

L T P C
3 1 0 4

Objective:

To familiarize the basic concept of Differential Equations, Laplace Transform, Fourier series

Course Contents-

Unit I

(Lectures 08)

Differential Equations: Linear Differential Equation, Linear Differential Equation with constant coefficient: Complementary functions and particular integrals, Linear Differential Equation with variable coefficient: Removal method, changing independent variables, Method of variation of parameters, Homogeneous Linear Differential Equation, Simultaneous linear differential equations.

Unit II

(Lectures 08)

Series Solutions: Power Series solutions of ODE, Ordinary Point, Singular Points, Frobenius Method.

Special Functions: Legendre equation and Polynomial, Legendre Function, Rodrigue's formula, Laplace definite integral for first and second kind, Bessel equation and Polynomial, Bessel Function, Orthogonal properties and Recurrence Relation for Legendre and Bessel function.

Unit III

(Lectures 08)

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.

Unit IV

(Lectures 08)

Fourier Series: Periodic functions, Trigonometric series; Fourier series; Dirichlet's conditions, Determination of fourier coefficient by Euler's formulae; Fourier series for discontinuous functions, Even and odd functions, Half range sine and cosine series.

Unit V

(Lectures 08)

Laplace Transform: Laplace transform; Existence theorem; Laplace transform of derivatives and integrals; Inverse Laplace transform; Unit step function; Diratch delta function; Laplace transform of periodic functions; Convolution theorem.

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-II, S. Chand.

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-II, Laxmi Publications.

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

Semester II Engineering Physics-I

Course Code: EAS212/112

L T P C
3 1 0 4

Objective: To understand the fundamentals of physics like interference of light, diffraction, Polarization, elements of material science, special theory of relativity etc.

Unit A (Unit A is for building a foundation and shall not be a part of examination)

Optics- Properties of light, Lens, Mirror, Focal length, Intensity, Power, Eye-piece, Work, Energy and its types, Waves, longitudinal and transverse waves, Time period, Frequency

Course Contents-

Unit-I

(08 Lectures)

Interference of Light: Introduction, Principle of Superposition, Interference due to division of wavefront: Young's double slit experiment, Theory of Fresnel's Bi-Prism, Interference due to division of amplitude: parallel thin films, Wedge shaped film, Michelson's interferometer, Newton's ring.

Unit-II

(08 Lectures)

Diffraction: Introduction, Types of Diffraction and difference between them, Condition for diffraction, difference between interference and diffraction. **Single slit diffraction:** Quantitative description of maxima and minima with intensity variation, linear and angular width of central maxima. **Resolving Power:** Rayleigh's criterion of resolution, resolving power of diffraction grating and telescope.

Unit-III

(08 Lectures)

Polarization: Introduction, production of plane polarized light by different methods, Brewster's and Malus Law. Quantitative description of double refraction, Nicol prism, Quarter & half wave plate, specific rotation, Laurent's half shade polarimeter.

Unit-IV

(08 Lectures)

Elements of Material Science: Introduction, Bonding in solids, Covalent bonding and Metallic bonding, Classification of Solids as Insulators, Semi-Conductor and Conductors, Intrinsic and Extrinsic Semiconductors, Conductivity in Semiconductors, Determination of Energy gap of Semiconductor. **Hall Effect:** Theory, Hall Coefficients and application to determine the sign of charge carrier, Concentration of charge carrier, mobility of charge carriers.

Unit-V

(08 Lectures)

Special Theory of Relativity: Introduction, Inertial and non-inertial frames of Reference, Postulates of special theory of relativity, Galilean and Lorentz Transformations, Length contraction and Time Dilation, Relativistic addition of velocities, Variation of mass with velocity, Mass-Energy equivalence.

Text Books:

1. Elements of Properties of Matter, D. S. Mathur, S. Chand & Co.
2. Engineering Physics, Bhattacharya & Tandon, Oxford University Press.
3. Optics, Ajay Ghatak, Tata Mc Graw-Hill.
4. H. K. Malik & A.K. Singh, Engineering Physics, McGraw-Hill, latest edition.

Reference Books:

1. F. A. Jenkins and H. E. White, Fundamentals of Optics, McGraw-Hill.
2. Concept of Modern Physics, Beiser, Tata McGraw-Hill.
3. R. Resnick, Introduction to Special Relativity, John Wiley, Singapore.

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

Semester II Engineering Chemistry

Course Code: EAS213/113

L T P C
3 1 0 4

Objective:

The basic objective of Engineering Chemistry is to educate the students about the chemical aspects of engineering and to provide leadership in advanced studies of engineering, in industry, academia and government.

Course Contents:

UNIT I

(Lecture 08)

Water and Its Industrial Applications: Sources, Impurities, Hardness and its units, Industrial water, characteristics, softening of water by various methods (External and Internal treatment), Boiler trouble causes effects and remedies, Characteristic of municipal water and its treatment, Numerical problem based on water softening method like lime soda, calgon etc.

UNIT II

(Lecture 08)

Fuels and Combustion: Fossil fuel and classification, calorific value, determination of calorific value by Bomb and Jumker's calorimeter, proximate and ultimate analysis of coal and their significance, calorific value computation based on ultimate analysis data, Combustion and its related numerical problems carbonization manufacturing of coke, and recovery of byproduct, knocking relationship between knocking and structure and hydrocarbon, improvement ant knocking characteristic IC Engine fuels, Diesel Engine fuels, Cetane Number.

UNIT III

(Lecture 08)

Lubricants: Introduction, mechanism of lubrication, classification of lubricant, properties and testing of lubricating Oil Numerical problem based on testing methods. **Cement and Refractories:** Manufacture, IS code, Setting and hardening of cement, Portland cement Plaster of Paris, **Refractories.** Introduction, classification and properties of refractories.

UNIT IV

(Lecture 08)

Polymers: Introduction, types and classification of polymerization, reaction mechanism, Natural and synthetic rubber, Vulcanization of rubber, preparation, properties and uses of the following Polythene, PVC, PMMA, Teflon, Polyacrylonitrile, PVA, Nylon 6, Terylene, Phenol Formaldehyde, Urea Formaldehyde Resin, Glyptal, Silicones Resin, Polyurethanes, Butyl Rubber, Neoprene, Buna N, Buna S.

UNIT V

(Lecture 08)

A. Instrumental Techniques in chemical analysis: Introduction, Principle, Instrumentation and application of IR, NMR, UV, Visible, Gas Chromatography, Lambert and Beer's Law.

B. Water Analysis Techniques: Alkalinity, Hardness (Complexometric), Chlorides, Free Chlorine, DO, BOD, and COD, Numerical Problem Based on above techniques.

Text Books:

1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.
2. Lee I.D., Inorganic Chemistry.
3. Chawla Shashi, Engineering Chemistry, Dhanpat Rai Publication.

Reference Books:

1. Morrison & Boyd, Organic Chemistry, Prentice Hall
2. Barrow Gordon M., Physical Chemistry, McGraw-Hill.
3. Manahan Stanley E., Environmental Chemistry, CRC Press.

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

Semester II

Basic Electrical Engineering

Course Code: EEE217/117

L T P C

3 1 0 4

Objective- To understand the fundamental concept of Electrical Engineering like D.C. Network, A.C. Network, Measuring Instruments, Energy Conversion Devices etc.

Course Contents-

Unit I

(Lectures 10)

D.C. Network Theory: Passive, active, bilateral, unilateral, linear, nonlinear element, Circuit theory concepts-Mesh and node analysis; Voltage and current division, source transformation, Network Theorems- Superposition theorem, Thevenin's theorem, Norton's theorem, and Maximum Power Transfer theorem, Star-delta & delta-star conversion.

Unit II

(Lectures 10)

Steady State Analysis of A.C. Circuits: Sinusoidal and phasor representation of voltage and current; Single phase A.C. circuit behavior of resistance, inductance and capacitance and their Combination in series & parallel; Power factor; Series and parallel resonance; Band width and Quality factor.

Unit III

(Lectures 06)

Basics of Measuring Instruments: Introduction to voltmeter, ammeter, Wattmeter & Energy meter.

Unit IV

(Lectures 06)

Single phase Transformer: Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and losses.

Unit V

(Lectures 08)

Three Phase A.C. Circuits: Line and phase voltage/current relations; three phase power, power measurement using two wattmeter method. Introduction to earthing and electrical safety.

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.
3. Nagrath I.J., Basic Electrical Engineering, Tata McGraw Hill.

Reference Books-

1. Fitzgerald A.E & Higginbotham., D.E., Basic Electrical Engineering, McGraw Hill.
2. 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 II
Basic Electronics Engineering

Course Code: EEC211/111

L T P C
3 1 0 4

Objective- To understand the basic concept of Electronics Engineering like p-n Junction, Bipolar Junction Transistor, Field Effect Transistor, Operational Amplifier and switching theory.

Course Contents:

UNIT I

(Lectures 08)

p-n Junction: Energy band diagram in materials, Intrinsic & Extrinsic Semiconductor, Introduction to PN-Junction, Depletion layer, V-I characteristics, p-n junction as rectifiers (half wave and full wave), calculation of ripple factor of rectifiers, clipping and clamping circuits, Zener diode and its application as shunt regulator.

UNIT II

(Lectures 08)

Bipolar Junction Transistor (BJT): Basic construction, transistor action; CB, CE and CC configurations, input/output characteristics, Relation between α , β & γ , Biasing of transistors: Fixed bias, emitter bias, potential divider bias.

UNIT III

(Lectures 08)

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

UNIT IV

(Lectures 08)

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

UNIT V

(Lectures 08)

Switching Theory: Number system, conversion of bases (decimal, binary, octal and hexadecimal numbers), Addition & Subtraction, BCD numbers, Boolean algebra, De Morgan's Theorems, Logic gates and truth table- AND, OR & NOT, Seven segment display & K map.

Text Books-

1. Robert Boylestad & Louis Nashelsky, Electronic Circuit and Devices, Pearson India.
2. Millman & Halkias, Integrated Electronics, McGraw Hill.
3. Millman & Halkias, Electronics Devices and Circuits, McGraw Hill.
4. Morris Mano M., Digital Design, Prentice Hall.

Reference Books-

1. Sedra and Smith, Microelectronic Circuits, Oxford University Press.
2. Gayakwad, R A, Operational Amplifiers and Linear Integrated circuits, Prentice Hall of India Pvt. Ltd.
3. Chattopadhyay D and P C Rakshit, Electronics Fundamentals and Applications, New Age International.

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

Semester II

Computer System & Programming in C++

Course Code: ECS212/MCS111/BCS111

L T P C

3 0 0 3

Objective: To learn the basics of computers & C++ programming language.

Course Contents:

Unit I

(Lectures 08)

Problem Solving: Phases of problem solving, Algorithms, Structure Chart, Flow chart, Practice of solving Sequence Problems, Selection Problems, Repetition problem.

Statements for problem solving: if, switch, while, for, do, break, continue, go to statements.

Unit II

(Lectures 08)

Concepts in Computer Application: Generations, Characteristic and Application of Computers, Functional Component of Computer: CPU, I/O devices, Type of Memory.

Translators: Assembler, Compiler, and Interpreter; Number System: Decimal, Octal, Binary and Hexadecimal & their Conversions; Various Codes: BCD, ASCII and EBCDIC and Gray Code.

Unit III

(Lectures 08)

Concepts in Operating System: Purpose, Services, Types, Functions.

Data Communication & Networks: Types, Topology, IP address classes.

C++ Basics: Data types, Variables, Constants, Keywords, Identifiers, Types of Operators, Memory Allocation operators, Expressions, Pre-processor directives, Introduction to Array, Pointers, Structures and Strings.

Unit IV

(Lectures 08)

Functions: Scope of variables; Parameter passing; Default arguments; Inline functions; Recursive functions; Pointers to functions.

C++ Classes and Data Abstraction: Class Structure, Objects; this pointer; Friend function; Static class members; Constructors and Destructors; Data abstraction.

Inheritance: Types, Access to the base class members; Virtual base class.

Unit V

(Lectures 08)

Polymorphism: Function overloading; Operator overloading; Static Binding and Dynamic bindings; Virtual function: Definition, Call mechanism, Pure virtual functions; Virtual destructors; Abstract Classes.

C++ I/O: Stream classes hierarchy; Stream I/O; File streams; Overloading << and >> operators; File Modes, Reading and Writing to a file; Formatted I/O.

Text Books-

1. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley.
2. Object-Oriented Programming with C++, Balagurusamy, TMH
3. C++ The Complete Reference, Schildt, TMH
4. Programming in C++, Shah & Thaker, ISTE/EXCEL

Reference Books-

1. Beginning C++, The Complete Language, Horton,SPD/WROX
2. Programming with C++, Radhaganesan, Scitech
3. Projects using C++, Varalaxmi, Scitech
4. Object Oriented modelling & Design, RumBaugh, PHI

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

Semester II

English Communication and Soft Skills-II

Course Code: EHM249/BHM249

L T P C
1 1 2 2

Objectives:

1. To enhance the vocabulary of learners to address competitive exams like GATE
2. To develop ability of sentence construction.
3. To enhance learner's writing ability.
4. To make the learner effective in presenting himself/herself.

Course Contents:

Unit – I Vocabulary & Grammar (14 hours)

- Homophones, Homonyms, Synonyms, Antonyms and one-word substitution.
- Parts of Speech, Modals, Tenses and Simple sentence construction.

Unit – II Listening Skills (05 hours)

- Difference between listening & hearing, Types of Listening, Process
- Importance and Barriers to listening

Unit – III Writing Skills (08 hours)

- Letters and Email writing
- Story Narration

Unit – IV Strategies & Structure of Presentation and Problem Sounds (13 hours)

- Managing Time, Audience & Locale, Structure and Organization of Content and 5 W's
- Problem Sounds: S- Sh, J-Z and V-B*

Reference Books:

- Nesfield J.C. "*English Grammar Composition & Usage*" Macmillan Publishers
- Sood Madan "*The Business letters*" Goodwill Publishing House, New Delhi
- Kumar Sanjay & Pushplata "*Communication Skills*" Oxford University Press, New Delhi.

