

UNIVERSITY OF JAMMU, JAMMU
FOR EXAMINATIONS TO BE HELD FOR BATCH 2014 & ONWARDS

COURSE OF STUDY FOR BE 1ST SEMESTER ENGINEERING
BRANCH: COMMON TO ALL BRANCHES

Course No.	Course Name	Lecture	Tutorial	Pract.	Marks			
					Theory	Sessional	Practical	Total
MTH -101	Engg. Math-1	3	2	-	100	25	-	125
PHY -102	Engg. Phy-I	3	1		100	25	-	125
CHM -103	Engg. Chem-I	3	1		100	25	-	125
M -104	Engg. Mech	3	1		100	25	-	125
HUM -105	Comm. Skills	3	1	-	100	25	-	125
M-106	Engg. Graphics	1	-	3	100	-	50	150
PHY -107	Engg. Physics Lab.	-	-	2	-	-	50	50
CHM -108	Engg. Chemistry Lab	-	-	2	-	-	50	50
M -109	Engg. Mech. Lab.	-	-	2	-	-	50	50
M -110	WS Technology	1	-	3	-	-	75	75
Total		17	6	12	600	125	275	1000

CLASS : B.E. IST SEMESTER
BRANCH: COMMON TO ALL
COURSE TITLE: ENGINEERING MATHEMATICS-I
COURSE NO.MTH-101
DURATION OF EXAM: 3 HOURS

L	T	MARKS	
3	2	Theory	Sessional
		100	25

SECTION-A

- Differential Calculus:** Successive differentiation, Leibnitz theorem (without proof), Partial differentiation with errors and approximations, Euler's theorem on homogeneous functions, Taylor's and Maclaurin's series of two variables, Maxima and Minima of functions of two variables, Asymptotes, Double points, curvature, Curve tracing in Cartesian, polar and parametric forms.
- Integral Calculus:** - Definite integrals with important properties, differentiation under the integral sign, Gamma, Beta and error functions with simple problems, applications of definite integrals to find length, area, volume and surface area of revolutions, transformation of coordinates, double and triple integrals with simple problems.

SECTION-B

- Complex Trigonometry:** Hyperbolic functions of a complex variable, Inverse Hyperbolic functions, Logarithmic function of a complex variable, Summation of series by $C+iS$ method.
- Ordinary Differential Equations:** Differential equations of first order and first degree: Exact and non-exact differential equations, Linear and Bernoulli's differential equations. Higher order linear differential equations: Complementary solution, particular integral and general solution of these equations, variation of parameters technique to find particular integral of second order differential equations, Cauchy's and Lagrange's differential equations. Applications of Ordinary Differential Equations to simple Electrical and Mechanical Engg. problems.
- Solid Geometry:** Sphere, Intersection of sphere and plane, tangent plane property, cone and cylinder, related problems to right circular cone and cylinder.

BOOKS RECOMMENDED:

- | | |
|-----------------------------------|---|
| 1. Engineering Mathematics | B.S. Grewal, Khanna Publications, New Delhi |
| 2. Calculus and Analytic Geometry | Thomas and Finney, Addison Wesley, Narosa. |
| 3. Differential Calculus | S. Narayan, New Delhi |
| 4. Integral Calculus | S. Narayan, New Delhi. |

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section. Use of calculator is allowed.

COURSE OUTCOMES

COURSE NAME- ENGG. MATHEMATICS – I
COURSE CODE-MTH – 101

After learning this course students will be able to:

CO101.1	Learn the rules of nth derivative, to find maximum and minimum value of any function, to trace the curves.
CO101.2	Understand the concept of definite integrals and find arc length, area, surface area and volume of various curves.
CO101.3	Solve the differential equations of first order and higher order.
CO101.4	Differentiate the concept of finding the equations of sphere, cone and cylinder and evaluate the complex no. in polar form and understand the idea of hyperbolic functions.

B.E IST SEMESTER**BRANCH: COMMON TO ALL****SUBJECT: ENGINEERING PHYSICS-I****COURSE NO.PHY-102****DURATION OF EXAM: 03 HOURS**

L	T	P
3	1	2

MAXIMUM MARKS:125	
THEORY	SESSIONAL
100	25

SECTION-A**UNIT-I: MATHEMATICAL PHYSICS**

Review of Vector Algebra, Scalar and Vector fields, Gradient of a Scalar field, Divergence and curl of a vector field and their physical significance, solenoidal fields, Gauss Divergence theorem, Stokes theorem and their applications, Vector Identities

*No of Lectures – 10, Weightage = 25%***UNIT-II: ELECTROMAGNETIC FIELDS AND WAVES**

Gauss's law in vector notation (differential and integral forms), Applications of Gauss's law to find electric fields due to a long straight charged wire, Cylindrical and Spherical charge distributions.

Derivation of Ampere's Circuital law, Application of Ampere's circuital law to find magnetic intensity due to long cylindrical wire, due to a long solenoid. Differential & Integral form of Faraday's law of electromagnetic induction, Equation of continuity, Displacement current and its significance, Maxwell's field equations (differential and integral forms), Biot-Savart law,

Electromagnetic wave propagation in free space (e.m wave equations for \vec{E} & \vec{B} fields for free space and their solutions (plane wave solution), velocity of e.m. waves, Relation between E_0 & B_0 . Definition of Poynting Vector, Poynting theorem.

*No of Lectures – 16, Weightage = 25%***SECTION-B****UNIT-III: APPLIED OPTICS**

Interference in thin films (by reflection and transmission of light), Theory of Newton's rings by reflected light, Determination of wave length and refractive index of monochromatic light by Newton's theory.

Fraunhofer & Fresnel's diffractions Fresnel's half period zones and rectilinear propagation of light, Fraunhofer diffraction due to a single slit, plane diffraction grating & its theory for secondary maxima and minima.

Unpolarized and polarized light, Nicol Prism, Mathematical representation of polarization of different types, Quarter & half wave plates.

*No of Lectures – 12, Weightage = 20%***UNIT-IV: OSCILLATIONS**

Free damped and forced oscillations and their differential equations, Logarithmic decrement, power dissipation & Quality factor, ultrasonic waves and their production by Piezoelectric method and applications (General)

*No of Lectures – 05, Weightage = 15%***UNIT-V: FIBRE OPTICS**

Propagation of light in fibres, numerical aperture, Single mode and multimode fibres, General applications

No of Lectures – 05, Weightage = 15%

TUTORIALS

S.NO.	TOPICS	UNIT NO.
T-1	Numerical problems based on vector analysis	I
T-2	Numerical problems on Gradient of Scalar fields	I
T-3	Numerical problems on Divergence of Vector fields	I
T-4	Numerical problems on Curl of vector fields	I
T-5	Numerical problems based on Guass divergence theorem and Stokes Theorem	I
T-6	Numerical problems based on the applications of Guass's Law	II
T-7	Numerical problems based on the applications of Ampere's law	II
T-8	Numerical problems pertaining to the applications of Faraday's law	II
T-9	Numerical problems pertaining to the applications of Interference phenomenon, Formation of Newton's rings	III
T-10	Numerical problems pertaining to the applications of diffraction and polarization phenomenon	III
T-11	Numerical problems based on the applications of SHM, damped and forced motion of bodies and applications of ultrasonic	IV
T-12	Numerical problems based on the applications of Fibre optics	V

NOTE: SETTING OF QUESTION PAPER (Instructions for examiners)

- i) The question paper will consist of two sections\
 - a) Section-I
 - &
 - b) Section-II
- ii) Section-I Comprises of Unit-I and Unit-II
Section-II Comprises of Unit-III, Unit-IV and Unit-V
- iii) Number of questions to be set in the paper =8 (eight)
(Four from each section) as per weightage
- iv) Number of questions to be attempted =5 (five)
(Selecting at least two from each section)

BOOKS RECOMMENDED:

S.NO.	TITLE	AUTHOR
1.	Vector Analysis	Spiegel
2.	Mathematical Physics	Rajput & Gupta
3.	Physics	Reisnick & Hatliday
4.	Optics	Brijlal & Subramaniam
5.	Sound	Subramaniam
6.	Sound	Khanna & Bedi
7.	Fibre Optics	Ghatak, Tyagrajan

COURSE OUTCOMES

COURSE NAME- ENGG. PHYSICS I
COURSE CODE- PHY-102

After learning this course students will be able to:

CO102.1	Students should be able to understand the mathematical concepts required to understand physics.
CO102.2	Students should be able to derive the Maxwell's equations and understand the basis electromagnetic theory.
CO102.3	Students should be able to assimilate the basic concepts of interference in thin films, diffraction, polarisation and the characteristics of different types of waves.
CO102.4	Students should be able to gain the knowledge about lasers, their characteristic's & properties and the basics of optical fibres

CLASS: B.E. IST SEMESTER
BRANCH: COMMON TO ALL
COURSE TITLE: ENGG. CHEMISTRY
COURSE NO.:CHM-103
DURATION OF EXAM: 3 HOURS

L	T	P		MARKS	
3	1	2	Theory	Sessional	Practical
			100	25	50

SECTION - A

- SPECTROSCOPY:** UV Spectroscopy –Electronic transitions, spectrum, shift of bonds with solvents for double bonds, carbonyl compounds and aromatic compounds.

IR-Spectroscopy –Introduction, brief idea about instrumentation, applications and interpretation of IR Spectra, characterization of functional groups and frequency shift associated with structural changes.

¹H-NMR Spectroscopy –Theory of ¹H-NMR Spectroscopy, equivalent and non-equivalent protons, chemical shift, spin-spin coupling, spin-spin splitting, ¹H-NMR spectrum of a few organic compounds.

- EXPLOSIVES:** Introduction, classification and types of explosives, requirement for good explosives, preparation and uses of following explosives – Nitrocellulose, TNT, Dinitrobenzene, Picric Acid, Nitroglycerine and Dynamite, Gun Power, RDX, Tetracene.