Methodologies:

1. Words and exercises, usage in sentences.
2. Sentence construction on daily activities and conversations.
3. Format and layout to be taught with the help of samples and preparing letters on different subjects.

4. JAM sessions and Picture presentation.
5. Tongue twisters, Newspaper reading and short movies.

Note:

- 3 words per class will be taught with meaning, usage & correct pronunciation to ensure progressive learning.
- Class (above 30 students) will be divided in to two groups for effective teaching.
- For effective conversation practice, groups will be changed weekly.
- Repeated practice of sound.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
40 Marks		60 Marks		100
30 Marks (Progressive Evaluation) After each unit-completion: Assignments / oral Presentation	10 Marks (Attendance)	20 Marks Midway external assessment (Oral Presentation) *	40 Marks (Written Examination)	

*** Parameters of Midway external assessment Oral Presentation**

Content	Pronunciation	Delivery of Content	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note:

Midway Assessment: To take corrective actions, midway assessment will be conducted by 2-member committee of Director's nominee (not by the faculty teaching English courses) and average of the two would be the 20 marks obtained by the students after two units are completed. The marks in sealed envelope will be send to Examination Department.

Written Examination: There would be four questions with internal choice one from each unit of 10 marks.

Semester II
Engineering Physics (Lab)

Course Code: EAS262/162

L T P C
0 0 2 1

LIST OF EXPERIMENTS:

Note: Select any ten experiments from the following list.

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light by Michelson-Morley experiment.
3. To determine the wavelength of monochromatic light by Fresnel's Bi-prism.
4. To determine the Planck's constant using LEDs of different colours.
5. To determine the specific rotation of cane sugar solution using Polarimeter.
6. To verify Stefan's Law by electrical method.
7. To study the Hall Effect and determine Hall coefficient and mobility of a given semiconductor material using Hall-effect set up.
8. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's experiment.
9. To compare Illuminating Powers by a Photometer.
10. To determine the frequency of A.C. mains by means of a Sonometer.
11. To determine refractive index of a prism material by spectrometer.
12. To determine the Flashing & Quenching of Neon bulb.
13. Determination of Cauchy's constant by using spectrometer.
14. To study the PN junction characteristics.
15. To determine the resolving power and dispersive power by a prism.
16. To determine the value of Boltzmann Constant by studying Forward Characteristics of a Diode.
17. Study the characteristics of LDR.
18. To study the characteristics of a photo-cell.

Books:

1. B.Sc. Practical Physics, Gupta and Kumar, Pragati Prakashan.
2. B.Sc. Practical Physics, C.L. Arora, S.Chand & Company Pvt. Ltd.

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

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester II Engineering Chemistry (Lab)

Course Code: EAS263/163

L T P C
0 0 2 1

LIST OF EXPERIMENTS

Note: Select any ten experiments from the following list.

1. Determination of Total Hardness of a given water sample.
2. Determination of mixed alkalinity (a) Hydroxyl & Carbonate (b) Carbonate & Bicarbonate
3. To determine the pH of the given solution using pH meter and pH-metric titration.
4. Determination of dissolved oxygen content of given water sample.
5. To find chemical oxygen demand of waste water sample by potassium dichromate
6. Determination of free chlorine in a given water sample.
7. To determine the chloride content in the given water sample by Mohr's method.
8. To prepare the Bakelite resin polymer.
9. To determine the concentration of unknown sample of iron spectrophotometrically.
10. To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer.
11. To determine the flash & fire point of a given lubricating oil.
12. Determination of calorific value of a solid or liquid fuel.
13. Determination of calorific value of a gaseous fuel.
14. Determination of % of O₂, CO₂ % CO in flue gas sample using Orsat apparatus.
15. Proximate analysis of coal sample.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II

Basic Electrical Engineering (Lab)

Course Code: EEE261/161

L T P C
0 0 2 1

LIST OF EXPERIMENTS-

Note: Select any ten experiments from the following list.

1. To verify the Kirchhoff's current and voltage laws.
2. To study multimeter.
3. To verify the Superposition theorem.
4. To verify the Thevenin's theorem.
5. To verify the Norton's theorem.
6. To verify the maximum power transfer theorem.
7. To verify current division and voltage division rule.
8. To measure energy by a single-phase energy meter.
9. To measure the power factor in an RLC by varying the capacitance
10. To determine resonance frequency, quality factor, bandwidth in series resonance.
11. To measure the power in a 3-phase system by two-wattmeter method
12. To measure speed for speed control of D.C. Shunt Motor.
13. To determine the efficiency of single-phase transformer by load test.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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.

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II Basic Electronics Engineering (Lab)

Course Code: EEC261/161

L T P C
0 0 2 1

LIST OF EXPERIMENTS

Note: Minimum eight experiments should be performed-

1. To study the V-I characteristics of p-n junction diode.
2. To study the diode as clipper and clamper.
3. To study the half-wave rectifier using silicon diode.
4. To study the full-wave rectifier using silicon diode.
5. To study the Zener diode as a shunt regulator.
6. To study transistor in Common Base configuration & plot its input/output characteristics.
7. To study the operational amplifier in inverting & non-inverting modes using IC 741.
8. To study the operational amplifier as differentiator & integrator.
9. To study various logic gates & verify their truth tables.
10. To study half adder/full adder & verify their truth tables.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester II Computer System & Programming in C++ (Lab)

Course Code: ECS262/MCS161/BCS161

L T P C
0 0 2 1

LIST OF EXPERIMENTS:

Note: Minimum 15 experiments should be performed from the following:

1. Write a Program (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, $2+5+8+\dots +n$.
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. WAP to calculate area of circle using Functions.
9. WAP to calculate factorial of given number using Recursion function.
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 find even or odd up to a given limit n.
15. WAP to find whether a given no is palindrome or not.
16. WAP to Swap two numbers using third Variable and without using third variable.
17. WAP to Swap two numbers using call by value and call by reference.
18. WAP illustrating overloading of various operators.
19. WAP illustrating use of Friend.
20. WAP illustrating use of Inline Function.
21. WAP illustrating use of destructor and various types of constructor.
22. WAP illustrating various forms of Inheritance.
23. WAP illustrating use of virtual functions, virtual Base Class.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester II Engineering Drawing (Lab)

Course Code: EME261/161

L T P C
0 0 4 2

LIST OF EXPERIMENTS- [All to be performed]

1. To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per the standard dimensions.
2. To draw the types of lines and conventions of different materials.
3. To draw and study dimensioning and Tolerance.
4. To construction geometrical figures of Pentagon and Hexagon
5. To draw the projection of points and lines
6. To draw the Orthographic Projection of given object in First Angle
7. To draw the Orthographic Projection of given object in Third Angle
8. To draw the sectional view of a given object
9. To draw the development of the lateral surface of given object
10. To draw the isometric projection of the given orthographic projection.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the drawing sheet by the students and a Viva taken by the faculty concerned. The marks shall be given on the drawing sheet & regard maintained by the faculty.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

Drawing Sheet (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Note: The drawing sheet could be manual or in Auto CAD.

Semester II Workshop Practice (Lab)

Course Code: EME262/162

L T P C
0 0 4 2

List of Experiments:

(Perform any ten experiments selecting at least one from each shop.)

Carpentry Shop:

1. To prepare half-lap corner joint.
2. To prepare mortise & tenon joint.
3. To prepare a cylindrical pattern on woodworking lathe.

Fitting Bench Working Shop:

1. To prepare a V-joint fitting
2. To prepare a U-joint fitting
3. To prepare a internal thread in a plate with the help of tapping process

Black Smithy Shop:

1. To prepare a square rod from given circular rod
2. To prepare a square U- shape from given circular rod

Welding Shop:

1. To prepare a butt and Lap welded joints using arc welding machine.
2. To prepare a Lap welded joint Gas welding equipment.
3. To prepare a Lap welded joint using spot welding machine.

Sheet-metal Shop:

1. To make round duct of GI sheet using 'soldering' process.
2. To prepare a tray of GI by fabrication

Machine Shop:

1. To study the working of basic machine tools like Lathe m/c, Shaper m/c, Drilling m/c and Grinding m/c.
2. To perform the following operations on Centre Lathe:
Turning, Step turning, Taper turning, Facing, Grooving and Knurling
3. To perform the operations of drilling of making the holes on the given metallic work-piece (M.S.) by use of drilling machine.

Foundry Shop:

1. To prepare core as per given size.
2. To prepare a mould for given casting.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4- 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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP211

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester III Engineering Mechanics

Course Code: EME311

L	T	P	C
3	1	0	4

Objective:

1. To make students learn and apply basic theories and concepts of equilibrium, Shear force and Bending moment diagrams in beams for different conditions of loading.
2. To make students learn and understand the concept friction, second moment of Areas, and forces in various members of Truss.

Course Contents:

Unit I

(Lectures 8)

Force systems and analysis: Concepts of force and force systems; Resultant of force systems; Determination of Resultant of coplanar, concurrent force system; Resolution and composition of forces; Resultant of coplanar and non-concurrent force system

Equilibrium: Concepts of equilibrium; Types of loads; Types of supports; Conditions of equilibrium for coplanar force system; Body constraints and free body diagrams; Moments of a force; Moment and arm of a couple; Beam reactions;

Unit II

(Lectures 8)

Friction: Introduction; Definitions; Types of Friction; Coulomb's law of friction; Angle of Repose; simple cases of equilibrium of bodies involving dry friction.

Unit III

(Lectures 8)

Shear Force and Bending Moment

Definitions- Types of beams; Conception of shear Force and Bending Moment- Sign conventions- Sagging and hogging moments- shear force and bending moment diagrams for cantilevers and simply supported beams subjected to point load, uniformly distributed loads

Unit IV

(Lectures 8)

Properties of Section

Centroid: Centre of gravity and Centroid; Centroid of plane areas; Centroid of Composite areas; some cases of location of centroid of common areas.

Moment of Inertia: Area Moment of Inertia; Parallel axis theorem; Perpendicular axis theorem; Polar moment of inertia; Moment of inertia of composite sections; Radius of gyration.

Unit V

(Lectures 8)

Trusses: Introduction; Simple Trusses; Types of Trusses; Assumptions; Determination of Forces in simple trusses members; Methods of joints.

Torsion: Introduction; pure torsion; Theory of pure torsion; assumptions in theory of pure torsion; Torsional moment of resistance; polar modulus of shafts of circular section; power transmitted by a circular shaft; Shear stress and twist due to torque.

Text Books:

1. Bansal R. K., "A Text book of Engineering Mechanics", Laxmi Publications.
2. Kumar D. S., "A Text book of Engineering Mechanics", S. K. Kataria & Sons.
3. Kumar K. L., "Engineering Mechanics", Tata McGraw Hill Publication.
4. Khurmi R. S., "Engineering Mechanics", S. Chand Publications.

Reference Book:

1. S. Ramamrutham, "Strength of materials", Dhanpat Rai Publishing company
2. Singer F.L "Engineering Mechanics Statics and Dynamics", Harper International edition

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

Semester III

Engineering Thermodynamics

Course Code: EME312

L	T	P	C
3	1	0	4

Objective:

1. To understand the thermodynamic process and the methods for analyzing thermodynamic properties.
2. To determine the direction of the process by the analysis of entropy.
3. To understand the property equations and thermodynamic properties of real gases.
4. To acquire basic knowledge of Power cycles and application of thermodynamics in industrial equipment and to understand the jet propulsion.

Course Contents:

Unit I

(Lectures 8)

Basic Concepts of Thermodynamics: Definitions, system, control volume, surrounding, boundaries, universe; Types of systems; Macroscopic and Microscopic viewpoints; Thermodynamic equilibrium; State, property, process; Cycle - Reversibility - Quasi - static process; Irreversible process; Causes of irreversibility; Energy in state and in transition; Types of work and heat; Point and path function.

Unit II

(Lectures 8)

Laws of Thermodynamics: First law of thermodynamics; Corollaries: First law applied to a Process, applied to a flow system; Steady flow energy equation; Limitations of the first law; Thermal reservoir; Heat engine; Heat pump; Parameters of performance; Second law of thermodynamics: Kelvin-Planck and Clausius statements and their corollaries; PMM; Carnot's principle; Carnot cycle and its specialties; Thermodynamic scale of temperature; Clausius Inequality; Entropy; Principle of entropy increase; Energy equation; Availability and irreversibility; Thermodynamic potentials, Gibbs and Helmholtz Functions; Maxwell relations.

Unit III

(Lectures 8)

Properties of Steam and Boiler: Pure substances; P-V-T- surfaces; T-S and h-s diagrams; Phase transformations: Triple point at critical state properties during change of phase; Dryness Fraction; Properties of steam; Use of steam table & mollier charts; Steam generators: Classifications, working of fire tube & water tube boiler, boiler mounting & accessories, draught & its calculation.

Unit IV

(Lectures 8)

Vapor Power Cycles: Rankine & modified Rankine cycles; Working of steam engine; Indicator diagram; Effect of pressure & temperature on Rankine cycle; Reheat cycle; Regenerative cycle; Feed water heater; Classification of turbines; Comparison with steam engine; Velocity diagram of simple & compound turbines & related calculations.

Unit V

(Lectures 8)

Gas Power Cycle & Jet Propulsion: Gas turbine classifications, 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 principal of jet propulsion: Turbojet & turboprop engines & their processes; Introduction to rocket engine.

Text books-

1. Singh onkar, Applied Thermodynamics, New Age International (p) Publishers Ltd.
2. Ballaney P.L., Thermal Engineering, Khanna Publisher
3. Kearton W.J., Theory of Stream Turbine, I. Pitman.

References books-

1. Rajput R.K. Thermal Engineering, Laxmi Publication
2. Yahya SM. Turbine Compressor & Fans, TMH
3. Ganeshan, Gas Turbine, TMH
4. Yadav R. Heat Engines, CPH Allahabad
5. Nag PK. Engineering Thermodynamics, TMH

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

Semester III Material Science

Course Code: EME313

L	T	P	C
3	1	0	4

Objective:

1. Give basic knowledge of science behind materials & physical metallurgy.
2. Introduce the concept of basic structure of materials.
3. Lay the groundwork for studies in fields such as solid-state physics, mechanical behavior of material.
4. To give students a feel of how material science is useful in engineering practices.