SECTION - B

- STEREOCHEMISTRY:** Optical isomerism, racemization, asymmetric synthesis, methods for resolution of racemic mixture, enantiomerism and diastereoisomerism.
- ALLOYS:** Introduction, purpose of making alloys, preparation of alloys, classification of alloys. (Ferrous and non-ferrous alloys), alloy steels & copper alloys.
- LUBRICANTS: DEFINITIONS,** functions of lubricants, mechanism of lubrication, classification of lubricants (Lubricating oils, semi solid lubricants and solid lubricants) synthetic lubricants, flash and fire points, oiliness, cloud and pour points.
- DYES AND DRUGS:** Classification of dyes and its applications. Define drug and give the applications of following drugs.
 - Narcotics
 - Tranquilizers
 - Antipyretics
 - Antibiotics

FORMAT OF QUESTION PAPER**Total No. of Questions = 08****Questions to be attempted = 05****(Minimum Two from Each Section A & B)****BOOKS RECOMMENDED:**

- | | | |
|----|-----------------------------------|--------------------|
| 1. | Engineering Chemistry | Jain & Jain |
| 2. | Engineering Chemistry | Sharma, B.K. |
| 3. | Engineering Chemistry | Dara, S.S. |
| 4. | Organic Chemistry | Bahl, B.S. |
| 5. | Organic Chemistry | Soni, P.L. |
| 6. | Organic Chemistry | Jain, M.K. |
| 7. | Spectroscopy of Organic Compounds | Silverstain |
| 8. | Spectroscopy of Organic Compounds | Kalsi, P.S. |
| 9. | Engineering Chemistry | Dr. Rajinder Kumar |

COURSE OUTCOMES**COURSE NAME: ENGG. CHEMISTRY****COURSE NO: CHM-103**

After learning this course students will be able to:

CO103.1	One could acquire Knowledge about the identification of newly synthesized products.
CO103.2	Know the New drug development process.
CO103.3	Ability to design and perform in – vitro dissolution studies for various drugs as per the standards of official monographs Combine Dyeing Process and Colorants design – quality systems, develop manufacturing procedures.
CO103.4	know how to approach the problem of choosing an alloy for a particular application,
CO103.5	Know the importance of stereochemistry in organic compound and apply the knowledge gain in this course to the variety of chemical compounds.

CLASS: B.E. IST SEMESTER
BRANCH: COMMON TO ALL
COURSE TITLE: ENGINEERING MECHANICS
COURSE NO.M-104
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS		
3	1	2	Theory	Sessional	Practical
			100	25	50

SECTION-A (STATICS)

Scope and basic concepts (Rigid body, force, units, etc.), concept of free body diagram, Resultant of Co-planar concurrent forces in a plane and space, moment of force, Principle of Moments, Coplanar and spatial applications. Virtual work method and its applications.

Equilibrium and its equations for a planar and spatial systems, Analysis of trusses, Method of joints and sections.

Theory of friction, its laws and applications (inclined plane). Square threaded screws, Bolt friction, Centroids and center of gravity, centroids of lines and composite areas, centroids determined by integration.

Moment of inertia, Area M.O.I, Transfer theorems, Polar M.O.I, Product of inertia, Principal M.O.I, Mohr's circle for area M.O.I, Transfer theorems and axes M.O.I of composite bodies.

SECTION-B (DYNAMICS)

Kinematics of a particle rectilinear motion, motion curves, Rectangular components of curvilinear motion, Flight of Projectile, Normal and tangential components of acceleration, Radial and transverse components, Newton's Laws. D'Alembert's Principle.

Kinematics of rigid bodies: Types of rigid body motion, Angular motion, fixed axis rotation, Analysis of plane motion and its applications, Instantaneous center and Instantaneous axis of rotation.

Kinetics of Particle: Translation, Analysis of a particle as a rigid body.

Kinetics of rigid bodies: Equations of plane motion, fixed axis rotation, Rolling bodies, General plane motion, Impulse and momentum in plane motion, Angular momentum.

RECOMMENDED BOOKS:

- | | | |
|----|--|----------------------|
| 1. | Engineering Mechanics (Statics & Dynamics) | Beer and Johnson |
| 2. | Engineering Mechanics (Statics & Dynamics) | Mariam and Kraige |
| 3. | Engineering Mechanics (Statics and Dynamics) | Timoshenko and Young |
| 4. | Engineering Mechanics (Statics and Dynamics) | Ferdinand L Singer. |

NOTE: There shall be total eight questions, four from each section. Five questions will have to be attempted selecting at least two from each section. Use of calculator is allowed.

COURSE OUTCOMES**COURSE NAME: ENGINEERING MECHANICS****COURSE NO: M-104**

After learning this course students will be able to:

CO104.1	Analyze the system of units and the conversion of units from one to another.
CO104.2	Demonstrate knowledge on basic calculation of forces and their resultant and resolution.
CO104.3	Approach to a conclusion of forces causing equilibrium.
CO104.4	Be proficient in the use of integral and moment methods for calculating centre of gravity.
CO104.5	Develop a stable, environment friendly structure for various engineering purpose using various modern tools.

B.E IST SEMESTER
BRANCH: COMMON TO ALL
TITLE: COMMUNICATION SKILLS
COURSE NO: HUM-105
DURATION: 3 HOURS

L	T	P	MARKS	
3	1	-	Theory 100	Sessionals 25

Exercises in comprehension, grammar vocabulary, usage, pronunciation, spelling and composition based on the following texts:

- i. Contemporary English Prose
 Edited by Menon
 Oxford University Press
 - ii. Developing English Skills
 Edited by Thanker, Desai and Purani
 Oxford University Press
- Or
- English through Reading-II
 Edited by Bhasker and Prabhu

Note: Test-I carries 50% weightage in the question paper and Text-II carries 50% weightage

Question Paper:

1. Six short answer questions on comprehension to be set from Text-I. Students expected to answer any three in about 150 words each (30 marks)
 2. Phrases and idioms from text I to be used in sentences. Hundred percent choices to be given (20 marks)
 3. Completing a paragraph of which the first two or three short Sentences are given (10 marks)
 4. Exercise on tenses from Text II (5 marks)
 5. Exercises on active/passive transformation from Text-II (5 marks)
 6. Forming verbs or adjectives or nouns from the given words-text-II (5 marks)
 7. Propositions from text-II (5 marks)
 8. Matching words and their meanings Text-II (5 marks)
 9. Forming words ending in-ify,-ize,-tion, ec. From Text-II (5 marks)
 10. Filling in the blanks with a given set of words in Brackets-Text-II (5 marks)
 11. Questions on miscellaneous exercises from Text-II such as Question tags - articles etc. (5 marks)
- or
- Marking Stress or Syllable in given words.

COURSE OUTCOMES**COURSE NAME- COMMUNICATION SKILLS****COURSE CODE- HUM-105**

After learning this course students will be able to:

CO105.1	Prepare, organize, and deliver engaging oral presentations and thus increase confidence in speaking publicly.
CO105.2	Write effectively for a variety of professional and social settings.
CO105.3	Become active readers who can articulate their thoughts, views etc. and built curiosity for other perspectives and shall be able to understand the importance of communication with others.
CO105.4	Interpret texts with an awareness of and curiosity for other viewpoints.
CO105.5	Enhance his/her vocabulary.

CLASS: B.E. IST SEMESTER
BRANCH: COMMON TO ALL
COURSE TITLE: ENGINEERING GRAPHICS
COURSE NO. M-106
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS		
1	0	3	Theory	Sessional	Practical
			100	0	50

UNIT-1

Introduction: Conventional lines and signs used in Engineering Drawing, Printing and Lettering, Curves used in Engineering Practice: Cycloidals, Involutes, Spirals and Hellices, Locus of a point on simple mechanisms.

Theory and practice of Orthographic projections.

Projection of points and Lines: Projections of points and lines in different quadrants w.r.t principle reference planes, Finding of true length, True inclinations and traces of lines.

Projection of Planes: Projections of a plane w.r.t. the principle planes in simple and inclined positions. Rotation method and the Auxiliary plane method. Space relation of a plane and a line. To locate a point on a plane given its projections. Parallel relation of lines and planes. Shortest distance between a line and a plane.

UNIT-2

Projection of Solids: Classification and main features -Prisms and Pyramids. Projection of solids inclined to both the reference planes by (I) Rotation Method, and (II) Auxiliary plane method. Projection of solids in combination (Co-axial) in simple and inclined positions.

Sectioning of Solids: Object of sectioning, Types of cutting planes, True shape of section, Auxiliary views of sections of multiple co-axial solids in simple and titled conditions.

UNIT-3

Interpenetration of Solids and Intersection of Surface: Intersection of geometrical solids/hollow sections, Tracing of lines of intersection by line method and by section method.

Development of Surfaces: Classification of surfaces, Methods of development-Straight line method and Radial line method, Development of solids and hollow sections in full or part development of transition pieces. To draw projections from given development.

UNIT-4

Isometric Projection: Isometric scale, Isometric axes and Isometric planes, Isometric projection of solids and simple machine blocks.

Orthographic Projections: Orthographic projection of simple blocks (First & Third angles), to draw the third view from given two views. Missing lines in projection.

RECOMMENDED BOOKS:

- | | |
|---------------------------------------|-----------------------------|
| 1. Engineering Drawing | N.D Bhatt |
| 2. Practical Geometry | V. Laxminarayan & GEV |
| 3. Engineering Graphics | K.L. Narayanan & P. Kamaish |
| 4. Principles of Engineering Graphics | P.E Giesecks |
| 5. Engineering Graphics | Frederic & Michelle. |

NOTE: At least two questions to be attempted from Unit-I and at least one question from each of the Units-II, III and IV in the theory examination paper.

COURSE OUTCOMES

COURSE NAME- ENGINEERING GRAPHICS

COURSE CODE- M-106

After learning this course students will be able to:

CO106.1	Draw orthographic projections of sections
CO106.2	Use architectural and engineering scales with accuracy.
CO106.3	Work with zeal of office practices and standards.
CO106.4	Convert sketches to engineered drawing.
CO106.5	Perform auto cad two dimensional drawing.

B.E IST SEMESTER
SUBJECT: ENGINEERING PHYSICS LAB-I
COURSE NO.: PHY-107

P
2

MAXIMUM MARKS
SESSIONAL
50

S.No.	Experiment No.	Title of Experiment
1.	Exp-I	To plot a graph between the distance of the knife edges from the center of gravity and the time period of a compound pendulum. From the graph, find a) Acceleration due to gravity b) Radius of gyration and the moment of inertia of the bar about an axis through the center of gravity.
2.	Exp-II	To find the dispersive power of a given prism using a spectrometer.
3.	Exp-III	To find the refractive index of a given liquid using a hollow prism
4.	Exp-IV	To find the focal lengths of a convex mirror and a concave lens using a convex lens and a concave mirror respectively.
5.	Exp-V	To find the frequency of A.C mains using an electrical vibrator.
6.	Exp-VI	To draw the V-I characteristics of a forward and reverse bias P-N junction diode.
7.	Exp-VII	To study the common base characteristics of PNP junction transistor.
8.	Exp-VIII	To study the common emitter characteristics of PNP junction transistor.
9.	Exp-IX	To study the common base characteristics of NPN junction transistor.
10.	Exp-X	To study the common Emitter characteristics of NPN junction transistor.
11.	Exp-XI	To evaluate the value of Planck's constant.
12.	Exp-XII	To study the characteristics of a Solar Cell.