Course Contents-

Unit I

(Lectures 8)

Crystallography and Imperfections: Introduction to material science, 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.

Mechanical properties and Testing: Stress-strain diagram; Ductile & brittle materials; Toughness, Hardness, Fracture, Fatigue and Creep; Testing: Strength testing, Hardness testing, Impact testing, Fatigue testing, Creep testing, Non-destructive testing (NDT).

Unit II

(Lectures 8)

Deformation of Metal: Elastic and plastic deformation, mechanism of plastic deformation, twinning, conventional and true stress strain curves for polycrystalline materials, yield point phenomena, strain ageing, work hardening, Bauschinger effect, season cracking. Recovery, re-crystallization and grain growth.

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.

Unit III

(Lectures 8)

Ferrous Materials: Iron and steel manufacture, furnaces; Carbon steels, alloy steels and cast irons, and their properties and uses.

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 a Duralumin.

Unit IV

(Lectures 8)

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

Magnetic Properties: Concept of magnetism; Dia-, para-, ferro- magnetism; Hysteresis; Soft and hard magnetic materials; Superconductor; basic concepts and its applications; Meissner effect; Type I & II superconductors.

Unit V

(Lectures 8)

Ceramics: Structure, Properties, Applications; Mechanical /Electrical behavior and processing of Ceramics.

Plastics: Types of polymers/plastics and their applications; Mechanical behaviors and processing of plastics; Future of plastics.

Other Materials: Description of material such as optical and thermal materials, Concrete, Smart materials, Composite materials and their uses.

Text Books:

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

Reference Books:

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

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

Semester III Industrial Engineering

Course Code: EME314

L	T	P	C
3	0	0	3

Objective:

1. To learn about productivity, work study, Break Even Analysis.
2. To learn about maintenance management, Job analysis, Job evaluation, and production planning & control techniques in industry.

Course Contents:

Unit I

(Lectures 8)

Productivity: Introduction, Definition, Measurement of Productivity index, Productivity improvement techniques.

Work study: Meaning and benefits of work study, Method study, Man machine chart, Work measurement, Calculation of Standard time, Work sampling, Principles of Motion economy.

Unit II

(Lectures 8)

Plant layout and materials Handling: Plant location; Type of layouts; Principles of facility layout; Principles of material handling; Material Handling equipment.

Production planning and control: Objectives of PPC; PPC functions: routing, scheduling, Dispatching, Loading & follow-up.

Unit III

(Lectures 8)

Break Even Analysis: Purpose; Costs: Overheads, Fixed & variable costs; Steps of Break Even Analysis Margin of safety; Angle of incidence; Profit volume graph.

Depreciation Analysis: Causes; Obsolescence; Methods.

Maintenance Management: Maintenance, Planning & Control; Maintenance Strategy.

Unit IV

(Lectures 8)

Inventory Control: Inventory, classification of inventory, inventory related costs, EOQ model, Introduction to Supply-chain Management

Quality Control: Introduction, SQC; Single, double & sequential sampling; Introduction to TQM & bench marking.

Unit V

(Lectures 8)

Industrial Ownership: Proprietorship; Partnership; Joint stock & co-operative stores.

Manpower Planning: Process.

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 evaluation methods, Merit rating, Wage incentive plans.

Text Books

1. Koontz H. Donnel C.O., Principles of Management: An Analysis of Management Functions, Tata McGraw Hill.
2. Moore J., Manufacturing Management”, Prentice Hall.
3. Mahajan, Industrial Engineering, Dhanpat Rai & Sons.

Reference Books

1. Khanna O.P., Industrial Engineering & Management, Dhanpat Rai & Sons.
2. Shanker. Ravi, Industrial Engineering, Galgotia Publications.
3. Buffa E.S., Modern Production Operations Management, Wiley Eastern

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

Semester III Operations Research

Course Code: EHM311

L	T	P	C
3	1	0	4

Objective:

1. To learn the linear programming techniques, decision theory, transportation problems, inventory modules etc.
2. Duality, and sensitivity analysis. Integer Programming. Network flows. Multi-criteria decision techniques. Decision making under uncertainty.

Course Contents:

Unit I

(Lectures 8)

Operations Research: History, Characteristics, Models and modelling, General Methodology to solve OR problem, Applications.

Linear Programming: Applications and Model Formation; Graphical method; Simplex method; Duality in Linear Programming.

Unit II

(Lectures 8)

Transportation Problem: Mathematical model of Transportation problem; 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 of transportation problem.

Assignment problems: Mathematical model of assignment problems; Hungarian method; Variations of the assignment problems: Multiple optimal solutions, maximization case; Unbalanced assignment problems.

Unit III

(Lectures 8)

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

Decision theory: Steps of Decision making process; Types of Decision making environments; Decision making under uncertainty; Decision Making under risk; Optimization criterion; Pessimism criterion; Laplace criterion; Hurwicz criterion; Regret criterion; Expected monetary value (EMV); Expected opportunity loss (EOL); Expected value of Perfect information (EVPI); Decision Tree analysis

Unit IV

(Lectures 8)

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.

Unit V

(Lectures 8)

Project Management: PERT & CPM; Network construction; Critical path analysis; Program evaluation and review technique (PERT); Project Time Cost Trade-Off; Project-crashing.

Text book:

1. Wangner M H., Operations Research , Prentice Hall (January 16, 1970)
2. Sharma S.D., Operations Research, Kedar Nath Ram Nath & Co.
3. Sharma J.K., Operations Research, SK Kataria & sons
4. Kapoor V.K., Operations Research, Sultan Chand & Sons.

Reference book:

1. Rao S. S Optimization Technique, TMH.
2. Taha, Operations Research, PHI

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

Semester III Machine Drawing (Lab)

Course Code: EME361

L	T	P	C
0	0	3	2

Objectives:

To learn the principles of technical drawing and acquire skills in the use of appropriate computer aids for effective preparation of 2D models in Machine Drawing.

Part and Assembly drawing:

1. To draw the Conventional representation of materials, common machine elements and parts.
2. To draw the Surface roughness symbols; Machining symbols, indication of surface roughness.
3. To draw the popular forms of screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
4. To draw the riveted joints for plates.
5. To prepare the different types of limits, fits and tolerances.
6. To prepare the part drawing of Cross heads & Eccentrics. (AutoCAD)
7. To draw the Shaft coupling-Spigot and Socket pipe joint. (AutoCAD)
8. To draw the Keys; cotter joints and knuckle joint. (AutoCAD)
9. To prepare the part drawing of Screws jacks & Tailstock. (AutoCAD)
10. To prepare the assembly drawing of Plummer block & stuffing boxes. (AutoCAD)

Reference Books

1. Narayana KL., Machine Drawing, New Age
2. Narayana KL., Production drawing, New Age
3. Nageswara Rao P. Auto CAD 14 for Engineering Drawing, Tata Mac Graw Hill.

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

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester III Engineering Thermodynamics (Lab)

Course Code: EME362

L	T	P	C
0	0	3	2

Objective:

1. To understand the basic thermodynamic cycle applicable to internal combustion engines.
2. To understand the working of 2 stroke and 4 stroke engines.
3. To understand the pressure compounded and velocity compounded turbines.
4. To gain knowledge about different boilers used in power plants and industrial applications.

Experiments: Minimum 10 experiments in depth and details out of following according to theory covered in applied thermodynamics theory subject (EME312)

1. To study of Fire Tube boiler
2. To study of water Tube boiler
3. To study of velocity compounded steam turbine and pressure compounded steam turbine
4. To study of impulse & Reaction turbine
5. To study of steam Engine model.
6. To study and working of two stroke petrol Engine
7. To study and working of Four stroke petrol Engine
8. To determine the Indicated H.P. of I.C. Engine by Morse Test
9. To study of Gas Turbine Model
10. To prepare the energy balance for Diesel/Petrol Engine
11. To study & working of two stroke Diesel Engine
12. To study & working of four stroke Diesel Engine.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester III Material Science (Lab)

Course Code: EME363

L	T	P	C
0	0	3	2

Objective:

To understand the Mechanical behavior of materials, relating laboratory test results to material structure, and elements of mechanical analysis.

I. Material Science Lab Experiments: (To conduct at least 5 of the following)

1. To make a plastic mould for small metallic specimen.
2. To prepare a Specimen for micro structural examination-cutting, grinding, polishing, etching.
3. To determine grain Size of a given specimen.
4. To compare microstructures of different specimens (mild steel, gray C.I., brass, copper)
5. To identify the material from 50 common items kept in a box.
6. To study of microstructure of welded component using microscope.

II. Material Testing Lab Experiments: (To conduct at least 5 of the following)

1. To determine Strength of a given mild steel specimen on UTM and plot a stress-strain graph
2. To determine bending Strength and shear strength of a given mild steel specimen on UTM.
3. To determine impact strength using Charpy impact testing machine.
4. To perform hardness test on given mild steel and compare Brinell hardness and Rockwell hardness.
5. To determine Spring index on spring testing machine.
6. To determine fatigue strength fatigue testing machine.
7. To determine deflection of beam and comparison of actual measurement of deflection with dial gauge to the calculated one, and evaluation of young's modulus of beam.
8. To determine torsion strength of a rod on torsion testing machine.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester III
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP311

C-1

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester IV Strength of Materials

Course Code: EME411

L	T	P	C
3	1	0	4

Objectives:

1. To make students learn and apply basic theories and concepts of equilibrium, shear force, bending moment in beams, bending stress, shear stress and stress-strain laws to different materials for different conditions of loading.
2. To make students learn and understand the concept and theory of deflection of beams, combined direct and bending stresses.

Course Contents:

Unit – I: Simple Stresses and Strains

(Lectures 8)

Definitions; Elastic, plastic and rigid materials; Stress, strain-Tensile and compressive stresses; Shear stresses; Elastic Limit- Hooke's Law-Stress-Strain curve for mild steel- Yield point- Modulus of Elasticity- Modular ratio; Modulus of rigidity; Bars of varying sections; Lateral Strain; Poissons ratio; volumetric strain; Bulk modulus; Relation between the elastic constants. Strain energy; stresses due to various types of axial loads-gradually applied load suddenly applied and impact loads.

Unit – II: Shear Force, Bending Moment and Axial force

(Lectures 8)

Conception of shear Force and Bending Moment- Sign conventions- Sagging and hogging moments- shear force and bending moment diagrams for simply supported beams and overhanging beams, Beams subjected to various types of loading- point load, distribution loads, couples, Maximum bending moment for a beam, point of contra flexure, Inter relation between Shear force and bending moment diagrams

Unit – III: Stresses in Beams

(Lectures 8)

Definitions- Pure or Simple bending- Theory of simple bending- Neutral axis- Bending stress- Bending stress distribution- Moment of resistance, Derivation of Bending Equation- Assumption in the theory of bending- section Modulus, Section modulus for different shapes of beam sections- Rectangular, Circular, L and T section; Shear stress distribution for a beam section for Rectangular, I and T Section

Unit – IV: Direct and Bending stresses

(Lectures 8)

Introduction-Stress distribution for an eccentrically loaded rectangular and circular section; the middle third rule; Core or Kernal of a section.

Thin cylinders & spheres: Introduction, difference between thin walled and thick walled pressure vessels. Thin walled spheres and cylinders, hoop and longitudinal stresses and strains, volumetric strain.

Unit – V: Deflection of Beams

(Lectures 8)

Derivation of differential equation of moment curvature relation, Differential equation relating deflection and moment shear and load, Deflection of simply supported and overhanging beams subjected to point and uniformly distributed loads using Macaulay's method; Boundary conditions. **Principal stresses and strains-** Determination of normal stress, tangential stress, Principal stresses, Principal planes and obliquity by analytical method.

Text Books:

1. S. Ramamrutham & Narain “Strength of Materials”. Dhanpat Rai Publishing Company
2. Rajput R. K, “Strength of Materials: Mechanics of Solids”, S. Chand Limited

Reference Books:

1. Timoshenko S, D.H. Young, “Elements of Strength of Materials”, East West Press.
2. Kazami S.M.A., “Mechanics of Solids”, McGraw Hill Education

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

Semester IV

Production Technology –I

Course Code: EME412

L	T	P	C
3	0	0	3

Objective:

1. To study various manufacturing processes like forming, sheet metal working, casting etc.
2. To study the various plastic manufacturing process for solid and hollow products.
3. To correlate the application of riser, gates and runner in predefined mould.

Course Contents:

Unit I

(Lectures 8)

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 and 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.

Unit II

(Lectures 8)

Metal Forming Processes (continued): Analysis of Wire/strip drawing and maximum 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.

Unit III

(Lectures 8)

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

Unit IV

(Lectures 8)

Jigs & Fixtures: Principle of locating & clamping devices; Jigs and Fixtures and their applications.
Manufacturing of Plastic components: Review of plastics and its uses and applications. Injection moulding and blow moulding; Extrusion of plastic section; Welding of plastics; Resins & adhesives.

Unit V

(Lectures 8)

Casting: 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; Sand-casting; Defects of casting and its remedies; Cupola and crucible furnace; Die Casting, Centrifugal casting, Investment casting etc.

Text Books:

1. Ghosh and Mallik, Manufacturing Science, East West Pvt Ltd
2. Pandey P.C., Production Engg. Science, Standard Publishers Ltd.
3. Jain R.K., Production Technology, Khanna

Reference Books:

1. Rao P N., Manufacturing Technology, Tata. McGraw Hill
2. Paul Degarmo, Materials and Manufacturing, Macmillan Pub. Company

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

Semester IV Measurement, Metrology & Control

Course Code: EME413

L	T	P	C
3	1	0	4

Objective:

1. To study principles, process of measurement and methods of measurement.
2. To study about classification of measuring instruments, Selection of measuring instruments.
3. To study measuring systems and accuracy of measurement, precision and accuracy, errors in measurement.

Course Contents:

Unit I

(Lectures 8)

Mechanical Measurements: Introduction to measurement and measuring instruments; Generalized 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.

Unit II

(Lectures 8)

Strain Measurement

Strain gauges, various types of metallic resistance strain gauges, Selection and Installation factors for metallic strain gauge, Strain rosettes, The strain gauge ballast circuit, Wheat stone bridge circuit, Temperature compensation.

Measurement of Pressure

Gravitational, direct acting, Elastic and indirect type pressure transducers, strain gauge pressure cells, measurement of high pressure, Measurement of low pressures.

Temperature Measurement

Thermometers, bi-metallic thermocouples, thermistors and pyrometers, Calibration of temperature measuring devices.

Force, Speed and Torque Measurement:

Load Cells, Dynamometers, Tachometer, Stroboscope, measurement of torque of rotating shafts, The seismic instruments: vibrometers and accelerometers.

Unit III

(Lecture 8)

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

Unit IV

(Lectures 8)

Measurement of geometric forms: Straightness, Flatness, Roundness; Tool makers microscope, Profile-projector, autocollimator.

Interferometer: Principle and use of interferometer; optical flat; Measurement of screw threads and gears.

Surface texture: Quantitative evaluation of surface roughness and its measurement (Taly surf).

Unit V

(Lectures 8)

Controls: Introduction, Concept of Automatic Controls; Open loop & closed loop systems; Servo-mechanisms;

Block diagrams; Transfer functions; Applications of Laplace Transform in control systems with simple examples; Representation of control components & Systems; Series & parallel combinations; Cascade system, **Controllers:** Introduction to Pneumatic and hydraulic control systems.

Text Books:

1. Beckwith Thomas G, Mechanical Measurements, Narosa Publishing House, N. Delhi.
2. Doeblein E.O., Measurement Systems, Application Design, McGraw Hill.
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, R. S. and Radha krishna H.C., Mechanical Measurements, New Age Publishers
3. Jain, R.K., Engineering Metrology, Khanna Publishers.
4. Raven, Automatic Control Theory, McGraw Hill Publishers.
5. Nagrath and Gopal, Control System Engineering, New Age Publishers

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

Semester IV Fluid Mechanics

Course Code: EME414

L	T	P	C
3	1	0	4

Objectives: The learner is expected to:

1. Develop an appreciation for the properties of fluids.
2. Understand the dynamics of fluid flows and the governing non-dimensional parameters.
3. Study analytical solutions to variety of simplified problems.
4. Apply concepts of mass, momentum, and energy conservation to flows.
5. Grasp the basic ideas of turbulence.

Course Contents:

Unit – I

(Lectures 8)

Fluid and continuum, Physical properties of fluids, Rheology of fluids. Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.

Unit – II

(Lectures 8)

Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows, one, two and three-dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential. Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance,

Unit – III

(Lectures 8)

Potential Flow: source, sink, doublet and half-body. Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends. Similarity Laws: geometric, kinematics and dynamic similarity, undistorted and distorted model studies.

Unit – IV

(Lectures 8)

Equation of motion for laminar flow through pipes, Stokes' law, transition from laminar to turbulent flow, turbulent flow, types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and pipe networks.

Unit – V

(Lectures 8)

Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sublayer, separation and its control, Drag and lift, drag on a sphere, a two-dimensional cylinder, and an aero foil, Magnus effect. Introduction to compressible flow.

Text Books:

1. V Gupta and S K Gupta, “Fluid Mechanics and its Applications”, Wiley Eastern Ltd
2. Som and Biswas, “Introduction to Fluid Mechanics and Machines”, Mc Graw Hill Publications
3. Bansal R K, “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications
4. Modi and Seth, “Hydraulics and Fluid Mechanics including Hydraulic Machines”, Standard Book House.

References:

1. Grade. R J and A G Mirajgaonkar, Engineering Fluid Mechanics (Including Hydraulic Machines) Nemchand and Bros, Roorkee,
2. Fox & Donald, “Introduction to Fluid Mechanics” John Wiley & Sons Pvt Ltd
3. Cengel & Cimbala, “Fluid Mechanics” TMH, New Delhi.
4. I.H. Shames, “Mechanics of Fluids”, McGraw Hill, Int. Student, Education

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

Semester-IV
English Communication and Soft Skills-III

[EHM449/BHM349/449 amended vide approval dt. July 23, 2018 & January 23, 2019 of V.C]

Course Code: EHM449/BHM349/449

L T P C
1 1 2 2

Objectives:

1. To enable the learners to upgrade their knowledge of grammar and vocabulary to address competitive exams like GATE.
2. To enable the learner to improve their listening.
3. To enable the learners to improvise their voice modulation in reading and speaking.
4. To enable the learners to enhance their writing and comprehensive skills in English
5. To enable the learners to proactively participate in activities in situational context.

Course Contents:

Unit – I Grammar & Vocabulary (14 hours)

- Correction of Common Errors (with recap of English Grammar with its usage in practical context.)
- Transformation of sentences
- Commonly used Idiom & Phrases (Progressive learning whole semester)

Unit – II Essence of Effective listening & speaking (12 hours)

- Listening short conversation/ recording (TED talks / Speeches by eminent personalities)
Critical Review of these abovementioned
- Voice Modulation: Five P's - Pace, Power, Pronunciation, Pause, and Pitch.
- Impromptu
- Power Point Presentation (PPT) Skills: Nuances of presenting PPTs

Unit – III Reading and Comprehension Skills (08 hours)

- Strategies of Reading comprehension: Four S's
- How to solve a Comprehension (Short unseen passage: 150-200 words)
- Reading Newspaper (Progressive learning whole semester)

Unit – IV Writing Skills (06 hours)

- Essentials of a paragraph
- Paragraph writing (100-120 words)

Reference Books:

1. Allen, W. "Living English Structure" Pearson Education, New Delhi.
2. Joseph, Dr C.J. & Myall E.G. "A Comprehensive Grammar of Current English" Inter University Press, Delhi

3. Wren & Martin “*High School English Grammar and Composition*” S. Chand & Co. Ltd., New Delhi.
4. Norman Lewis “*Word Power Made Easy*” Goyal Publications & Distributers, New Delhi.
5. Chaudhary, Sarla “*Basic Concept of Professional Communication*” Dhanpat Rai Publication, New Delhi.
6. Kumar Sanjay & Pushplata “*Communication Skills*” Oxford University Press, New Delhi.
7. Agrawal, Malti “*Professional Communication*” Krishana Prakashan Media (P) Ltd. Meerut.

Methodologies:

1. Idiom & Phrases and exercises, usage in sentences.
2. Sentence transformation on daily activities and conversations.
3. Power Point presentation.
4. Newspaper reading, short articles from newspaper to comprehend and short movies.
5. https://youtu.be/j_mMowcNOFs

Note:

- For effective communication practice, groups will be changed weekly
- Class (above 30 students) will be divided in to two groups for effective teaching.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
40 Marks		60 Marks		100
30 Marks (Progressive Evaluation) After each unit-completion: Assignments / Ppt Presentation (<i>Best three assignments</i>)	10 Marks (Attendance)	20 Marks Midway external assessment (viva) *	40 Marks (Written Examination)	

Note: Midway external assessment of 20 marks will be submitted and consider with external evaluation with a total of 60 marks.

*** Parameters of Midway external assessment Viva**

Content	Voice Modulation	Body Language	Question responsiveness	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	20 Marks

Note:

Midway Assessment: To take corrective actions, midway assessment will be conducted by 2-member committee of Director’s nominee (not by the faculty teaching English courses) and average of the two would be the 20 marks obtained by the students after two units are completed. The marks in sealed envelope will be sent to Examination Department.

Written Examination: There will be questions only from Unit-I, III & IV

Semester IV Production Technology-I (Lab)

Course Code: EME461

L	T	P	C
0	0	3	2

Objective:

To develop skill to lead various organizational functions that demand application of working knowledge in the domain of industrial engineering system design, process design and analysis using mechanical energy and manufacturing process.

List of Experiments:

1. To Prepare a Cylindrical Pattern.
2. To prepare a cylindrical sheet metal work piece with the help of roller.
3. To make a mould (with core) for casting.
4. To determine grain fineness number of Sand.
5. To prepare a component of plastics as per the given drawing using injection moulding.
6. To prepare a component as per the given drawing by hand forging process.
7. To Study the foundry tools.
8. To perform tube bending with a tube-bending machine.
9. To study different types of dies used on a press and to prepare a washer of specified dimension on press.
10. To prepare a wire from a soft material using wire drawing by Extrusion operation.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester IV Measurement, Metrology & Control (Lab)

Course Code: EME462

L	T	P	C
0	0	3	2

Objectives:

1. The course covers different aspects of dimensional measurement technology put in a production context.
2. The intention is to give a good competence in industrial metrology, i.e. knowledge about traditional and new instrumentation.
3. How to handle and select appropriate measurement tools, how to estimate and avoid measurement uncertainties and a good understanding of the role of measurement in the production chain.

List of Experiments-

1. To determine length, width and height of given component using vernier callipers, micrometer, and compare the result
2. To measure the angle of a given job using bevel protector
3. To Measure angle of given component using sine bar & slip gauges.
4. To measure the dimensional parameters of a given bolt by using profile projector.
5. To measure the speed of the haft using stroboscope and compare with tachometer
6. To check the roundness of a circular rod using dial indicator.
7. To measure pressure using pressure gauge.
8. To measure temperature using RTD and compare with thermometer
9. To check spark plug gap using feeler gauges and measure surface roughness by using Talysurf
10. To compare given component sizes with standard size using dial indicator

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester IV
Fluid Mechanics (Lab)

Course Code: EME463

L	T	P	C
0	0	3	2

Objective:

1. To understand the basic fluid flow problems.
2. To understand the fundamental equation of fluid mechanics applicable to engineering equipment.

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. 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 equations
11. To study the boundary layer velocity profile and to determine boundary layer thickness and displacement thickness. Also 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 Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester IV
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP411

C-1

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester V Production Technology –II

Course Code: EME511	L	T	P	C
	3	1	0	4

Objective:

1. To study about metal removing mechanism and surface finish.
2. To study about manufacturing tools, tools nomenclature and tool design.
3. To study about various machining process like turning, threading, milling shaping etc.
4. To study about different machinery like lathe, shaper, turner etc.

Course Contents:

Unit I (Lectures 8)

Metal Cutting and Machine Tools: Metal Cutting: Mechanics of metal cutting; Geometry of tool and nomenclature as per 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 for Cutting; Cutting fluids/lubricants; Tool materials; Tool wear and tool life; Machinability; Brief introduction to machine tool vibration and surface finish.

Unit II (Lectures 8)

- (i) **Lathe:** Principle, Types, Operations; Turret/capstan, Semi/Automatic; Tool layout.
(ii) **Shaper, Slotter, Planer:** Working principle; Operations; Drives.

Unit III (Lectures 8)

- (i) **Milling:** Milling cutters; Up milling & down milling; Dividing head & indexing; Max chip thickness & power required.
(ii) **Drilling and Boring:** Drilling; Drill-bits; Geometry of twist drills; Boring, Reaming tools.

Unit IV (Lectures 8)

Grinding & Super finishing: Grinding: Abrasive; Cutting action; Grinding wheel specifications; Grinding wheel wear: Attritions wear, fracture wear; Dressing and Truing; Maximum chip thickness and Guest criteria; Surface grinding, Cylindrical grinding and Centerless grinding.
Super finishing: Honing, lapping, and polishing.

Unit V (Lectures 8)

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, electro slag, 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.

Text Books:

1. Ghosh & Malik, Manufacturing Science, E.W. Press.
2. Boothroyd, Fundamentals of Metal Cutting and Machine Tools, Scripta Book Company
3. Jain R.K., Production Technology, Khanna Publications.

Reference Books:

1. H.M.T., Production Technology, Tata McGraw Hill.
2. Pandey P.C., Production Engineering Science, Standard Publishers.
3. Juneja & Shekhon, Fundamentals of Machining & Machine Tools, New Age Publishers Pvt Ltd.
4. Lundeberg., Process & Materials of Manufacturing, Allyn and Bacon.

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

Semester V Dynamics of Machines

Course Code: EME512

L	T	P	C
3	0	0	3

Objective:

1. To teach students concepts of generalized forces and the Principle of Virtual Work.
2. To teach students concepts of Cam and followers, governors and Gyroscopic motion.
3. To introducing the approaches and mathematical models used dynamical analysis of machinery

Course Contents:

Unit I

(Lectures 8)

Introduction: Links-types; Kinematics pairs-classification; Constraints-types; Degrees 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.

Unit II

(Lectures 8)

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.

Gears: Classification & terminology; Law of gearing; Tooth forms; Interference; Under cutting; Minimum number of teeth on gear and pinion to avoid interference, Gear trains.

Unit III

(Lectures 8)

Force Analysis, Turning Moment & Flywheel: 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

Unit IV

(Lectures 8)

Governors: Dead weight and spring-loaded governors; Sensitivity; Stability; Hunting; Isochronism; Effort and Power; Friction and Insensitivity; Introduction to inertia governors.

Unit V

(Lectures 8)

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

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, Tata McGraw Hill
6. Rao & Dukhipati, Mechanisms and Machine Theory, New Age.
7. Ghosh & Mallik, Theory of Machine & Mechanism, Affiliated East-West Press (P) Ltd
8. Ballaney P. L., Theory of Machines, Khanna Publication.

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

Semester V

Heat & Mass Transfer

Course Code: EME513

L	T	P	C
3	1	0	4

Objective:

1. To introduce a basic study of heat and mass transfer phenomena.
2. To study methodologies for solving a wide variety of practical engineering and industrial problems.
3. To provide useful information concerning the performance and design of particular systems deals with heat transfer.
4. A knowledge-based design problem requiring the formulations of solid conduction, fluid convection and radiation.

Course Contents:

Unit I

(Lectures 08)

Heat Transfer: Mechanisms of heat flow: 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 for 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.

Unit II

(Lectures 08)

Fins of Uniform Cross-sectional Area: Types of fin, Heat transfer from fin with different geometries; Fin efficiency; Fin effectiveness; Applications of the fins.