NOTE: A minimum of six experiments is to be performed in a semester.

BOOKS RECOMMENDED:

	TITLE	AUTHOR
1.	Practical Physics	Warnop & Flint
2.	Practical Physics	Chauhan & Singh (Vol. I & Vol. II)
3.	B.Sc. Practical Physics	C.L Arora

COURSE OUTCOMES**COURSE NAME- ENGINEERING PHYSICS LAB-I****COURSE CODE- PHY-107**

After learning this course students will be able to:

CO106.1	calculate the value of Plank's constant by using Photoelectric effect and thereby verify the Einstein's photoelectric equation
CO106.2	Understand the concepts of semiconductor diodes by studying their characteristics in forward and reverse bias modes.
CO106.3	Understand the concepts of stationary waves and hence find the value for frequency of A.C Mains by using Sonometer.
CO106.4	Equip themselves with concepts of acceleration due to gravity, moment of inertia & radius of gyration and verify the same by using compound pendulum.
CO106.5	Calculate the angle of prism by using spectrometer and thereby verify the laws of reflection & refraction. To verify the laws of dispersion of light and calculate the minimum deviation and hence find the Refractive Index of a Prism by using Spectrometer

“Practical performance pertaining to the above topics will be useful for the students to acquaint them with handling of instruments and experimentation”.

B.E 1ST SEMESTER
SUBJECT: ENGINEERING CHEMISTRY LAB
COURSE NO.: CHM – 108

P
2

MAXIMUM MARKS
SESSIONAL
50

CHEMISTRY PRACTICAL:

1. Determine the percentage of CaCO_3 in precipitated chalk. You are provided with 1N HCl and 0.1N NaOH.
2. To analyse the given antacid tablets.
3. Determine Volumetrically the %age purity of given sample of Ferrous sulphate, x gms of which have been dissolved per litre provided N/10 KMnO_4
4. Determine Volumetrically the number of molecules of water of crystallization present in the given sample of Mohr's salt, x gms. of which have been dissolved per litre provided N/10 $\text{K}_2\text{Cr}_2\text{O}_7$ (using an external indicator).
5. Determine Volumetrically the percentage of Cu in a sample of CuSO_4 crystals, Z gms of which have been dissolved per litre, provided 0.1N $\text{Na}_2\text{S}_2\text{O}_3$.
6. To determine the coefficient of viscosity of an unknown liquid using Ostwald Viscometer.
7. Determine the surface tension of a unknown liquid using Stalagmometer.
8. To prepare a pure and dry sample of Aspirin
9. To prepare a pure and dry sample of Glucosazone
10. Determine the method of purification of organic compounds by coloumn chromatography.
11. Determine the aniline point of a given lubricating oil.

BOOKS RECOMMENDED:

- | | | |
|----|---|-------------------------|
| 1. | Experimental Engineering Chemistry | Shashi Chawla |
| 2. | Lab. Manual on Engg. Chemistry | Basin, S K & Sudha Rani |
| 3. | A Manual of Practical Engineering Chemistry | Dr. Rajinder Kumar |

COURSE OUTCOMES**COURSE NAME: ENGINEERING CHEMISTRY LAB-I****COURSE CODE: CHM-108**

After learning this course students will be able to:

CO108.1	Capability to visualize and understand chemical engineering unit, operations related to fluid and practical mechanics and mass transfer.
CO108.2	To provide an overview of preparation and identification of organic compound.
CO108.3	This course relies on quantitative analysis and makes use of simple equation to illustrate the concept involved.
CO108.4	Handling different types of instruments for analysis of materials, using small quantity of material involved for quick and accurate results.

B.E IST SEMESTER
SUBJECT: ENGG. MECHANICS LAB
COURSE NO.: M – 109

P
2

MAXIMUM MARKS
SESSIONAL
50

Lab work shall be based on theory course of Engineering Mechanics Paper

COURSE OUTCOMES

COURSE NAME: ENGINEERINGMECHANICS LAB

COURSE CODE:M-109

After learning this course students will be able to:

CO109.1	Apply the fundamentals of statics and motion principles of various engineering problems related to statics and motion.
CO109.2	Have the knowledge of finding the stable structures of various engineering purposes and bending of beams by using bending moment apparatus.
CO109.3	Solve engineering problems related to motion.
CO109.4	Demonstrate the knowledge on basic calculation of forces and their resultant and resolution.
CO109.5	Solve the engineering problems related to friction and analyze it in real life situation.

CLASS: B.E. IST SEMESTER

**BRANCH: COMPUTER ENGG., CIVIL ENGG., MECH. ENGG., ELECTRICAL ENGG.,
ELECTRONICS & COMM. ENGG.**

COURSE TITLE: WORKSHOP TECHNOLOGY

COURSE NO.WS-110

L	T	P	MARKS		
1	0	3	Theory	Sessional	Practical
			0	0	75

COURSE CONTENT:

Introduction to workshop as a fabrication unit. Information regarding various material of construction i.e Ferrous and Non-Ferrous, wood, plastics, etc. Basic fabrication process i.e. castings, Mechanical working, welding and machining.

Wood working and pattern making practice, Information about working hand and wood working machines, various methods of joining of wooden parts for the fabrication of patterns, Pattern materials and allowances, pattern construction procedures, preservation of patterns.

Moulding and casting practice. Sand Moulding, Natural foundry sands and synthetic sands, preparation of moulding sands, mould making procedure, cast iron and aluminum and pouring, melting crucible process, Extraction of Castings.

Cold and hot working processes, basic tools and equipment used in mechanical working. Forging furnace operation, Smith forgoing operations.

BOOKS:

1. Manufacturing process and materials by Campbell.
2. Manufacturing Process by P.N. Rao
3. Workshop Technology by Hajra and Chowdhary Vol.I

SHOP PRACTICE:

Unit-1 Pattern Making:

- i) Baring block pattern
- ii) Split pattern of “bench Vice” (Sliding Jaw).

Unit-II Moulding and Casting

Moulding and Castings of Patterns at Unit I.

Unit-III Hand forging of:

- i) Haxagonal headed bolt from a cylindrical rod.
- ii) Cubical Block from a Cylindrical section.

COURSE OUTCOMES**COURSE TITLE: WORKSHOP TECHNOLOGY****COURSE NO.WS-110**

After learning this course students will be able to:

CO110.1	Prepare pattern making of open bearing block
CO110.2	Prepare pattern making of bench vice (Sliding Jaw).
CO110.3	Perform moulding and casting of open bearing block and bench vice .
CO110.4	Perform forging of hexagonal headed bolt from a cylindrical rod.
CO110.5	Perform forging of cubical block from a cylindrical section.

UNIVERSITY OF JAMMU, JAMMU
FOR EXAMINATIONS TO BE HELD FOR BATCH 2014 & ONWARDS

COURSE OF STUDY FOR BE 2ND SEMESTER ENGINEERING
BRANCH: COMMON TO ALL BRANCHES

Course No.	Course Name	Lecture	Tutorial	Pract	Marks			
					Theory	Sess.	Pract	Total
MTH –201	Engineering Math-II	4	2	-	100	25	-	125
PHY -202	Engineering Phy-II	3	1	-	100	25	-	125
CHM -203	Engineering Chem-II	3	1	-	100	25	-	125
COM -204	Computer Programming	3	1	-	100	25	-	125
HUM-205	Engineering Economics	3	1	-	100	25	-	125
M -206	Machine Drawing-I	1	-	3	100	25	-	125
M -207	Workshop Technology-II	1	-	3	-	-	75	75
PHY –208	Engineering Physics II Lab	-	-	2	-	-	50	50
CHM –209	Engineering Chemistry II Lab	-	-	2	-	-	50	50
COM –210	Computer Programming Lab	-	-	2	-	-	75	75
Total		18	6	12	600	150	250	1000

B.E 2ND SEMESTER**COURSE NO: MTH-201****COURSE TITLE: ENGG. MATH-II****BRANCH : COMMON TO ALL****DURATION OF EXAM: 3 HOURS****L T**
4 2**MAXIMUM MARKS:125****THEORY SESSIONAL**
100 25**SECTION-A**

- 1. Introduction to infinite series & sequences:** - Convergence and divergence of a series, Leibnitz test, p-test, comparison test, Cauchy's root test, D' Alembert Ratio Test, Raabe's Test, Logarithmic test, alternating series.
- 2. Fourier Series:** Introduction, Euler's formulae, sufficient conditions for a Fourier expansion, functions having points of discontinuity, change of intervals. Odd and even functions, Fourier expansion of Odd and even periodic functions, half range series, typical wave forms, Parseval's formula, complex form of Fourier -series.
- 3. Power Series Solutions of Second order O.d.e:** Analytic function, ordinary point, singular point, regular and irregular singular points of o.d.e. $Y'' + P(x)Y' + Q(x)Y=0$, Series solution of such differential equations about an ordinary point, Frobenius series solution about a regular singular point.

SECTION-B

- 2. First Order partial differential equations: -**
Formation of p.d.e, First order linear p.d.e, Non-Linear p.d.e. of 1st order, solution by Charpit's method, Four Standard forms of non-linear p.d.e with reference to Charpit's technique.
- 3. Higher Order Linear p.d.e:** Homogenous and Non-homogenous higher order linear partial differential with constant coefficient inverse operator $1/f(D,D')$, Rules for finding P.I and C.F, Non-Linear equations of 2nd order. Application of p.d.e, method of separation of variables to solve equations of vibrations of strings (or one dim wave equation), one dim and two dim heat flow equations, Laplace equations, transmission line).
- 4. Matrices & determinants:** Introduction, Rank of matrix, Elementary transformations, Elementary matrices, Inverse using elementary transformation, Normal form of a matrix, Vector spaces, Linear dependence and independence of vectors, consistency of linear system of equations, linear and orthogonal transformations, Eigen values and Eigen vector, Properties of Eigen value, Cayley Hamilton Theorem, Reduction to diagonal form, Reduction of quadratic form to canonical form, complex matrices.

BOOKS RECOMMENDED:

- Advanced Engineering Mathematics by R.K. Jain, S.R.K Iyenger, 2nd edition, Narosa, New Delhi.
- Higher Engineering Mathematics Dr. B.S. Grewal
- Engineering Mathematics Dr. Bhopinder Singh
- Engineering Mathematics B.S. Grewal Khanna Publication, New Delhi.
- Partial differential equations Singhania

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section. Use of calculator is allowed.

COURSE OUTCOMES**COURSE NAME- ENGG. MATHEMATICS – II****COURSE CODE-MTH – 201**

After learning this course students will be able to:

CO201.1	Learn the concept of linear and non- linear partial differential equations.
CO201.2	Understand the concept of Fourier series of any function
CO201.3	Apply the concept of analyticity of functions for the expansions of second order differential equations.
CO201.4	Find the rank, Eigen values/ vectors of matrices, solve simultaneous linear equations, find inverse of matrices using normal forms and evaluate the convergence and divergence of a given sequence of series

B.E IIND SEMESTER (COMMON COURSE)**COURSE NO. PHY-202****COURSE TITLE : ENGINEERING****PHYSICS-II****BRANCH : COMMON TO ALL****DURATION OF EXAM: 3 HOURS****MAXIMUM MARKS:125**

	L	T	THEORY	SESSIONAL
	3	1	100	25
UNIT-	RELATIVISTIC DYNAMICS		NO. OF	WEIGHTAGE
1	Concept of Relativity, Frames of reference, Galilean Transformations, Michelson and Morley's experiment, Postulates of Special Theory of relativity, Lorentz transformations, Length Contraction, Time dilation, variation of mass with velocity (Velocity addition), mass energy equivalence ($E^2 = P^2c^2 + m_0^2c^4$).		LECTURES 10	25%
UNIT-	WAVE-PARTICLE DUALITY			
II	Black Body radiation spectrum (Characteristics & Energy distribution), Wien's laws, Rayleigh Jeans Law excluding mathematical derivations, ultraviolet Catastrophe, Planck's hypothesis and Planck's radiation law, Explanation of black body radiation characteristics on the basis of Planck's law, photon concept. Compton effect, derivation of the direction of emission and the change in wavelength of scattered photons, direction of recoil electron and discussion of observed results. Debroglie's hypothesis, concept of matter waves, Davisson & Germer's experiment, wavepacket, Phase and Group velocity, Heisenberg's uncertainty principle. Experimental illustration of uncertainty principle using single slit.		12	25%
UNIT	QUANTUM MECHANICS			
-III	Wave function definition, interpretation and significance of wave function, Schrodinger's wave equations (Steady-State and time dependent) for 1-dim case, concept of operators and expectation values, Applications of Schrodinger's equation (Time independent) to a) Particle in a 1-dimensional box of infinite height, b) single step potential barrier, c) Tunnel effect, d) Quantum Mechanical harmonic oscillator with concept of Zero point energy.		14	25%
UNIT-	SOLID STATE PHYSICS			
IV	Intrinsic & extrinsic semi-conductors, Fermi & impurity levels, Impurity compensation, charge neutrality equation and semi-conductor conductivity. Einstein's relation, drift and diffusion current. Introductory concepts of advanced materials viz; conducting polymers dielectric materials,		7	15%

	Nanomaterials, Smart materials and High T_c materials.		
UNIT-V	LASERS		
	Principle of Laser action, population Inversion, Einstein's Coefficients, He-Ne & Ruby Lasers, Holography	5	10%

TUTORIALS

B.E IIND SEMESTER

SUBJECT: ENGG: PHYSICS-II

COURSE NO.PHY-202

S.NO.	TOPICS	UNIT NO.
T-1	Numerical problems based on Length contraction & time dilation	I
T-2	Numerical problems based on variation of mass, energy mass equivalence etc.	I
T-3	Numerical problems pertaining to energy spectrum of Black body radiations, Wien's displacement/R-J laws, Planck's law	II
T-4	Numerical problems based on photo-electric effect, work functions	II
T-5	Numerical problems based on Compton effect, recoil energy of electron etc.	II
T-6	Numerical problems based on the characteristics of De-broglie waves, Davisson-Germer's Expt.	II
T-7	Numerical problems related to Heisenberg's uncertainty principle	II
T-8	Numerical problems based on Schrodinger's wave equation, expectation values of certain physical quantities and operators	III
T-9	Numerical problems to find the Eigen function and Eigen values for particle in a box	III
T-10	Numerical problems to find the reflection and transmission co-efficients for a particle penetrating a potential barrier	III
T-11	Simple numerical problems based on finding the bandgaps in semi-conductor materials etc.	IV
T-12	Simple numerical problems based on finding the energy level difference in Lasers etc.	V

NOTE: SETTING OF QUESTION PAPER (Instructions for Examiners)

- i) The question paper will consist of two sections
 - a) Section-I
&
 - b) Section-II
- ii) Section-I Comprises of Unit-I and Unit-II
Section-II Comprises of Unit-III, Unit-IV and Unit-V
- iii) Number of questions to be set in the paper =8 (eight)
(Four from each section as per weightage)
- iv) Number of questions to be attempted =5 (five)
(Selecting at least two from each section)

BOOKS RECOMMENDED:

TITLE	AUTHOR
1) Modern Physics	Beiser
2) Modern Physics	Blatt
3) Modern Physics	Gupta & Gupta
4) Basic Electronics	Millman & Halkias
5) Material Science	S.L. Kakani, Amit Kakani

COURSE OUTCOMES**COURSE NAME: PHYSICS-II****COURSE NO: PHY-202**

After learning this course students will be able to:

CO202.1	Understand the mathematical concepts required to understand physics.
CO202.2	Derive the Maxwell's equations and understand the basis electromagnetic theory.
CO202.3	Assimilate the basic concepts of interference in thin films, diffraction, polarization and the characteristics of different types of waves.
CO202.4	Gain the knowledge about lasers, their characteristic's & properties and the basics of optical fibers.

B.E 2ND SEMESTER**COURSE NO: CHM-203****COURSE TITLE: ENGG. CHEM-II****BRANCH : COMMON TO ALL****DURATION OF EXAM: 3 HOURS****MAXIMUM MARKS:125****THEORY****SESSIONAL****L****T****3****1****100****25****SECTION-A****1. ENVIRONMENTAL CHEMISTRY:**

Concept of Environmental chemistry, segments of environment (a brief idea about atmosphere, hydrosphere and lithosphere)

AIR POLLUTION –Introduction, Types of air pollution and control of air pollution.

WATER POLLUTION: Introduction, Sources of water pollution and methods of controlling water pollution.

CHEMICALS AND METAL TOXICOLOGY (Biochemical effects of Pb, Hg, As, Zn, Cd, Ni, Se, CN, O₃ and pesticides in brief on man).

2. INORGANIC CEMENTING MATERIALS:

Cement and Lime – Introduction, classification of lime, manufacture and properties of lime, setting and hardening of lime.

Cement, types of cement, manufacture of Portland cement, setting and hardening of cement.

3. WATER TREATMENT

Introduction, types of water, softening of water by different processes, chemical methods and sterilization, priming and foaming, sludge and scale formation, determination of hardness of water by soap titration method and EDTA method. Radioactivity of water, numericals on hardness and softening of water.

SECTION-B**1. PLASTICS:**

Introduction, importance of plastics and uses, classification of plastics, moulding constituents of a plastic, moulding of plastics into articles (compression moulding, injection moulding, transfer moulding and extrusion moulding) Preparation, properties and uses of following plastic materials:

a) Polymethyl methacrylate b) Epoxy resins c) Alkyd resins.

2. RUBBER

Introduction, types of rubber, treatment of latex, vulcanization of rubber, preparation, properties and uses of following synthetic rubber: Buna-S, Buna-N & Butyl rubber.

3. PAINTS

Introduction, requisites of a good paint, constituents of a paint, manufacture of a paint, properties and uses of important white pigments such as white lead, Zinc oxide and Lithophone.

BOOKS RECOMMENDED:

- | | | |
|----|-------------------------------------|----------------------|
| 1. | Engineering Chemistry | Jain & Jain |
| 2. | Engineering Chemistry | Sharma, B.K. |
| 3. | Engineering Chemistry | Dara, S.S. |
| 4. | Engineering Chemistry | Shashi, Chawla |
| 5. | Organic Chemistry | Bahl, B.S. |
| 6. | Environmental Chemistry | De, A.K. |
| 7. | Textbook of Environmental Chemistry | Tyagi & Mehra |
| 8. | Polymer Science | Gowrikar, V.R. etal. |
| 9. | Engineering Chemistry | Dr. Rajinder Kumar |

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section. Use of calculator is allowed.

<u>COURSE OUTCOMES</u>

COURSE NAME: ENGG. CHEM II	
COURSE CODE: CHM-203	
After learning this course students will be able to:	
CO203.1	Explain the air quality, emission, pollution control and Environmental. Health.
CO203.2	Analyze different polymerization processes used to make thermoplastic and thermosetting plastics.
CO203.3	Recognize the common physical, chemical process encountered in treatment process of water.
CO203.4	Define basic knowledge on cement, its production, characteristics, properties etc.
CO203.5	Summarize the chemical structure, molecular properties, vulcanization process and application of major type of rubber.

CLASS: B.E 2nd SEMESTER
BRANCH: COMMON FOR ALL
COURSE TITLE: COMPUTER PROGRAMMING USING C
COURSE NO: COM –204
DURATION OF EXAM: 3 HOURS

L	T	P	MARKS	
3	1	-	Theory	Sessionals
			100	25

SECTION-A

1. Basic structure of Computer, Stored Program Concept, Binary Arithmetic – Addition, Subtraction, Multiplication, Data Representation – Fixed and Floating Point, Semiconductor Memories.
2. Introduction to C, Data Types, Constants, Variables, Expressions, Statements, Operators, Data Input and Output.
3. Control Statements, Arrays, Recursion, Storage Classes, Library Functions.