Transient Conduction: Transient heat conduction; Lumped capacitance method: Time constant; Unsteady state heat conduction in one dimension only; Heisler charts.

Unit III

(Lectures 08)

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.

Unit IV

(Lectures 08)

Thermal Radiation: Basic concepts; Radiation properties of surfaces; Laws of black-body radiation; Shape factor; Black-body radiation exchange; Radiation exchange between diffused non black bodies in an enclosure; Radiation shields; Solar radiation.

Unit V

(Lectures 08)

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 phenomenon; 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; Fick's law of diffusion; Steady state equi-molar counter diffusion; Steady state diffusion through a stagnant gas film.

Texts Books:

1. Bayazitoglu & 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, New Age International (P) Ltd. Publishers
4. Rao Y.V.C., Heat Transfer, University Press.

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

Semester V

Automobile Engineering

Course Code: EME514

L	T	P	C
3	0	0	3

Objective:

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

Course Content:

Unit I

(Lectures 8)

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.

Unit II

(Lectures 8)

Transmission System: Requirements; Clutches; Torque 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; Steering geometry; Ackerman mechanism; Under-steer and over-steer.

Unit III

(Lectures 8)

Braking System: General requirements; Road tyre adhesion; Weight transfer; **Brakes:** Mechanical brakes, Hydraulic brakes, Vacuum and air brakes; Thermal aspects; **Chassis and Suspension System:** Loads on the frame; Strength and stiffness; Various types of suspension systems.

Unit IV

(Lectures 8)

Electrical System: Types of starting motors; Generator & regulators; Lighting system; Ignition system; Horn; Battery; **Fuel Supply System:** Diesel & Petrol vehicle system such as Fuel Injection Pump; Injector & Fuel Pump; Carburetor; MPFI.

Unit V

(Lectures 8)

Automobile Air-Conditioning: Requirements; Cooling & heating systems, **Lubrication System:** Different type of lubrication system, **Maintenance system:** Preventive maintenance; Break down maintenance and over hauling system.

Text Books:

1. Hietner, Automotive Engineering, East West Press
2. Singh Kripal, Automobile Engineering, Standard Publishers

Reference Books:

1. Narang, Automobile Engineering, Khanna Publisher
2. Crouse, Automotive Mechanics, Tata McGraw Hill
3. Newton & Steeds, Automobile Engineering, ELBS Publishing

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

Semester V

Database Management System

Course Code: ECS511/611/411/MSC014/BCS311

L T P C

3 1 0 4

Objective: Introducing the fundamental concepts necessary for designing, using, and implementing database systems and applications. The goal of this course is for students to become well-grounded in basic concepts necessary for understanding DB and their users, DBMS concepts, architecture, the concepts of the Entity Relationship(ER) model, the data abstraction and semantic modeling concepts leading to EER data model, describe the basic relational model, its integrity constraints and update operations, and the operation of relational algebra, describe relational schema design, and it covers the normalization and functional dependency algorithm.

Course Contents:

Unit I:

(Lectures 08)

Introduction: Scope and purpose of database system, view of data, relational databases, database architecture, transaction management, database system Vs filesystem, Database system concept and architecture, data definitions language, DDL.

Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction

Unit II:

(Lectures 08)

Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity etc, Codd's rules, Relational Schemas, Introduction to UML, Relational database model: Logical view of data, keys, integrity rules.

Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF)

Unit III:

(Lectures 08)

Relational data Model and Language: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, Relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, Computational capabilities, constraints, Views.

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, and Procedures in SQL/PL SQL.

Unit IV:

(Lectures 08)

Usage of Oracle:

1. Installing oracle
2. Creating Entity-Relationship Diagram using case tools.
3. Writing SQL statements Using ORACLE
4. MYSQL: a) Writing basic SQL SELECT statements.
b) Restricting and sorting data.
c) Displaying data from multiple tables.
d) Aggregating data using group function.
e) Manipulating data.
f) Creating and managing tables.
5. Normalization in ORACLE.
6. Creating cursor in oracle.
7. Creating procedure and functions in oracle.
8. Creating packages and triggers in oracle.

Unit V:

(Lectures 08)

Transaction management: ACID properties, serializability and concurrency control Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Text Books:

1. Elmasri, R., Navathe, S., Fundamentals of Database Systems, Addison-Wesley.
2. G. K. Gupta, "Data Base Management", Tata Mc Graw Hill.
3. Atul Kahate, "Introduction to Database Management Systems" Pearson Education, New Delhi, 2006.

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

Semester V Production Technology –II (Lab)

Course Code: EME561

L	T	P	C
0	0	3	2

Objective:

1. To understand basic manufacturing processes like machining, drilling and different welding processes.
2. To study the different cutting tool materials and types & geometry of cutting tools.
3. To learn introductory concepts of milling and gear cutting.

List of Experiments:

Perform 10 experiments out of the following

1. To determine shear-angle and chip thickness ratio for orthogonal cutting on lathe machine.
2. To prepare a bolt (thread) on lathe machine
3. To provide tool angles on tool using Grinding Machine.
4. To perform Gear cutting on milling machine.
5. To Prepare a block of given size on shaper machine.
6. To Obtain a given job on surface grinding machine.
7. To prepare a hole using drilling machine and study of twist of twist drill.
8. To Study different types of tools, its angles and materials.
9. To prepare weld joint using gas welding machine.
10. To prepare weld joint using manual metal arc welding machine.
11. To prepare weld joint using resistance welding machine.
12. To perform soldering & brazing on given work piece
13. To prepare a weld joint using TIG/MIG welding machine.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester V Dynamics of Machines (Lab)

Course Code: EME562

L	T	P	C
0	0	3	2

Objective:

1. Ability to analyze kinematics of the three-dimensional particle motion in various coordinate systems: cartesian, natural and cylindrical.
2. Understanding of the concepts of power and mechanical efficiency.
3. Ability to analyze particle dynamics.

List of Experiments-

1. To compare practical and theoretical balancing (statically and dynamically) of rotating masses.
2. To determine the controlling force at given speed, sensitiveness at given limits of lift and governor effort and power.
3. To find the spring tension and follower displace at various angle of cam.
4. To find the applied torque in case of gyroscope couple.
5. To determine the frequency of vibration (oscillation).
6. To determine the natural frequency of vibration in case of two rotor system
7. To identify the amplitude of vibration of beam for different damping
8. To verify for the epicyclical gear train input torque + holding torque = output torque.
9. To find the whirling speed of rotating shafts.
10. To find out the moment of inertia of a given specimen using velocity and acceleration.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester V Heat & Mass Transfer (Lab)

Course Code: EME563

L	T	P	C
0	0	3	2

Objective:

1. Apply principles of heat and mass transfer to basic engineering systems
2. Analyse heat transfer by conduction, convection;
3. Analyse and design heat exchangers;
4. To study radiations and shape factor.

List of Experiments-

1. To Study and determine thermal resistance of a composite wall.
2. To determine heat flow rate through the lagged pipe and thermal conductivity of lagging material.
3. To determine the critical heat flux using critical heat flux apparatus.
4. To determine the variation of heat transfer coefficient over the vertical surface in natural convection.
5. To demonstrate effective thermal conducting of heat pipe.
6. To determine heat flow rate and effectiveness of a fin for steady state of temperature distribution along the length.
7. To study forced measurement test rig.
8. To determine emissivity of test plate.
9. To ensure the speed of the shaft study speed measurement test rig.
10. To determine the LMTD of parallel and counter flow Heat exchanger.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester V
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP511

C-1

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester VI

Refrigeration & Air Conditioning

Course Code: EME611

L	T	P	C
3	1	0	4

Objective:

1. To study about vapour compression and vapour absorption refrigeration system.
2. To analyze the refrigeration cycles and the methods for improving performance.
3. To design air conditioning system using cooling load calculation.
4. To know the application of refrigeration and air conditioning processes.

Course Contents:

Unit I

(Lectures 8)

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).

Unit II

(Lectures 8)

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; Inter-cooling; Different configuration of multistage system; Cascade system.

Unit III

(Lectures 8)

Vapour Absorption System: Working principle 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 and desirable properties of refrigerants; Common refrigerants; Secondary refrigerants and CFC free refrigerants.

Unit IV

(Lectures 8)

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); Dew point apparatus.

Unit V

(Lectures 8)

Refrigeration Equipment & Applications: Basic components of refrigeration & air-conditioning equipments; Air washers; Cooling towers; Humidifying efficiency; Food preservation; Cold storage; Refrigerators; 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.

Text Books:

1. Prasad Manohar, Refrigeration and Air Conditioning, New Age International
2. Arora C.P., Refrigeration and Air Conditioning, McGraw Hill
3. Arora & Domkundwar, Refrigeration and Air Conditioning, Tata mcgraw-Hill

Reference Books:

1. Stoecker & Jones, Refrigeration and Air Conditioning, McGraw-Hill.
2. Roy J. Dossat, Refrigeration and Air Conditioning, John Wiley & Sons.
3. Baloney P.L., Refrigeration and Air Conditioning, Prentice Hall.
4. Kuhen, Ramsey & Theked, Thermal Environment Engg, Central Publishing House.

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

Semester VI
Mechanical Vibrations

Course Code: EME612

L	T	P	C
3	0	0	3

Objective:

1. To understand the importance of vibrations in mechanical design of machine parts that operates in vibratory condition.
2. To understand the differential equation of motion of vibratory system.
3. To study free and forced (harmonic, periodic, nonperiodic) vibration analysis of single and multi-degree of freedom linear system.

Course Contents:

Unit I

(Lectures 08)

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.

Unit II

(Lectures 08)

Single-Degree of Freedom: 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, characteristic curve, Magnification factor.

Unit III

(Lectures 08)

Two-Degree Freedom System: Introduction; Principal modes; Double pendulum; Torsional system with damping; Coupled System; Un-damped dynamic system; Vibration absorbers; Centrifugal pendulum absorber; Dry friction damper; Un-tuned viscous damper.

Unit IV

(Lectures 08)

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

Unit V

(Lectures 08)

Multi-degree Freedom System-II: Critical Speed of Shafts; Shafts with one disc with and without damping; Multi-disc shafts; Secondary critical speed.

Text Books:

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

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.**

Semester VI

Design of Machine Elements

Course Code: EME613

L	T	P	C
3	0	0	3

Objective:

1. To demonstrate how engineering design uses the many principles learned in previous engineering science courses and to show how these principles are practically applied.
2. To study about design and creation of devices that consist of interrelated components used to modify force and/or motion.

Course Contents:

Unit I

(Lectures 8)

Introduction: Definition of Design; Design Process; Analysis; Need based developments; Design by evolution; Technology based developments; Brain-storming. Standards in design & selection of preferred size; Different stages of creep; BIS system of designation of steels.

Unit II

(Lectures 8)

Design for Static and Dynamic loads: 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.

Unit III

(Lectures 8)

Joints: Welded joints, Screwed joints, Eccentric loading of welded and screwed joints; Design for fatigue loading; Design of riveted joints.

Unit IV

(Lectures 8)

Design of Shaft and keys. Selection of square & flat keys & splines; Design against static and fatigue loads; Strength & rigidity design; Design of Rigid & flexible couplings. Design of sliding contact bearings, Journal bearing, foot step bearing.

Unit V

(Lectures 8)

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 a screw; Design of screw jack.

Text Books:

1. Bhandari, Design of Machine Elements, TMH
2. Sharma & Agarwal, Machine Design, Kataria
3. Maleev & Hartman, Machine Design, C.B.S. Publishers
4. Sharif Abdulla, Design Data Book, Dhanpat Rai & Sons

Reference Books:

1. Shigley, Machine Design, Mcgraw Hill
2. Black & Adams, Machine Design, Mcgraw Hill.
3. Spotts, Design of Machine Elements, Prentice Hall of India Pvt. Ltd

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

Semester VI
Non-Conventional Energy Resources

Course Code: EEE614/EEE712

L T P C
3 1 0 4

Objective: To make the students aware about the types of turbines & site selection for installation of various types of power plants.

Course Contents:

Unit I **(Lectures 08)**

Introduction: World energy use; Reserves of energy resources; Energy cycle of the earth; Environmental aspects of energy utilization; Renewable energy resources and their importance.

Unit II **(Lectures 08)**

Solar Energy: Introduction; Extra-terrestrial solar radiation; Radiation at ground level; Collectors; Solar cells; Applications of solar energy. Biomass Energy: Introduction; Biomass Conversion; Biogas Production; Ethanol Production; Pyrolysis and Gasification; Direct Combustion; Applications.

Unit III **(Lectures 08)**

Wind, Geo-Thermal and Hydro Energy Sources: Introduction; Basic theory; Types of turbines; Geothermal Energy Resources; Resource based applications for heating and electricity generation; Hydropower basic concepts; Site selection; Types of turbines; Small scale hydropower.

Unit IV **(Lectures 08)**

Tidal Energy: Introduction; Origin of tides; Power generation schemes; Basic theory of Wave energy; Wave power Devices; Open and Closed OTEC cycles.

Unit V **(Lectures 08)**

Other Renewable Energy Sources: Ocean Currents; Salinity Gradient Devices; Environmental Aspects; Potential impacts of harnessing the different renewable energy resources.

Text Books:

1. G D Rai, Non-Conventional Energy Sources, Khanna publishers

Reference Books:

1. A. Duffie and W. A. Beckmann, "Solar Engineering of Thermal Processes", John Wiley
2. F. Kreith and J. F. Kreider, "Principles of Solar Engineering", McGraw-Hill
3. T. N. Veziroglu, "Alternative Energy Sources", McGraw-Hill.

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

Semester VI Operations Management

Course Code: EHM611

L	T	P	C
3	0	0	3

Objective:

To learn various concepts of operations management like Aggregate planning, scheduling forecasting, layout planning etc.

Course Contents

Unit I

(Lectures 8)

Operations Management: Overview; Definition of production and operations management; **Transformation process model:** Inputs, Process and outputs; Classification of operations; Responsibilities of Operations Manager; 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.

Unit II

(Lectures 8)

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.

Unit III

(Lectures 8)

Inventory Control & MRP: Inventory Management: Objectives, Factors, Process, Relevant costs; The EOQ model; Selective Inventory control techniques: ABC, VED, SED, FSN analysis; MRP: Overview; Process; Use of MRP in real world.