SECTION-B

4. Functions, User Defined Data Types, Structures, Unions, Passing Structure to Functions.
5. Pointers, Operation on Pointers, Passing Pointers to Functions, Data Files – Opening, Closing, Creating Data Files

BOOKS RECOMMENDED:

- | | |
|----------------------------------|----------------------|
| 1. Programming with C | - Byron Gottfried. |
| 2. Programming with C | - E. Balaguruswamy. |
| 3. C The Complete Reference | - Herbert Schildt. |
| 4. Let us C | - Yashwant Kanitkar. |
| 5. Digital Computer Fundamentals | - Thomas C. Bartee. |
| 6. Digital Computer Design | - V. Rajaraman. |

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section. Use of calculator is allowed.

COURSE OUTCOMES

COURSE TITLE: COMPUTER PROGRAMMING USING C
COURSE NO: COM –204

After learning this course students will be able to:

CO110.1	Remember the fundamentals of C programming.
CO110.2	Understand the use of loops and decision making statements to solve the problems.
CO110.3	Apply different operations on arrays and user-defined functions to solve real-time problems.
CO110.4	Analyze the operation of pointers, structures and unions.
CO110.5	Implement file operations in C programming for a given application.

B.E. 2ND SEMESTER**COURSE NO. HUM-205****COURSE TITLE: ENGINEERING ECONOMICS****BRANCH: COMMON TO ALL****DURATION OF EXAM : 3 HOURS****L T**
3 1**THEORY****100****SESSIONAL****25****SECTION-A****UNIT-1**

Definitions of Economics

- a) Science of Wealth
- b) Science of Material Welfare
- c) Science of Scarcity

Economic System

- a) Features of Capitalism
- b) Features of Socialism
- c) Features of Mixed Economy

UNIT-II

Consumer Behaviour

- a) Cardinal Utility Analysis: The Concept and Utility Maximisation: Laws of Diminishing Marginal Utility and Equi-Marginal Utility.
- b) Ordinal Utility Analysis: Meaning and Properties of Indifference Curves and Utility Maximization.

Demand Theory:

- a) Meaning of Demand and law of Demand
- b) Factors Affecting Demand
- c) Elasticity of Demand (Price Elasticity, Income Elasticity and Cross Elasticity)
- d) Demand Forecasting

SECTION-B**UNIT-III**

Theory of Production:

- a) Factors of Production and Production Function.
- b) Isoquants : Meaning & Properties
- c) Law of Variable Proportions & Returns to scale

Costs and Cost Analysis

- a) The Concept of Marginal, Average, Fixed and Variable Costs.
- b) The Shape of Fixed, Average and Marginal Cost Curves (short run)

Market and Market Structures

- a) Meaning and Feature of Perfect Competition, Monopolistic Competition, Oligopoly and Monopoly.
- b) Price Determination Under Perfect competition and monopoly.

UNIT-IV

Some commonly used Economic Concepts

- a) Meaning, Types and Methods to Control Inflation.
- b) Concept of Stock Market
- c) Meaning & Concept of National Income
- d) Functions of Commercial Bank & Central Bank
- e) Features of Development and Under Development
- f) Meaning & Phases of Trade/Business Cycle
- g) Index Number : Construction and difficulties in measurement of Index Number.

BOOKS RECOMMENDED :

- 1. K.K.Dewett : Modern Economic Theory
- 2. H.L Ahuja : Advanced Economic Theory
- 3. M.L. Jhingan : Macro Economics
- 4. P.N Chopra : Business Economics/Advanced Eco. Theory

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions will have to be attempted, selecting at least two from each section. Use of calculator is allowed.

<u>COURSE OUTCOMES</u>	
COURSE NAME- ECONOMICS	
COURSE CODE- HUM-205	
After learning this course students will be able to:	
CO205.1	Understand difference between classical and modern economic views.
CO205.2	Understand business environment of a country of which every business manager has to be aware in order to execute successfully.
CO205.3	Apply the laws in daily routine and be able to become a rational consumer and purchaser
CO205.4	Suggest producing the products at minimum cost by studying in detail about the cost curves and market structures.
CO205.5	Apply the knowledge of macroeconomics such as national income, index numbers, business cycle etc.

B.E. 2ND SEMESTER
COURSE NO. M-206
COURSE TITLE: MACHINE DRAWING-I
BRANCH: COMMON TO ALL
DURATION OF EXAM : 3 HOURS

MAXIMUM MARKS: 125
THEORY SESSIONAL
100 25

L P
1 3

SECTION-A

1. I.S. Code for Machine Drawing.
2. Types of Sections and Recommended Scale, Dimensioning and Sectioning of Machine elements.
3. Drawing and sketching of machine elements in Orthographic Projections.
4. Different types of Joints: Riveted joints, Threaded fasteners, Knuckle joint, Cotter Joints: Gib and Cotter, Sleeve and Spigot.
5. Stud assembly, Pipe joints including expansion joint.
6. Shaft pulley, cone pulley, Fast and loose pulley, etc.

SECTION-B

1. Simple assemblies: Shaft couplings and Clutches, Muff Coupling, split muff, Flange Couplings: Solid and Flexible, Protected and Unprotected, Universal Coupling.
2. Bearings: Pedestal bearing including Hanger bearings, Pivot bearing and Swivel bearing.

RECOMMENDED BOOKS:

- | | |
|--------------------|------------------------|
| 1. Machine Drawing | P.S. Gill |
| 2. Machine Drawing | Sidheshwar and Kannaih |
| 3. Machine Drawing | N.D. Bhatt |

NOTE: -

1. There will be Six questions in all, five from Section- A (each of 15 marks) and one Compulsory question of 55 marks from Section - B.
2. Students are required to attempt Four questions in all, three from Section-A and one compulsory question involving assembly from Sections–B.

COURSE OUTCOMES

COURSE TITLE: MACHINE DRAWING
COURSE NO: M-206

After learning this course students will be able to:

CO206.1	Helping the student in drafting their technical ideas.
CO206.2	Creating knowledge about the various practices with regard to the dimensioning, sectioning and development of views.
CO206.3	Understanding the importance of the linking functional and visualization aspects in the preparation of the part drawing.
CO206.4	Preparation of the part or assembly drawings as per the conventions.
CO206.5	Interpretation of machine drawings that in turn helps the students in the preparation of the production drawings Machine Drawing Conventions.

B.E 2ND SEMESTER**COURSE NO: M-207****COURSE TITLE: WORKSHOP TECHNOLOGY-II****BRANCH : COMMON TO ALL****DURATION OF EXAM : 3 HOURS****MAXIMUM MARKS : 75****L P****1 3****PRAC/LAB****75****WELDING SHOP**

1. Introduction to Welding as a fabrication process, Welding application and general safety precautions.
2. Introduction to Gas and Arc welding processes.
3. Preparation of single V-butt joint by Gas and Arc welding processes.
4. Preparation of double V-butt joint, Lap joint, Tee joint and Corner joint by Gas and Arc welding processes.

FITTING SHOP

1. Assembly of Snap fitting of flat pieces (Male, Female).
2. Assembly and fitting of two L-shaped rectangular flat pieces.

SHEET METAL SHOP

1. Introduction to sheet metal tools.
2. Practice of making regular geometrical and traditional shapes in sheet metal, which includes:
 - a) Square elbow
 - b) Tee joint
 - c) Funnel making
 - d) Tray and riveted handle.

COURSE OUTCOMES**Course Name: Workshop Technology-II****Course code: M-207**

After learning this course students will be able to:

CO207.1	Perform welding process like Arc and Gas welding .
CO207.2	Prepare single V butt joint, double V butt joint, Lap joint, Tee joint and corner joint.
CO207.3	Perform Assembly of Snap fitting of flat pieces.
CO207.4	Perform Assembly and fitting of two L shaped flat piece.
CO207.5	Perform various sheet metal process like square elbow, funnel making and tray and riveted handle.

B.E 2ND SEMESTER
COURSE NO: PHY-208
COURSE TITLE: ENGINEERING PHYSICS LAB-II
BRANCH : COMMON TO ALL
DURATION OF EXAM : 3 HOURS

MAXIMUM MARKS : 50
PRAC/LAB
50

P
2

S.NO.	EXPERIMENT NO.	TITLE OF EXPERIMENT
1.	Exp-1	To determine the wavelength of sodium light using a plane diffraction grating.
2.	Exp-II	To find the wavelength of a monochromatic source of light using Fresnel's Biprism.
3.	Exp-III	To determine the specific rotation of sugar using Laurent's half shade polarimeter.
4.	Exp-IV	Verification of Faraday's laws.
5.	Exp-V	To find the wavelength of monochromatic light using Newton's rings Apparatus.
6.	Exp-VI	To find the co-efficient of self-induction of a coil by Anderson's bridge using head phone.
7.	Exp-VII	To determine the value of e/m for electron by a long solenoid (Helical method).
8.	Exp-VIII	To find the impedance of LCR series and parallel circuits.
9.	Exp-IX	To study the Zener diode characteristics.
10.	Exp-X	To find the specific resistance of given wire by using carry Foster's Bridge.
11.	Exp-XI	To find the wavelength of He-Ne gas laser.
12.	Exp-XII	To find the diameter of a thin wire using He-Ne gas laser.

NOTE: AT LEAST A MINIMUM OF SIX EXPERIMENTS IS TO BE PERFORMED IN A SEMESTER.

BOOKS RECOMMENDED:

	TITLE	AUTHOR
1.	B.Sc Practical physics	C.L. Arora
2.	Practical Physics	Worsnop & Flint
3.	Practical Physics	Chauhan & Singh (Vol.I & Vol. II)

COURSE OUTCOMES**COURSE TITLE: ENGG. PHYSICS LAB II****COURSE NO.: PHY-208**

After learning this course students will be able to:

CO208.1	Insight about the working principle of LCR circuit and measurement of its impedance parameter.
CO208.2	Understand the concept of interference by using thin films and enable them to calculate the Wavelength of monochromatic light.
CO208.3	Understand the concept of diffraction of light using a transmission grating and thus find out the wavelength of monochromatic light. The students will also be able to understand the concepts of polarization of light and its rotation through optically active solutions by using Laurent's half shade polarimeter.
CO208.4	Work on the principles of wheat stone bridge and thereby calculate the self-induction of a given coil by Anderson's method using a headphone. The students will be able to verify Biot's Savart's Law by calculating the variation of magnetic field with distance along the axis of a circular coil.
CO208.5	Understand the functioning of PNP transistors for various combinations in forward and reverse bias.

B.E 2ND SEMESTER**COURSE NO: CHM-209****COURSE TITLE: ENGINEERING CHEMISTRY LAB-II****BRANCH : COMMON TO ALL****DURATION OF EXAM : 3 HOURS****MAXIMUM MARKS : 50****P PRAC/LAB****2 50****EXPERIMENTS**

1. Determine the total hardness of a sample of water by complexometric method (using EDTA).
2. Determine the chloride content in supplied water sample using Mohr's method (Argentometric method).
3. Determine dissolved oxygen in the given sample of water (winkler's method).
4. Determine the free chlorine in the given sample of water.
5. Determine the acidity of a given water sample.
6. Determine the alkalinity of a given water sample.
7. Determine the percentage of calcium oxide in cement.
8. Organic Analysis: Identify the following organic compounds (preparation of at least one derivative).
 - a) Carboxylic acids
 - b) Compounds containing alcoholic and phenolic OH groups
 - c) Aldehydes & Ketones
 - d) Carbohydrates
 - e) Amides, amines, anilides and nitro compounds
 - f) Hydrocarbons
 - g) Compounds containing Sulphur or halogen

LIST OF BOOKS RECOMMENDED

- | | |
|--|-------------------------|
| 1. Experimental Engineering Chemistry | Shashi Chawla |
| 2. Lab. Manual on Engineering Chemistry | Basin, S K & Sudha Rani |
| 3. A Manual of Practical Engineering Chemistry | Dr. Rajinder Kumar |

COURSE OUTCOMES**COURSE TITLE: ENGINEERING CHEMISTRY LAB-II****COURSE NO: CHM-209**

After learning this course students will be able to:

CO209.1	Capable to visualize and understand chemical engineering unit, operations related to fluid and practical mechanics and mass transfer.
CO209.2	Provide an overview of preparation and identification of organic compound.
CO209.3	Relies on quantitative analysis and make use of simple equation to illustrate the concept involved.
CO209.4	Handle different types of instruments for analysis of materials, using small quantity of material involved for quick and accurate results.

B.E 2ND SEMESTER**COURSE NO: COM-210****COURSE TITLE: COMPUTER PROGRAMMING
USING PC LAB.****BRANCH : COMMON TO ALL****DURATION OF EXAM : 3 HOURS****MAXIMUM MARKS : 75****PRAC/LAB****2****75**

The practicals will be based on the topics covered under Theory Syllabus. The Students are required to perform at least 15 Programs.

COURSE OUTCOMES

COURSE TITLE: COMPUTER PROGRAMMING USING C LAB.**COURSE NO: COM-210**

After learning this course students will be able to:

CO210.1	Read, understand and trace the execution of programs written in C language.
CO210.2	Exercise conditional and iterative statements to write C programs.
CO210.3	Implement Programs using operators, arrays and pointers to access functions.
CO210.4	Write programs that perform operations using derived data types and files.

COURSE SCHEME
B.E. 3RD SEMESTER ELECTRICAL ENGINEERING

Course		Hours/Week			Marks			
Course Code	Title	L	T	P	Theory	Sessional	Practical	Total
ECE-302	Electromagnetic Field and Transmission Lines Theory	3	2	0	100	50	--	150
MTH-311	Engineering Mathematics-III	3	2	0	100	50	--	150
M-314	Thermal Engineering	3	2	0	100	50	--	150
EE-301	Principle of Electrical Engineering	4	2	0	100	50	--	150
EE-302	Network Analysis & Synthesis	4	2	0	100	50	--	150
EE-303	Non Conventional Energy Resources & Applications	3	2	0	100	50	--	150
EE-308	Electrical and Electronics Workshops	0	0	2	---	--	50	50
EE-309	Principle of Electrical Engineering Lab	0	0	2	---	--	50	50
Total		20	12	04	600	300	100	1000

BRANCH: EE/ECE

COURSE CODE: ECE-302

TITLE: ELECTROMAGNETIC FIELD AND TRANSMISSION LINES THEORY

DURATION OF EXAM: 3 HOURS

Hours/week			Marks distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION - I

ELECTROSTATICS: Revision of vector analysis with, Spherical & polar coordinates, Electrostatic Potential, potential, Potential gradient, Gradient operator, Conductors, Method of images, Energy density in electrostatics field, Electric field in dielectric media, Capacitance, Solution of Electrostatic problems using Poisson’s & Laplace equation.

MAGNETOSTATICS: Magnetic flux density, & Magnetic potential, Torque on a closed circuit, Energy density in the magnetic field.

MAXWELL EQUATION UNIFORM PLANE WAVE: Application of Maxwell equation to circuits, Resonant cavity, Radiation antennas, Rotating magnetic field theory, Wave motion in perfect dielectric, Wave motion in lossy dielectric, Plane wave in lossy dielectric, Propagation in good conduction, Skin effect, Poynting theorem, Standing wave ratio, Polarization, Reflection of uniform plane wave,

SECTION – II

TRANSMISSION LINE: Basic principles of T.L, Equivalent ckt of T.L, Basic transmission line equation, Input impedance, infinite T.L, Characteristics impedance (Z_0), Propagation constant, attenuation constant, Phase constant, open and short circuits T.L, Velocity, wavelength, Voltage and power on line. Distortion in line Reflection and its coefficient,

LINE AT HIGHER FREQUENCY:- Line Equation, Waveform on line terminated in various impedances, SWR, & its relation with reflection coefficient. Impedance of short Circuit and open Circuit line. Characteristic of $\lambda/2$ & $\lambda/4$ lines. Principle of Impedance matching & use of smith chart for impedance matching using $\lambda/4$ transformer & single stub.

RECOMMENDED BOOKS:

- | | |
|-------------------------------------|---------------------|
| 01. Engineering Electromagnetic | Jseph A. Edminister |
| 02. Introduction to Electromagnetic | Griffith |
| 03. Engineering Electromagnetic | Jr. Hyat |
| 04. Network Line & Filters | J.D. Rayder |
| 05. Antenna & Wave Propagation | .D. Prasad |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: ECE-302	
TITLE: ELECTROMAGNETIC FIELD AND TRANSMISSION LINES THEORY	
COURSE OUTCOMES: Students will be able to	
CO302.1	Attain knowledge about the vector analysis, coordinate system, electric and magnetic fields and calculation of flux density, potential and energy densities.
CO302.2	Analyse the Maxwell's equations and the wave propagation equation in free space and in different media
CO302.3	Study the Transmission line and its parameters
CO302.4	Solve for transmission line parameters at high frequencies and principles of stub matching and smith chart

CLASS: B.E. 3RD SEMESTER**BRANCH: EE/ECE****COURSE CODE: MTH-311****TITLE: ENGINEERING MATHEMATICS-III****DURATION OF EXAM: 3 HOURS**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION - I**LAPLACE TRANSFORMS:**

Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms, LT of unit step function, Impulse function, Periodic function, Initial value theorem, Final value theorem, Convolution theorem, Application of LT to solve linear differential equations and convolution type integral equations.

INTEGRAL TRANSFORMS AND FOURIER INTEGRALS:

Integral transforms and Fourier Integrals Fourier integral theorem, Fourier sine and cosine Integrals, and their inverses.

SECTION - II**SPECIAL FUNCTIONS:**

Special Functions Legendre polynomials, Rodrigue's formula, Recurrence formulae, generating function, Orthogonality of Legendre polynomials, Bessel function of 1st kind. Recurrence formulae, generating function, Orthogonality of Bessel function.

BOOLEAN ALGEBRAS:

Boolean Algebras, Lattices, Finite Boolean algebra, C.N.F and D.N.F, Application of Boolean algebra to switching theory.

RECOMMENDED BOOKS:

- | | | |
|-----|--------------------------------|-----------------|
| 01. | Higher Engineering Mathematics | B.S. Grewal |
| 02. | Boolean Lattices | V.K. Khanna |
| 03. | Engineering Mathematics-III | Bhopinder Singh |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: MTH-311**TITLE: ENGINEERING MATHEMATICS-III****COURSE OUTCOMES:** Students will be able to

CO311.1	Learn the concept of Laplace Transform, inverse Laplace transform of various function and its applications.
CO311.2	Understand the idea of Fourier transform, Fourier sine and cosine transform and their properties.
CO311.3	Understand the concept of special functions such as Bessel's functions and Legendre's polynomial and their relations.
CO311.4	Draw the circuits using properties of Boolean algebra.

CLASS: B.E. 3RD SEMESTER

BRANCH: EE/ECE

COURSE CODE: M-314

TITLE: THERMAL ENGINEERING

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

UNIT-1

THERMODYNAMICS:

Dimensions and units, Basic concepts, Zeroth Law, Temperature scale. First Law of Thermodynamics for closed system and open system, applications, general energy equation for steady flow.

Second Law of Thermodynamics, Reversible and Irreversible processes, Carnot cycle, Clausius theorem, Entropy, entropy change, Clausius inequality, Principle of increase of entropy.

Ideal gases and process calculations.

UNIT-2

Principles of Refrigeration, Vapour compression cycle, Components of Vapour compression systems, COP and related calculations

UNIT-3

BOILERS: Fire tube and Water tube boilers- description and special features, fields of application.

UNIT-4

Properties of steam and process calculations.

Vapour Power Cycles: Carnot's cycle, Rankine cycle, and elementary cycle calculations.

Nozzles: Types, Nozzle efficiency, Critical pressure ratio, Throat and exit areas.

RECOMMENDED BOOKS:-

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|-------------------------------|-------------------|
| 1. Heat Engineering | Vasandani & Kumar |
| 2. Engineering Thermodynamics | Gupta & Prakash |
| 3. Engineering Thermodynamics | PK Nag |

NOTE : There shall be total eight questions, two from each unit. Five questions have to be attempted selecting at least one question from each unit. Use of calculator is allowed.

<p>COURSE CODE: M-314 TITLE: THERMAL ENGINEERING</p>

COURSE OUTCOMES: Student will be able to

CO314.1	Apply concepts of thermodynamics for evaluating the properties of fluids used in various industrial systems such as Mechanical power production by using engines; refrigeration and air conditioning.
CO314.2	Identify, formulate and solve thermal engineering problems.
CO314.3	Develop Intuitive problem solving technique.
CO314.4	Demonstrate and conduct experiments, interpret and analyze data and report results.
CO314.5	Encourage students to observe and distinguish the different thermodynamics around them and think creatively.