Unit IV

(Lectures 8)

Operation Scheduling: Characteristics of job shop scheduling problems; Theory of sequencing for single machine sequencing rules: FCFS, SPT, EDD, critical ratio, Minimum number of tardy jobs (NT).

Unit V

(Lectures 8)

Facility Location & Layout: Factors affecting location decisions; Techniques for locating new facilities; Subjective, Semi quantitative & quantitative techniques; Centre of gravity problem; Facility layout principles; Systematic layout planning procedure; Types of layout; Activity relationship chart; From/to chart; Line balancing.

Text Books:

1. Adam Jr & Everett E. R J, Production and Operations Management, Prentice-Hall.
2. Ashwathappa K. & Bhatt K, Production & Operations Management, Himalaya Publication.
3. Mahadevan B., Operations Management- Theory and Practice, Pearson Education.
4. Richard B Chase, Operations Management, Tata McGraw Hill.

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 S. N., Production and Operations Management, Tata McGraw-Hill.

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

Semester VI

English Communication and Soft Skills – IV

[EHM699/EHM599/BHM499 amended vide approval dt. July 23, 2018 of V.C]

Course Code: EHM699/599/BHM499

L T P C

1 1 2 2

Objectives:

1. To enable the learners to inculcate the skills of technical writing.
 2. To enable the learners to proactively participate in Job Oriented activities.
 3. To enable the learners to be aware of corporate Skills.
-

Course Contents:

Unit – I: Job Oriented Skills

(10 Hours)

- Cover Letter
- Preparing Resume and Curriculum-Vitae
- Writing Joining Report

Unit – II: Technical Communication

(12 Hours)

- Technical description of engineering objects
- Data Interpretation: Tables, Charts, & Graphs
- Preparing Agenda & Minutes of the Meeting
- Technical Proposal: Types, Significance, Structure & AIDA
- Report Writing: Types, Structure & Steps towards Report writing

Unit- III: Interview Skills

(10 Hours)

- Branding yourself
- Interview: Types of Interview, Tips for preparing for Interview and Mock Interview
- Group Discussion: Do's and Don'ts of Group Discussion
- Negotiation skills

Unit – IV: Corporate Skills

(8 Hours)

- Corporate Expectation
- Service mindset: Selling a product - Ad made shows
- Goal setting
- Team Building & Leadership
- Professional Ethics

Reference Books:

- Raman Meenakshi & Sharma Sangeeta, “*Technical Communication-Principles & Practice*” Oxford University Press, New Delhi.
- Mohan K. & Sharma R.C., “*Business Correspondence of Report Writing*”, TMH, New Delhi.
- Chaudhary, Sarla “*Basic Concept of Professional Communication*” Dhanpat Rai Publication, New Delhi.
- Kumar Sanjay & Pushplata “*Communication Skills*” Oxford University Press, New Delhi.
- Agrawal, Malti “*Professional Communication*” Krishana Prakashan Media (P) Ltd. Meerut.

Methodology:

1. The content will be conveyed through Real life situations, Pair Conversation, Group Talk and Class Discussion.
2. Conversational Practice will be effectively carried out by Face to Face & Via Media (Audio-Video Clips)
3. Modern Teaching tools (PPT Presentation & Motivational videos with sub-titles) will be utilized.

Note:

- For effective communication practice, groups will be changed weekly.
- Class (above 30 students) will be divided in to two groups for effective teaching.

Evaluation Scheme

Internal Evaluation		External Evaluation		Total Marks
50 Marks		50 Marks		100
40 Marks (Progressive Evaluation) After each unit-completion: Assignments /Oral Presentation	10 Marks (Attendance)	25 Marks Midway external assessment (Viva) *	25 Marks (External Viva)* **	

Note: 1. Midway external assessment of 25 marks will be submitted and considered with external evaluation with a total of 50 marks.

2. Assignments & Oral Presentation (Progressive Evaluation) will be designed to test learning outcomes unit wise.

***Parameters of Midway external assessment (Viva)**

Knowledge of frequently asked questions	Body Language	Communication skills	Confidence	Voice Modulation	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

Note: To take corrective actions, midway assessment will be conducted by 2-member committee of Director's nominee (not by the faculty teaching English courses) and average of the two would be the 25 marks obtained by the students after two units are completed.

****Parameters of External Viva**

Knowledge of frequently asked questions	Body Language	Communication skills	Confidence	Voice Modulation	TOTAL
05 Marks	05 Marks	05 Marks	05 Marks	05 Marks	25 Marks

Note: External Viva will be conducted by 3-member committee comprising

- a) Faculty teaching the class
- b) English faculty from other college of the University (As approved by VC).
- c) T&P officer of other colleges of the University (As approved by VC).

Each member will evaluate on a scale of 25 marks and the average of three would be the 25 marks obtained by the students.

Semester VI Refrigeration & Air Conditioning (Lab)

Course Code: EME661

L	T	P	C
0	0	3	2

Objective:

1. To study about different types of refrigerators, different types of expansion devices.
2. To study about volumetric efficiency of compressor used in refrigerator.
3. To study about air washer etc.

List of Experiments:

1. To study & determination of volumetric efficiency of Reciprocating compressor.
2. To study & determination of volumetric efficiency of Semi Sealed compressor.
3. To study & determination of volumetric efficiency of Open type compressor.
4. To determine refrigeration effect using the different diameters expansion devices used in refrigeration system.
5. To study and determination of cooling effect using window air conditioner
6. To determine the COP of vapour compression refrigeration system.
7. To Study Air Washer.
8. To identify different parts of evaporators (Forst Free) used in refrigeration systems.
9. To determine COP of see through freeze (Direct cooled).
10. To identify different parts of automobile AC test rig.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester VI Solid Works Lab

Course Code: EME662

L	T	P	C
0	0	3	2

Objective:

To make the students aware of 3D modeling of machine components using CAD software.

List of Experiments:

1. Introduction to modeling software and detail discussion & familiarization about SOLIDWORKS.
2. Practice sketch Tools and Relations with in stipulated duration.
3. Practice sketcher tool, relation and dimensioning and prepare Bracket Drawing with SOLIDWORKS sketcher.
4. To prepare coupling shaft using revolve command.
5. To create a machine component from the views using extrude, fillet & instant 3D.
6. To prepare the detail model of Wing Nut, Snap Head Rivet, Grub Screw & Set Screw.
7. To prepare the assembly of given experiment no. 6.
8. File Management- New, Open, Save, Save As, Page Setup, Printing, Import and Export.
9. Introduction of kinematics using SOLIDWORKS MOTION.
10. Introduction of joints using SOLIDWORKS MOTION.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VI
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP611

C-1

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester VII Computer Aided Design (CAD)

Course Code: EME711	L	T	P	C
	3	0	0	3

Objective:

1. This course provides an introduction into engineering design and communication through the use of computer aided design (CAD) software.
2. The principles and methods of engineering design are introduced, and the critical role of graphic communication within the design process is described.
3. The use of CAD software to generate computer models and technical drawings.

Course Contents:

Unit-I

(Lectures 8)

Introduction: Introduction to CAD/CAE; Element of CAD, Essential requirements of CAD, Concepts of integrated CAD/CAM; Importance of CAD& their necessity; CAD Engineering applications, Computer aided Inspection (CAI), Computer aided Testing (CAT), Co-ordinate measuring machine (CMM), Machine Vision, 3D-printing.

Unit-II

(Lectures 8)

Computer Graphics: Graphics input devices, Graphics display devices, Graphics standards, Graphics Software, Software Configuration, Graphics Functions, Output primitives- Bresenham's line drawing algorithm and Bresenham's and mid-point circle generating algorithm

Geometric Transformations: World/device Coordinate Representation, Windowing and clipping, 2-D Geometric transformations- Translation, Scaling, Shearing, Rotation & Reflection, Matrix representation, Composite transformation, 3-D transformations.

Unit-III

(Lectures 8)

Curves: Curves representation, Interpolation vs approximation, Properties of curve design, Parametric representation curves, Parametric continuity conditions, Synthetic curves-Hermite cubic splines-Blending function formulation and its properties, Bezier curves-Blending function formulation and its properties, Composite Bezier curves, B-spline curves and its properties.

Unit-IV

(Lectures 8)

3D Graphics: Polygon Surfaces-Polygon mesh representations, Quadric and Super-quadric surfaces, Blobby objects; Fractals, Solid modeling- Regularized set operations; Boundary representation (B-rep), Constructive solid geometry (CSG), Sweep representation, Color models. Basic commands for 2-D drafting software like AutoCAD and 3-D solid modeling software PTC Creo and Solidworks.

Unit-V

(Lectures 8)

Finite Element Methods: Introduction, Basic concept of the finite element method (FEM), Stages in finite element analysis, Shape functions, Development of elemental stiffness matrix and their assembly, Finite Element analysis of 1-D problems like spring, bar, truss and beam elements formulation with elimination and penalty approaches, 1-D thermal and fluid problems.

Text Books-

1. Hearn D. & Baker M. P., Computer Graphics, Prentice Hall
2. Srivastava. R.K., Computer Aided Design, Umesh Publication

Reference Books-

1. Foley D., Van Dam A., Feiner S. K., Computer Graphics: Principles and Practice in C, Pearson Education.
2. Zeid Ibrahim, CAD/CAM theory and practice, McGraw Hill International.
3. Dukkipati R. V., Rao M. A., Bhat R. Computer Aided Analysis & Design of Machine Elements, New Age International.
4. Rogers D. F. Adams J. A., Mathematical Elements for Computer Graphics, McGraw Hill.
5. Groover M. P.& Zimmers E. W., CAD/CAM: computer-aided design and manufacturing, Prentice Hall of India Pvt Ltd.
6. S.S. Bhavikatti, Finite Element Analysis, New Age International Publishers.
7. Krishnamoorthy, FE Analysis Theory and Programming, Tata McGraw Hill.

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

Semester VII IC Engines

Course Code: EME712

L	T	P	C
3	0	0	3

Objective:

1. introduction to reciprocating internal combustion engines with emphasis on mobile and stationary applications.
2. Understand the fundamentals of combustion such as flame stoichiometry, and flame speed and how combustion is coupled to engine performance.
3. Understand how the major pollutants of internal combustion engines are formed and controlled.

Course Contents:

Unit I

(Lectures 8)

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; Alternative fuels for IC engines: LPG, CNG, Biogas, Producer gas.

Unit II

(Lectures 8)

SI Engines: Carburetion; Mixture requirement, Carburettor type; Theory of Carburettor; MPFI Combustion in SI engine; Flame speed; Ignition delay; Abnormal combustion and its control.

Combustion chamber design for SI engines; Ignition system requirement; Magneto and battery ignition system; Ignition timing and spark plug; Electronic ignition system.

Unit III

(Lectures 8)

CI Engine: Fuel injection in CI engines; 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.

Unit IV

(Lectures 8)

Engine Cooling: Different cooling systems; Radiators and cooling fans; Lubrication: Engine friction; Lubrication principal; Type of lubrication; Lubrication oils; Crankcase ventilation; **Supercharging:** Types of supercharging; Effect of altitude on power output; Testing and performance measurement of SI and CI engines.

Unit V

(Lecture 8)

Compressors: Classification; Reciprocating compressors: Single and multi-stage; Inter cooling; volumetric efficiency; Rotary compressors: Centrifugal compressor; Elementary theory; Vector diagram; Efficiencies; Elementary analysis of axial compressors; Surging and stalling; Roots blower; Waned compressor; Performance analysis.

Text Books:

1. Obert E.F., I.C Engine Analysis & Practice, Tata Mc Graw Hill Publishers
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.**

Semester VII Power Plant Engineering

Course Code: EME713

L	T	P	C
3	1	0	4

Objective:

1. To Study about power plants like nuclear, hydroelectric, steam, diesel etc.
2. To introduce students with both steam generation and electricity production and to familiar with the engineering calculations encountered in practice problems.

Course Content:

Unit I

(Lectures 8)

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 realized 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, Depreciation and replacement; Theory of rates; Economics of plant selection; Other considerations in plant selection.

Unit II

(Lectures 8)

Steam Power Plant: Power plant 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, pulverisers 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, Operation and maintenance of steam power plant; Heat balance and efficiency.

Unit III

(Lectures 8)

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.

Unit IV

(Lectures 8)

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; Inter connected systems; **Non-Conventional Power Plants:** Non-conventional power plants (Solar, wind, geothermal, tidal).

Unit V

(Lecture 8)

Electrical System: Generators and generator cooling; Transformer and their cooling; Bus bar Instrumentation: Classification; Selection and application; Recorders and their use; Listing of various control rooms. **Pollution:** Pollution due to power generation.

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.**

Semester VII Hydraulic Machines

Course Code: EME714

L	T	P	C
3	1	0	4

Objective:

1. Describe the operating characteristics of hydraulic machinery (pumps and turbines), and the factors affecting their operation and specifications, as well as their operation in a system.
2. To gain knowledge about hydraulic machine.

Course Contents:

Unit I

(Lectures 8)

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.

Unit II

(Lectures 8)

Water Turbines: Layout of hydroelectric power plant; 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 turbines (Pelton wheel, Francis and Kaplan turbine); Velocity diagrams, work done, efficiencies and its calculation.

Unit III

(Lectures 8)

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 multistage of centrifugal pump; Priming and cavitation.

Unit IV

(Lectures 8)

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 a reciprocating pump; Separation and maximum speed of operation

Unit V

(Lectures 8)

Pumping and Hydraulic Devices: Construction and working of following of air lift pump, jet pump, rotary pumps, external gear pump, internal gear pump, lobe pump, vane pump, hydraulic press, hydraulic accumulator, hydraulic intensifier.

Text Books:

1. Bansal R.K., Fluid Mechanics and hydraulic machines, Laxmi Publications
2. Lal Jagadish, Fluid Machinery, Metropolitan Book Co. Pvt Ltd

Reference Books:

1. Modi P.N. & Seth, Fluid Mechanics and hydraulic machines, Standard Book House

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

Semester VII Computer Aided Design (Lab)

Course Code: EME 761

L	T	P	C
0	0	3	2

Objective:

To learn computer aided design and apply these technique for some practical problems.