CLASS: B.E. 3RD SEMESTER**BRANCH: EE/ECE****COURSE CODE: EE-301****TITLE: PRINCIPLE OF ELECTRICAL
ENGINEERING****DURATION OF EXAM: 3 HOURS****Hours/ Week****L T P****4 2 0****Marks Distribution****Theory Sessional****100 50****SECTION-I**

Electric Circuit Laws & Energy Sources: Basic electric circuit terminology, Ohm's law, Kirchhoff's laws, Circuit parameters (Resistance, inductance & capacitance), series & parallel combination of resistance, inductance & capacitance. Ideal & practical voltage and current sources and their transformation. Dependent voltage sources and dependent current sources.

D.C. Circuit Analysis: Power and energy relations, analysis of series parallel D.C. circuits, Star-Delta transformation, Superposition theorem, Mesh & Nodal methods, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem. Reciprocity Theorem

A.C. Circuit: Basic terminology and definition, Average and effective values of periodic functions, instantaneous and average power, Power factor. Phasor and complex number representation.

SECTION-II

A.C. Circuit Analysis: Solution of sinusoidally excited R, L, C circuits, Applications of above mention Network theorems to A.C. circuits. Resonance in series and parallel circuits; quality factor.

Steady State A.C. 3-Phase Circuits: Concept of 3-phase voltage, Wye (y) circuits, Delta circuits current and voltage relations in Wye and delta circuits. Measurement of power in three phase balanced circuits.

Transformer: Construction, operating principle No-load and On-load vector diagrams, Equivalent circuit, regulation and efficiency calculations, Transformer test (open circuit & short circuit). All day efficiency.

RECOMMENDED BOOKS:

- | | |
|--|-----------------|
| 1. Electrical Engineering Fundamentals | V. Del toro |
| 2. Electrical Technology | H.Cotton |
| 3. Electrical Technology | E.Hughes |
| 4. Circuit Theory | A.K.Chakorbarti |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-301**TITLE: PRINCIPLE OF ELECTRICAL ENGINEERING****COURSE OUTCOMES:** students will be able

CO301.1	To define concepts of electric circuit terminology, circuit parameters, Kirchhoff's and Ohm's laws.
CO301.2	To solve circuits using electrical theorems and understand the basic terminologies in AC circuit along with the concept of resonance in series and parallel circuits..
CO301.3	To analyze the measurement of power in three phase star and delta connected balanced circuits
CO301.4	To attain knowledge about construction, operating principle, testing and application of transformer.

CLASS: B.E. 3RD SEMESTER

BRANCH: EE/ECE ENGINEERING

COURSE CODE: EE-302

TITLE: NETWORK ANALYSIS & SYNTHESIS

DURATION OF EXAM: 3 HOURS

Hours/ Week

Marks Distribution

L T P

Theory Sessional

4 2 0

100 50

SECTION-I

Conventions for describing networks: Reference directions for currents and voltages, conventions for magnetically coupled circuits, circuit topology.

First order differential equation: Differential equations as applied in solving networks, Application of initial conditions, evaluating initial conditions in networks.

Laplace Transformations: Solution of network problems with Laplace transformation, Heavisides Expansion theorem

Wave Form Analysis & Synthesis: The unit set ramp and impulse functions and their Laplace transforms, Initial and final value theorems, convolution integral, convolution as summation.

SECTION-II

Network Functions-poles and zeroes: Ports or terminal pairs, Network functions for one port and two port networks (ladder and general networks), Poles and Zeros of network functions, Restriction on pole and Zero locations for driving point and transfer functions. Time domain behaviour from pole Zero plot.

Two port parameters: Admittance, impedance, transmission and hybrid parameters, Relationship between parameter sets, parallel, series & Cascade connection of two port Networks, Characteristics impedance of two port networks.

Filters: Filter fundamentals- pass and stop band, filter classification, constant K & m derived filters, Behaviour of characteristics impedance over pass & stop bands, design of filters.

Network Synthesis: Synthesis problem formulation, properties of positive real functions. Hurwitz polynomials properties of RC, LC and RL driving point, functions. Foster and Cauer synthesis of LC,RL and RC circuits.

RECOMMENDED BOOKS:

- | | | |
|----|--|----------------------|
| 1. | Network Analysis | Van Valkenberg |
| 2. | Network Analysis & Synthesis | F.F. Kuo |
| 3. | Introduction to Circuit Synthesis & Design | Temes & La Patra |
| 4. | Fundamentals of Network Analysis & Synthesis | Perikari |
| 5. | Network Theory & Filter Design | V. Atre |
| 6. | Network analysis and Synthesis | Sudhakar Shyam Mohan |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-302	
TITLE: NETWORK ANALYSIS & SYNTHESIS	
COURSE OUTCOMES: Student will be able to	
CO302.1	Apply the knowledge of basic circuit law, dot convention and topological description of Electrical networks.
CO302.2	Acquire knowledge about the application of differential equation method and Laplace transform in electrical circuits.
CO302.3	Understand pole-zero configuration and determine parameters of two port network.
CO302.4	Understand concept and design of filters and synthesize circuits using Foster and Cauer forms.

CLASS: B.E. 3RD SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: EE-303****TITLE: NON CONVENTIONAL ENERGY RESOURCES & APPLICATIONS****DURATION OF EXAM: 3 HOURS**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Introduction: Limitations of conventional energy sources need & growth of alternate energy sources, basic schemes and applications of direct energy conversion.

MHD Generators: Basic Principles and Half effect, generator and motor effect, different types of MHD generators, conversion effectiveness. Practical MHD generators, applications and economic aspects.

Solar Energy: Photovoltaic effect, characteristics of photovoltaic cells, conversion efficiency, solar batteries and applications. Solar energy in India, solar collectors, solar furnaces & applications.

Wind Energy: History of wind power, wind generators, theory of wind power, characteristics of suitable wind power sites, scope in India.

SECTION-II

Thermo-electric, Generators: Seeback effect, peltier effect, Thomson effect, thermoelectric convertors, brief description of the construction of thermoelectric generators, applications & economic aspects.

Fuel Cells: Principle of action, Gibbs free energy, general description of fuel cells, types, Construction, operational characteristics and applications.

Miscellaneous Sources: Geothermal system, Characteristics of geomothermal resources, choice of generators, electric equipment and precautions. Low head hydro plants, definition of low head hydro power, choice of site and turbines. Tidal energy, idea of tidal energy, Tidal electric generator, limitations.

RECOMMENDED BOOKS:

- | | |
|---|---------------------------|
| 1. Non conventional Energy Resources | D.S. Chauhan |
| 2. Conventional energy sources | G.D. Rai |
| 3. Non Conventional energy sources | B.H. Khan |
| 4. Solar Energy Fundamentals and Applications | H.P. Garg and Jai Prakash |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-303**TITLE: NON CONVENTIONAL ENERGY RESOURCES & APPLICATIONS****COURSE OUTCOMES:** Student will be able to

CO303.1	Understand the different alternate energy sources and the process of direct energy conversion
CO303.2	Familiarize with solar and wind energy technologies with their applications.
CO303.3	Understand other direct energy conversion systems like magneto hydrodynamic thermoelectric and fuel cells.
CO303.4	Analyze the environmental aspects of renewable energy resources.

CLASS: B.E. 3RD SEMESTER
BRANCH: EE/ECE ENGINEERING

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	50

COURSE CODE: EE-308
TITLE: ELECTRICAL AND ELECTRONICS WORKSHOPS
DURATION OF EXAM: 3 HOURS

SECTION-I

Study of Wires & Cables: Study of various type of wiring, Cost estimation for wiring of a single storied building having light & power circuits, Method of earthing & measurement of earth resistance, Electrical shock precautions & treatment, jointing of wires & cables, Soldering of joints, Wiring practices in PVC, Conduit system of wiring, Control of fluorescent lamp circuit power & ordinary circuits suitable for domestic wiring.

SECTION-II

Familiarization with Various Electronic Components: Resistor, Capacitors, Transistors, Diodes IC's, Transformer, Assembly of signal phase, Full wave rectifier circuit with capacitor filter, Assembling the common emitter amplifier circuit, Assembling the following circuit comprising of IC's on a bread board, Like timer circuit using IC 555 & Fabrication on General purpose PCB (to get familiar with soldering techniques).

BOOK RECOMMENDED:

1. Electrical Wiring & Estimation S.I. Uppal

NOTE : The Electronic circuit diagrams will be provided to the students. The operation of the circuits will be explained. The purpose of the exercise is to familiarize the students Fabrication/Assembling of the given Electronic circuits and to solder the different components to form different Circuits.

COURSE CODE: EE-308

TITLE: ELECTRICAL AND ELECTRONICS WORKSHOPS

COURSE OUTCOMES: Students will be able to

CO308.1	Understand and apply the general lab safety rules.
CO308.2	Familiarize with different types of wirings and joints.
CO308.3	Study different methods of earthing.
CO308.4	Analyze different electronic components.
CO308.5	Design basic electronic circuits using soldering techniques.

CLASS: B.E. 3RD SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-309
TITLE: PRINCIPLE OF ELECTRICAL ENGINEERING LAB.

Hours/Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	50

LIST OF EXPERIMENTS:

1. Verification of Kirchoff's Laws.
2. Verification of Superposition Theorem.
3. Verification of Thevinin's Theorem.
4. Verification of Reciprocity Theorem.
5. Verification of Maximum Power Transfer Theorem.
6. Measurement of current in various branches of RLC series-parallel circuit.
7. Single phase power measuring by using a Wattmeter.
8. Study of three-phase A.C Circuits with Star and Delta connected Load.
9. Study of single phase transformers. Determination of voltage Ratio, Turns Ratio and Polarity Test. Open circuit and short circuit test of given single phase transformer. Determination of regulation and efficiency.

<p>COURSE CODE: EE-309 TITLE: PRINCIPLE OF ELECTRICAL ENGINEERING LAB.</p>

<p>COURSE OUTCOMES: Students will be able to</p>

CO309.1	Experimentally verify the basic circuit theorems
CO309.2	Measure current in series-parallel RLC circuits.
CO309.3	Measure power dissipation in single phase circuit by using wattmeter.
CO309.4	Determine the turn's ratio and polarity test of single phase transformer.