List of Experiments:

1. Introduction to Drafting/Modeling/Analysis/Management. Example- Creo, Solidworks, ANSYS, MSP/PPM
2. To prepare the given sketch using **Creo Sketcher**.
3. To prepare Bracket using **Creo Sketcher**.
4. To prepare the given machine component using **Creo**.
5. To prepare the Flange and Drum using **Creo Sketcher**.
6. To prepare elbow and suspension component using **Creo Sketcher**.
7. To prepare the connecting rod and piston assembly using **Creo**.
8. To prepare the component of Plummer Block and Assembly using **Creo**.
9. **Finite Element Methods:** Introduction, principle of FEM, types of element-Introduction to FEM - 1D, 2D and 3D elements - shape functions - preprocessing - boundary conditions, structured. (ANSYS)
10. **Exercises on finite element analysis-** free mesh generation - analysis - linear and nonlinear analysis - static and dynamic analysis, post processing- setup, solution and result. (ANSYS)

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester VII IC Engines (Lab)

Course Code: EME762

L	T	P	C
0	0	3	2

Objective:

1. Illustrate the thermodynamic study of various air-breathing engines.
2. To study energy balance for 2 and 4 stroke IC engines.

List of Experiment:

1. To identify the different part of a 2-stroke petrol engine
2. To identify the different part of a 4-stroke diesel engine
3. To measure the fuel consumption in four stroke petrol engines.
4. To measure the fuel consumption in four stroke diesel engines.
5. To determine the brake thermal efficiency of 4 stroke petrol engine
6. To do tuning and servicing of carburetor.
7. To determine the indicated power of multi cylinder 4 stroke petrol engine
8. To compare features of common small cars (such as fiat, Maruti, Centro and Indica)
9. To analyze fuel saving by application of MPFI system.
10. To analyze the power transmission of a car.
11. Industrial visit to automobile industry.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester VII Industrial Training & Presentation (6 Weeks)

Course Code: EME792

L	T	P	C
0	0	0	4

Students will have to 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 officer for coordination of the training.

Students will prepare an exhaustive technical report of the training during the VII semester which will be duly signed by the officer under whom training was undertaken 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/Principal 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/Principal of the College which would comprise of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. 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/Principal.

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/Principal – 25 marks.

External: 50 marks

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

By External examiner appointed by the University – 25 marks.

Technical report will consist five chapter as per given format:

Chapter 1: Brief about organization

Chapter 2: Detail of business carried out by organization

Chapter 3: Specific contribution during the industrial training (not more than 500 words)

Chapter 4: Learning during the industrial training (not more than 200 words)

Chapter 5: Conclusion

Plagiarism will check of technical report in chapter 3, 4 & 5 only.

Semester VII
Project Work Phase-I

Course Code: EME798

L T P C
0 0 8 4

A group of students, not more than three, will be assigned a faculty guide who would be the supervisor of the group. The faculty would be identified in the starting of the VII semester.

The group will carry out the literature search and collect required material for carrying out the project.

The group will prepare a report not exceeding 15 pages at the end of semester.

The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII. In this semester, the student shall present the progress of project live as also using overheads project (30% Project completion) or power point presentation on LCD to the internal committee.

The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. 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/Principal.

The marking shall be as follows.

Internal: 100 marks

By the Faculty Guide - 50 marks

By Committee appointed by the Director/Principal – 50 marks

Semester VII
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP711

C-1

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester VII Open Elective-I

Course: Principle of Management

Course Code: FOE011

L T P C

3 1 0 4

Objective:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the applications of principles in an organization.

Course Contents:

Unit I: Introduction To Management And Organizations (Lectures 08)

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company- public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

Unit II: Planning (Lectures 08)

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

Unit III: Organising (Lectures 08)

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

Unit IV: Directing (Lectures 08)

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

Unit V: Controlling (Lectures 08)

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

Textbooks:

1. Stephen P. Robbins & Mary Coulter, "Management", Prentice Hall (India) Pvt. Ltd.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management: Pearson Education.

References:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education.
2. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra.
3. Harold Koontz & Heinz Weihrich "Essentials of Management" Tata Mc Graw Hill.
4. Tripathy PC & Reddy Pn," Principles of Management", Tata Mc Graw Hill.

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

Course: Artificial Neural Network

Course Code: FOE012

L T P C

3 1 0 4

Objective: This course aims at introducing the fundamental theory and concepts of computational intelligence methods, Presentation of artificial intelligence as a coherent body of ideas and methods to acquaint the student with the basic programs in the field and their underlying theory. Students will explore this through problem-solving paradigms, logic and theorem proving, language and image understanding, search and control methods and learning.

Unit I

(Lecture 08)

Artificial Intelligence: Issues, Techniques, Problems, Problem solving state space search; DFS; BFS
Production: System, Problem characteristics; Heuristic Search Techniques; generate and Test; Hill Climbing; Best First Search; Constraint satisfaction.

Unit II

(Lecture 08)

Knowledge representation: Approaches; Issues; Representing simple facts in logic; Resolution and natural deduction; Representing knowledge using rules; Procedural vs. Declarative knowledge; Forward v/s Backward chaining.

Slot and Filler Structures: Semantic nets; Frames; Conceptual dependency; Scripts; parsing techniques.

Unit III

(Lecture 08)

Introduction to Neural Network: Introduction, Organization of the Brain, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Potential Applications of ANN.

Essentials of Artificial Neural Networks: Artificial Neuron Model, Types of Neuron Activation Function, ANN Architectures, Learning Strategy (Supervised, Unsupervised, Reinforcement).

Unit IV

(Lecture 08)

Single Layer Feed Forward Neural Networks: Introduction, Perceptron Models and Training Algorithms.

Multilayer feed forward Neural Networks: Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training.

Unit V

(Lecture 08)

Expert System: Definition and Characteristics; Expert system life cycle & Expert system tools; MYCIN & DENDRAL.

Associative Memories: Paradigms of Associative Memory, Pattern Engineering, Hebbian Learning, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Architecture of Hopfield Network.

Text Books:

1. E Rich. and K Knight, "Artificial Intelligence", Tata McGraw Hill.
2. S. Rajasekharan and G. A. Vijayalakshmi pai, Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications, PHI Publication.

Reference Books:

1. “Simon Haykin, Neural Networks- A comprehensive foundation, Pearson Education.
2. S.N. Sivanandam, S. Sumathi,S. N. Deepa, Introduction to Neural Networks using MATLAB 6.0”, TMH.
3. James A Freeman and Davis Skapura, Neural Networks Pearson Education, 2002.
4. Timothy J. Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill Inc.
5. V.S. Janakiraman, K Sarukesi, “Foundation of Artificial Intelligence & Expert System”, Macmillan.

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

[FOE013 amended vide approval dt. July 23, 2018 of V.C]

Course: Industrial Sociology (old name: Industrial Psychology)

Course Code: FOE013

L T P C

3 1 0 4

Objective: Students will learn core psychological competencies including:

1. History of I/O Psychology and its integration into the broader discipline
2. Various fields of psychology from which I/O shares a great deal with (i.e. Social Psychology, Psychometrics, Motivation, Learning theory, Personality)

Unit I

(Lectures 08)

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.

Unit II

(Lectures 08)

Work and Social change: Nature of modern societies, emergence of industrial capitalism, Technology & Social change, the information society after the industrial society, post-modernity, globalization & Convergence, Significance of the service sector today, work restructuring and corporate management.

Unit III

(Lectures 08)

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

Unit IV

(Lectures 08)

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.

Unit V

(Lectures 08)

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

Text Books:

1. Sheth N.R., Social Frame Work of Indian Factory, O.U.P. Bombay.
2. Gisbert P., Fundamentals of Industrial Sociology, O.U.P. New Delhi.

3. Watson Tony J., Sociology: Work & Industry, New York. Routledge.
4. Schinzinger, Roland & Mike W. Martin, Introduction to Engineering Ethics- Boston, McGraw Hill.

Reference Books:

1. Fleddermann Charles, Engineering Ethics, Upper Saddle River- N.J. Prentice Hall.
2. Miller & Form, Industrial Sociology, London Harper & Row.
3. Parsons Richard D., The Ethics of Professional Practice- Allyn & Bacon, London.
4. Govindarajan - Engineering Ethics- Prentice Hall (India) New Delhi.

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

Objective: This course is to understand the concept of Organizational Behaviour.

Course Contents:

Unit – I

(Lecture 08)

Concept, Nature, Characteristics, Models of Organizational Behaviour, Management Challenge, Organizational Goal. Global challenges and Impact of culture.

Unit – II

(Lecture 08)

Perception: Concept, Nature, Process, Importance. Attitudes and Workforce Diversity.

Personality: Concept, Nature, Types and Theories of Personality Shaping, Learning: Concept and Theories of Learning.

Unit – III

(Lecture 08)

Motivation: Concepts and Their Application, Principles, Theories, Motivating a Diverse Workforce.

Leadership: Concept, Function, Style and Theories of Leadership-Trait, Behavioural and Situational Theories. Analysis of Interpersonal Relationship.

Unit – IV

(Lecture 08)

Organizational Power and Politics: Concept, Sources of Power, Approaches to Power, Political Implications of Power. Knowledge Management & Emotional Intelligence in Contemporary Business Organization.

Organizational Change: Concept, Nature, Resistance to change, Managing resistance to change, Implementing Change.

Unit –V

(Lecture 08)

Conflict: Concept, Sources, Types, Functionality and Dysfunctional of Conflict, Classification of Conflict Intra, Individual, Interpersonal, Intergroup and Organizational, Resolution of Conflict, Stress: Understanding Stress and Its Consequences, Causes of Stress, Managing Stress.

Text Books:

1. Dwivedi, D. N, Managerial Economics, Vikas Publishing House.
2. Varshney & Maheshwari, Managerial Economics, Sultan Chand & Sons.

Reference Books:

1. Robbins Stephen P., Organizational Behavior Pearson Education
2. Hersey Paul, “Management of Organizational Behavior: Leading Human Resources” Blanchard, Kenneth H and Johnson Dewey E., Pearson Education
3. Khanka S. S. “Organizational Behavior

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

Objective:

1. To understand the concepts of Economics, Managerial Economics and its scope in engineering perspective
2. To study demand analysis, demand forecasting and market structure.

Course Contents:

Unit-I

(Lectures 08)

Introduction: Meaning, Nature and Scope of Economics, Meaning of Science, Engineering and Technology; Managerial Economics and its scope in engineering perspective.

Unit-II

(Lectures 08)

Demand: Basic Concepts Demand Analysis; Law of Demand; Determinates of Demand; Elasticity of Demand-Price, Income and cross Elasticity; Uses of concept of elasticity of demand in managerial decisions.

Unit-III

(Lectures 08)

Forecasting: Demand forecasting; Meaning, significance and methods of demand forecasting; production function; Laws of returns to scale & Law of Diminishing returns scale.

Short and Long run Cost curves: fixed cost, variable cost, average cost, marginal cost, Opportunity cost.

Unit-IV

(Lectures 08)

Market Study: Market Structure Perfect Competition; Imperfect competition: Monopolistic competition, Monopoly, Oligopoly, Duopoly Sorbent features of price determination and various market conditions.

Unit-V

(Lectures 08)

Inflation: National Income; Concept of N.I. and Measurement; Inflation: Meaning of Inflation; Type, causes & prevention methods; Business Cycles, Phases of business cycle.

Text Books:

1. Koutsoyiannis, A : Modern Microeconomics, ELBS.
2. Kakkar, D.N., Managerial Economics for Engineering, New Age International Publication.

Reference Books:

1. Dwivedi, D.N., Managerial Economics, Vikas Publishing.
2. Maheshwari, Y., Managerial Economics, Prentice Hall of India.

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

Objective: The goal is to become familiar with basic techniques to protect data in computer and communication environments against several different varieties of fraud.

Course Contents:

Unit I (Lectures 08)

Network Security: Attacks; Services & Mechanisms; Conventional Encryption: Classical Encryption Techniques, Steganography.

Unit II (Lectures 08)

Encryption Schemes: DES: Standard, Strength; Block Cipher Design Principles; Block Cipher Modes of Operation: Triples DES; Key Distribution, Random Number Generation.

Unit III (Lectures 08)

Public-Key Cryptography: Principles; RSA Algorithm; Key Management; Fermat's & Euler's Theorems; Primarily Miller Test; Chinese Remainder Theorem.

Unit IV (Lectures 08)

Message Authentication & Hash Functions: Authentication: Requirements, Protocols, Introduction to Message Authentication Codes and Hash Functions, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signature.

Unit V (Lectures 08)

IP Security: Electronic Mail Security; Pretty Good Privacy (PGP); S/MIME; Authentication Header; Encapsulating Security Payloads.

Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set);

Text Books:

1. Stallings, W., Cryptography and Network Security: Principles and Practice, Prentice Hall.
2. Kahate, A., Cryptography and Network Security, Tata McGraw Hill.

Reference Books:

1. Johannes, A. B., Introduction to Cryptography, Springer.

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

Semester VIII
Computer Aided Manufacturing (CAM)

Course Code: EME811

L	T	P	C
3	1	0	4

Objective:

1. To know about automation, numerical control (NC) machines and computer aided manufacturing systems.
2. basic understanding of computer numerical control (CNC) machining processes and operations using a combination of G-codes, milling and turning equipment.

Course Content:

Unit- I

(Lectures 8)

Automation:

Introduction to CAM; Automated Manufacturing system; Need of automation; Basic elements of automation; Levels of automation; Advantages & disadvantages of automation.

NC Machines: Features of NC Machines; Fundamental of Numerical Control; CNC machines; Direct Numerical Control (DNC); Elements of NC machine tools; Classification of NC machine tools; Advantages; and limitations of NC machine tools; Application of NC system; Factors affecting selection of components for machining on CNC machine tools.

Unit II

(Lectures 8)

NC Part Programming:

(a) Manual programming; Examples of Drilling; Turning and Milling operations; Canned cycles; Subroutine and macro.

(b) APT programming, Geometry; Motion and additional statements; Macro- statement.

Control of NC Systems: Open and closed loops; Control of point to point systems; Incremental and absolute systems; Control loop in contouring systems; Adaptive control.

Unit III

(Lectures 8)

Group Technology: Introduction, part families, part classification and coding; Machining cells; Benefits of group technology; Computer aided process planning; Retrieval and generative types.

Unit IV

(Lectures 8)

Computer Integrated Manufacturing System: Introduction to CIM, Elements of CIM, CIM wheel, Benefits of CIM.

Flexible Manufacturing System: Introduction & Component of FMS; Needs of FMS; General FMS consideration; Objectives, types and advantages of FMS, Automatic storage and retrieval system, Automated guided vehicles; Computer aided inspection.

Unit V

(Lectures 8)

Robotics: Introduction; Basic elements of a robot; Classification of robot; Physical configuration of robot; Basic robot motions; Technical features; Actuators; Sensors; Robot application; Robot applications; economics, Intelligent robots, interfacing of a vision system with a Robot, Robot programming methods.

Text Books:

1. Groover Mikell P., Automation, Production Systems and Computer Integrated Manufacturing, Prentice Hall.
2. Kundra, Rao & Tiwari, Computer Aided Manufacturing, Tata McGraw Hill.
3. Koren, Computer Control of Manufacturing Systems, McGraw-Hill
4. Adithan M. & Pabla B. S., CNC Machines, New Age Publishers

References Books:

1. Martin S.J., NC Machine Tools, English University Press
2. Groover, CAD/CAM, Prentice Hall
3. Chang Tien Chien, Computer Aided Manufacturing, Pearson Education
4. Koren Y. Robotics for Engineer, McGraw Hill
5. Sinha S.K. CNC programming, Golgotia publications.
6. Rao P. N., CAD/CAM, Principles and Applications, McGraw Hill.
7. Vajpayee S. Kant, Computer integrated manufacturing, Prentice Hall of India
8. Radhakrishnan P., "Computer Numerical Control", New Central Book Agency

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

Semester VIII Unconventional Manufacturing Processes

Course Code: EME812

L	T	P	C
3	1	0	4

Objective:

1. To study about principle of working and applications of various types of unconventional manufacturing processes.
2. To have a basic understanding of the machining capabilities, limitations, and productivity of advanced unconventional manufacturing processes.

Course Contents:

Unit I

(Lectures 8)

Introduction: Limitations of conventional manufacturing processes; Need of unconventional manufacturing processes and its classification.

Unit II

(Lectures 8)

Unconventional Machining Process: Principles, working and applications of unconventional machining process such as Electro-Discharge machining, Electro-chemical machining, Ultrasonic machining, Abrasive jet machining.

Unit III

(Lectures 8)

Principles, working and application of unconventional machining processes such as Laser beam machining, Electron beam machining, Ultrasonic machining

Unit IV

(Lectures 8)

Unconventional welding processes: Explosive welding and cladding; Under-water welding; Metalizing; Plasma arc welding/cutting

Unit V

(Lectures 8)

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.

Text Books

1. Pandey P.C., *Modern Machining Processes*, Tata McGraw Hill

Reference Book

1. Jain V.K., *Unconventional Machining*, Allied Publishers Pvt. Ltd

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

Semester VIII Mechatronics

Course Code: EME813

L	T	P	C
3	1	0	4

Objective: The aim of the subject of the Introduction to Mechatronics is to get the students acquainted with basic issues and principles of mechatronics and to show examples of differences between mechatronic systems and classic constructions. The task of the subject is to explain the principles of activity of basic functional blocks of mechatronic system.

Course Contents:

Unit I

(Lectures 8)

Introduction: Definition, trends, control methods; Stand alone, PC based (Real Time Operating Graphical User Interface, Simulation); Applications: SPM, Robot, CNC, FMS, CIM

Unit II

(Lectures 8)

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.

Unit III

(Lectures 8)

Precision Mechanical Systems: Pneumatic actuation systems; Electro-pneumatic actuation systems; Hydraulic actuation systems; Electro-hydraulic actuation systems; Timing belts, Ball screw and nuts; Linear motion guides; Linear bearings, Harmonic transmission; Bearings; Motor drive selection.

Unit IV

(Lectures 8)

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.

Unit V

(Lectures 8)

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.

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, PWS Publishing

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

Semester VIII

Computer Aided Manufacturing (CAM) (Lab)

Course Code: EME861

L	T	P	C
0	0	3	2

Objective:

1. To introduces students to software and equipment associated with CAM.
2. To build basic concepts about CAM.
3. To learn the different CNC Machine's Basic working principal like Axis movements, G & M code Development Programing and Test run of Programmed part.

List of Experiments:

1. To write a part-program for a given job for lathe and running on NC machine.
2. To write a part-program for a job for drilling operation (point-to- point) and running on NC machine.
3. To write a part program for a job for milling operation and running on NC machine.
4. To generate a part program for lathe operation using software.
5. To generate a part program for drilling operation using software.
6. To generate a part program for milling operation using software.
7. To obtain different types of motion for Robots.
8. To identify the differences between conventional lathe machine and NC lathe machine.
9. To generate automatic process plan for a given diagram.
10. To learn the grouping of parts according to Group Technology philosophy.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VIII Unconventional Manufacturing Process (Lab)

Course Code: EME862

L	T	P	C
0	0	3	2

Objectives:

1. To Identify the classification of modern machine processes.
2. To understand the mechanism of Abrasive jet machining, Water jet machining and abrasive water jet machine.
3. To understand the applications of plasma process for machine processes.
4. Complete understanding on modern machine processes.

List of Experiments-

1. To prepare a cavity with Abrasive jet machining.
2. To study effect of parameters of EDM on MRR.
3. To study effect of parameters of EDM on surface finish.
4. To prepare hole in mild steel plate on EDM.
5. To prepare a given profile in mild steel plate using Laser beam machining.
6. To prepare a weld joint using Plasma arc welding
7. To cut the given shape in a mild steel plate using Plasma arc machine
8. To prepare a given shape with the help of water hammer forming.
9. To prepare a given job using ultrasonic machining.
10. To compare the surface roughness of the surface prepared on EDM and ultrasonic machining.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester VIII Mechatronics (Lab)

Course Code: EME863

L	T	P	C
0	0	3	2

Objectives:

This course introduces the student to the concept of a combination of mechanical and electronic devices (Mechatronics), which incorporate pneumatic and hydraulic equipment controlled by PLC's or parallel interfaced computers.

List of Experiment-

1. To measure speed using Inductive pickup/Proximity sensor
2. To measure temperature using thermocouple/thermistor/RTD
3. To measure displacement using LVDT
4. To measure position and velocity encoders
5. To measure angles using capacitive transducer.
6. To control speed of DC motor using PLC.
7. To test Relays using PLC.
8. To identify amplified signals using OP amps
9. Linear actuation of hydraulic cylinder with counter and speed control.
10. Hydrometer rotation with timer and speed control.
11. Sequential operation of pneumatic cylinders.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-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 (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 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.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)
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Semester VIII Project Work Phase-II

Course Code: EME898

L T P C
0 0 14 7

Students should devote themselves to prepare something tangible, which could be a working model of their thoughts based on their subject of choice.

The project shall be finalized by the students based on the VII semester project work report and shall be completed (100% working condition) 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. In this semester 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 comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director/Principal. 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/Principal.

The marking shall be as follows.

Internal: 50 marks

By the Faculty Guide - 25 marks.

By Committee appointed by the Director/Principal – 25 marks.

External: 50 marks

By External examiner appointed by the University – 50 marks.

Semester VIII
DISCIPLINE & GENERAL PROFICIENCY

Course Code: EGP811

C-1

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 NSS.
5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.
6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.
7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.
8. General behavior
9. Any extraordinary achievement.

The above 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).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S N o	Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co- curricular activities	General Behavior	Any Extra Achievement
			(5)	(15)	(20)	(10)	(20)	(20)	(5)	(5)
Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester VIII **Open Elective-II**

Course: Machine learning & Data Analytics

Course Code: FOE021

L T P C

3 1 0 4

Objective:

1. Be able to formulate machine learning problems corresponding to different applications.
2. Understand a range of machine learning algorithms along with their strengths and weaknesses.

Course Contents:

Unit I

(Lectures 08)

Introduction, Different Types of Learning, Hypothesis Space & Inductive Bias, Evaluation and Cross- Validation, Linear Regression, Introduction to Decision Trees, Learning Decision Tree, Overfitting

Unit II

(Lectures 08)

K- Nearest Neighbour, Feature Selection, Feature Extraction, Collaborative Filtering, Bayesian Learning, Naïve Bayes, Bayesian Network

Unit III

(Lectures 08)

Logistic Regression, Introduction of Support Vector machine, The Dual Formulation, Maximum Margin with Noise, Nonlinear SVM & Kernel Function, Solution to the Dual Problem.

Unit IV

(Lectures 08)

Multilayer Neural Network, Neural Network and Backpropagation Algorithm, Deep Neural Network

Introduction to Computational Learning Theory, Sample Complexity: Finite Hypothesis Space, VC Dimension

Unit V

(Lectures 08)

Introduction to Ensembles, Bagging and Boosting, Introduction to Clustering, Kmeans Clustering, Agglomerative Hierarchical Clustering,

Test Books:

1. Machine Learning by Tom M. Mitchell, Mc Graw Hill Publication.
2. Machine Learning: A Probabilistic Perspective (Adaptive Computation and Machine Learning series) by Kevin P. Murphy, MIT Press.
3. Deep Learning (Adaptive Computation and Machine Learning series) by Ian Good fellow, Yoshua Bengio and Aaron Courville, MIT Press.
4. Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas Muller.

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

Objective: To study about quality concepts, management policies, control charts.

Course Contents:

Unit I

(Lectures 08)

Quality Concepts: Introduction; Meaning; Quality characteristics of goods and services; Evolution of Quality control, 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.

Unit II

(Lectures 08)

Quality Management: Organizational 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.

Unit III

(Lectures 08)

Quality improvement and cost reduction: 7 QC tools and new QC tools; Economics of quality value and contribution; Quality cost; Optimizing quality cost; Quality assurance.

Unit IV

(Lectures 08)

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.

Unit V

(Lectures 08)

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

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.

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

Course: Entrepreneurship
Course Code: FOE023

L T P C
3 1 0 4

Objectives: To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

Unit I : (Lectures 08)

Entrepreneurship:

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur
Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

Unit II: (Lectures 08)

Motivation:

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

Unit III: (Lectures 08)

Business:

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

Unit IV: (Lectures 08)

Financing and Accounting:

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

Unit V: (Lectures 08)

Support to Entrepreneurs:

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

Text Books:

1. Khanka. S.S., “Entrepreneurial Development” S. Chand & Co. Ltd., Ram Nagar, New Delhi.
2. Donald F Kuratko, “Entrepreneurship – Theory, Process and Practice”, Cengage Learning.

References:

1. Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill.
2. Mathew J Manimala, “Entrepreneurship theory at cross roads: paradigms and praxis” 2nd Edition Dream tech.
3. Rajeev Roy, ‘Entrepreneurship’, Oxford University Press.
4. EDII “Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development”, Institute of India, Ahmadabad.

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

Course Objective: This course will cover the basic concepts of big data, methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and the business needs.

UNIT I

(Lectures 08)

Introduction to Big Data: Introduction – distributed file system – Big Data and its importance, Four Vs Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

UNIT II

(Lectures 08)

Introduction Hadoop: Big Data – Apache Hadoop & Hadoop Eco System – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

UNIT- III

(Lectures 08)

Hadoop Architecture: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read., Name Node, Secondary Name Node, and Data Node, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT-IV

(Lectures 08)

Hadoop Ecosystem and Yarn: Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- Name Node High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

UNIT-V

(Lectures 08)

Hive and Hiveql Hbase: Hive Architecture and Installation, Comparison with Traditional Database, Hive QL - Querying Data - Sorting and Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts- Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

Text Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley.
2. 2.Chris Eaton, Dirk deroos et al., “Understanding Big data”, McGraw Hill.
3. 3.Tom White, “HADOOP: The definitive Guide”, O Reilly.
4. 4.Vignesh Prajapati, “Big Data Analytics with R and Haoop”, Packet Publishing.

Reference Books:

1. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press.
2. <http://www.bigdatauniversity.com/>
3. Jy Liebowitz, “Big Data and Business analytics”, CRC press.

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

Objective: The basic objective of this course to understand the functions, roles, goals and the processes of financial management.

• Course Contents:

Unit I

(Lectures 08)

Introduction: Concept of finance, scope and objectives of financial management; Functions of Finance Manager in Modern Age; Financial decision areas; Time value of money; Risk and Return analysis; Valuation of Securities.

Unit II

(Lectures 08)

Investment Decision; Appraisal of project; Techniques of capital budgeting and its applications; Risk and Uncertainty in Capital Budgeting; Leverage analysis: Financing, operating and combined leverage and its implications; EBIT-EPS analysis.

Unit III

(Lectures 08)

Financing Decision: Long-term sources of finance, Concept and approaches of capital structure decision: NI, NOI, Traditional and Modigliani Miller Approach; Cost of capital equity share, preference share, debentures, weighted average cost of capital.

Unit IV

(Lectures 08)

Working Capital: Concept of Gross Working Capital and Net Working Capital, Various Approaches to Working Capital Management, Factors affecting working capital requirement and sources of working capital financing, Management of inventory, receivables and cash.

Unit V

(Lectures 08)

Dividend Decision: Dividend policies; Factors affecting dividend policies, Dividend Theories, Bonus policy guidelines relating to dividend declaration and payment.

Text Books:

1. Pandey I.M., Financial Management, Vikas Publications.
2. Khan & Jain, Financial Management, Tata McGraw-Hill.
3. Chandra Prasanna, Fundamentals of Financial Management TMH.

Reference Books:

1. Smith K.V., Management of Working Capital, 2nd edition, Harper Collins Publications.
2. Agarwal J.D., Working Capital Management, Tata McGraw-Hill.

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