COURSE SCHEME**B.E. 4th SEMESTER ELECTRICAL ENGINEERING**

Course		Hours/Week			Marks			
Course Code	Title	L	T	P	Theory	Sessional	Practical	Total
MTH-411	Engineering Math-IV	3	2	0	100	40	-	140
EE-401	Electrical Machines-I	3	2	0	100	40	-	140
ECE-416	Analog Electronics-I	3	2	0	100	40	-	140
EE-402	Control Systems-I	3	2	0	100	40	-	140
EE-403	Electrical Measurements and Measuring Instruments.	3	2	0	100	40	-	140
M-413	Electrical Engineering Materials	3	2	0	100	40	-	140
ECE-417	Analog Electronics-I Lab	0	0	2	-	-	40	40
EE-406	Electrical Machines-I Lab	0	0	2	-	-	40	40
EE-407	Electrical Measurements and Measuring Instruments Lab	0	0	2/2	-	-	40	40
EE-408	Control Systems-I Lab	0	0	2/2	-	-	40	40
	TOTAL	18	12	6	600	240	160	1000

CLASS: B.E. 4TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: MTH-411****TITLE: ENGINEERING MATHEMATICS - IV****DURATION OF EXAM: 3 HOURS**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION - I

THEORY OF COMPLEX VARIABLES: Functions of a complex variable, Limits, Continuity, Derivative, Analytic function, Cauchy-Riemann equations, Conformal mappings, Standard Transformation, Bilinear transformation, Line integral, Cauchy's theorem, Cauchy's integral formula, Cauchy's inequality, Liouville's theorem, Taylor and Laurent series expansions, Poles and singularities, Contour integration, Residue theorem, Evaluation of Real Integrals using residue theorem, and Contour integration.

SECTION - II

NUMERICAL METHODS: Definition of operators, Finite and divided difference, Newton's and Lagrange's Interpolation formulas, Numerical differentiation and Numerical integration, Trapezoidal and Simpson's one-third Rule.

Numerical Solutions of Algebraic and Transcendental Equations by Regula Falsi, Newton-Raphson and direct iterative methods, Solution of difference equations, solution of differential equations by Picard's method, Euler's method, Modified Euler's method, Taylor's method, Runge-Kutta method.

RECOMMENDED BOOKS:

- | | | |
|-----|--------------------------------------|----------------|
| 01. | Advance Engineering Mathematics | Jain & Iyengar |
| 02. | Numerical Methods in Engg. & Science | B.S. Grewal |
| 03. | Difference Calculus (New Edition) | S.C. Sexena |
| 04. | Engineering Mathematics | S.S. Sastri |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: MTH-411**TITLE: ENGINEERING MATHEMATICS - IV****COURSE OUTCOMES:** Student will be able to

CO411.1	Find limit, continuity, differentiability of a function in a plane.
CO411.2	Calculate the integrals using residue evaluation instead of actual complicated calculation and definite integral using an appropriate numerical method
CO411.3	Expand a function about a particular point using Laurent's and Taylor's series.
CO411.4	Obtain the values of function at a given point within the given data by using certain method of Interpolation and the basics of different types of Operators.
CO411.5	Find out the exact real root of algebraic and transcendental equations.

CLASS: B.E. 4TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-401
TITLE: ELECTRICAL MACHINES-I
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Electromagnetic Energy Conversion: Basic Principle, Energy in magnetic system, Field energy and mechanical force.

Transformers: Principle, Construction and operation of single phase transformer, phasor diagram, equivalent circuit, voltage regulation. Transformers losses and efficiency, Testing-Polarity Test, Open & short circuit tests, Sumpner's test.

Three Phase Transformer: Construction, various types of connection and their comparative features. Parallel operation of single phase and three phase transformers. Rating of transformers.

Autotransformers: Construction, Principle, Applications and Comparison with two winding transformer.

Scott connection, Open delta. Cooling of transformers.

SECTION-II

D.C. Machines: Working principle, construction and methods of excitation.

Armature Windings: Study of simple lap and wave winding.

D.C. Generators: Emf equation, Armature reaction, Commutation- Causes of bad commutation, Methods of improvement, Effect of brush shift, Compensating winding, Characteristics of various types of generators, applications.

D.C. Motors: Torque equation, Characteristics of d. c. shunt, Series and compound motors, applications.

Starting & Speed Control: Starting methods and speed control of d. c. shunt and series motors.

Testing: Direct and regenerative methods to test d. c. machines.

RECOMMENDED BOOKS:

- | | |
|--|-------------------|
| 1. Performance and design of Direct Current machines | A.E Clayton |
| 2. Electric machinery and Transformers | Irving and Kosow. |
| 3. An Introduction to Electrical machines & Transformers | George Mcpersion |
| 4. Electric machines | Nagrath & Kothari |
| 5. Electrical Machinery | PS Bimbhra |
| 6. Electrical machines | SK Bhattacharya |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-401

TITLE: ELECTRICAL MACHINES-I

COURSE OUTCOMES: Students will be able to

CO401.1	Acquire knowledge about the fundamental principles and classification of electromagnetic machines.
CO401.2	Understand the operating characteristics, starting method and speed control of D.C. machines.
CO401.3	Acquire knowledge about constructional details, principle of operation, testing and application of transformer.
CO401.4	Develop the equivalent circuit of given transformer and analyze its performance.

CLASS: B.E. 4TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: ECE-416

TITLE: ANALOG ELECTRONICS-I

DURATION OF EXAM: 3 HOURS.

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

SEMICONDUCTOR DIODES AND CIRCUITS: Introduction to pn junction diodes, Equivalent circuit & symbol, pn junction as rectifier, Short circuit & open circuit pn junction diodes, Current components in pn junction diode & law of junction, Volt ampere characteristics, Zener diode and Zener as shunt regulator & its analysis, LED. Half wave, Full wave & bridge rectifiers with necessary derivations, Capacitor filter, Inductor filter, LC filter with necessary derivations for ripple factor. Pulse circuits: RC integrator and differentiator circuits, diode clampers and clippers, Clipping at two dependent levels.

BIPOLAR JUNCTION TRANSISTORS: Transistor basics (unbiased & biased transistor), Generalized transistor equation, Transistor current components, Early effect, Transistor configurations & characteristics, Reach through & avalanche phenomena. Need for Biasing, Type of biasing circuits with necessary derivations (Fixed & Voltage Divider Biasing Circuits), Load line concept (AC & DC), Bias stabilization (S, S' S'')

AND FIELD EFFECT TRANSISTORS: Construction of JFET, Operation, Symbol, JFET-Characteristics, JFET Parameters and their relationship, Biasing of FET, with necessary derivations. Comparison between JFET and BJT & MOSFET, FET small signal model, MOSFET (Depletion & Enhancement), Characteristics and Operation.

SECTION – II

SINGLE & MULTISTAGE AMPLIFIERS: Two port network, hybrid model for CE configuration with necessary derivations, Analysis of transistor CE amplifier with & without emitter resistance using h-parameters. Need for cascading, N-stage cascaded amplifiers, Gains in decibels, Methods of coupling multistage amplifiers (RC, DC and transformer coupling), RC Coupled Amplifier and its frequency response, Effect of emitter & bypass capacitors on the bandwidth of a cascaded amplifier.

VOLTAGE REGULATORS: Necessity of voltage regulator, Difference between unregulated & regulated power supply, Factor affecting unregulated power supply, Stabilization, Type of voltage regulators-series voltage regulator using emitter follower, Pre-regulator, protection-simple & fold back current limiting, IC regulators (78XX,79XX,LM317,LM337) and design Problems.

RECOMMENDED BOOKS:

- | | |
|---|-----------------|
| 1. Integrated Electronics | Millman Halkias |
| 2. Electronics Devices | Bolystead |
| 3. Electronics Devices | Malvino Leach |
| 4. Pulse, Digital & Switching Waveforms | Millman & Taub |
| 5. Pulse Circuits | D.A. Bell |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: ECE-416**TITLE: ANALOG ELECTRONICS-I****COURSE OUTCOMES:** Students will be able to**CO416.1** Acquire knowledge about fundamentals of semiconductor diodes and circuits.**CO416.2** Develop the ability to analyze and design the electronic circuits based on BJT, FET, and MOSFET.**CO416.3** Analyze the parameters and frequency response of single stage and multistage amplifiers**CO416.4** Develop the ability to design power supplies using IC regulators.**CO416.5** Create various analog circuits and compare to experimental results with theoretical analysis

CLASS: B.E. 4TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-402
TITLE: CONTROL SYSTEMS-1
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Introduction to Linear Control System: Control Systems, types of control systems, feedback and its effects, mathematical modeling of physical systems.

System Representation: Block diagrams, representation of control systems, transfer functions, signal flow graphs, polar and Bode plot representation of loop gains of control systems.

Time Domain Analysis of Control Systems: Time domain analysis of first & 2nd order Control systems. Typical test signals for time response of control systems, time domain performance of first and second order control systems (steady state response and transient response).

Design of Feedback Control Systems: Approaches to system design, phase lead, and phase lag design using Bode-diagram and root locus techniques. Introduction to P,PI and PID controllers Polar Plot.

SECTION-II

Analysis of Linear Feedback Systems : Stability characteristic equation, stability of linear time invariant systems, Routh-Hurwitz stability Criterion, Root locus plot, Bode plot, Polar Plot, Niquist Criterion.

Frequency Domain Analysis of Control Systems: Frequency domain characteristics second order systems relative stability, graphic methods of determining gain margin and phase margin, Nicholas chart.

Control Components: General block diagram of a control system, a.c. and d.c. Servomotors, a.c. tachometer, synchro transmitter and receiver, synchro pair as control transformer, a.c and d.c position control system, stepper motor. magnetic amplifier.

RECOMMENDED BOOKS:

- | | |
|-------------------------------|-------------------|
| 1. Modern Control Engineering | K.Ogatta |
| 2. Automatic Control Systems | B.C. Kuo |
| 3. Control System Engineering | Nagrath and Gopal |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator and semi log graph are allowed.

COURSE CODE: EE-402	
TITLE: CONTROL SYSTEMS-1	
COURSE OUTCOMES: Students will be able to	
CO402.1	Understand the concept of open loop and closed loop system, transfer functions and modeling of physical systems.
CO402.2	Obtain transfer function using block diagram technique and signal flow graph, design of feedback and time domain analysis of control system.
CO402.3	Understand Linear Feedback system and its frequency domain analysis using various stability criterions.
CO402.4	Understand the application of various control components.

CLASS: B.E. 4TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-403
TITLE: ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

MEASUREMENT OF RESISTANCE: Measurement of low resistance: - Potentiometer method, Kelvin double bridge.

Measurement of medium resistance: Ammeter-voltmeter method, Substitution method, Wheatstone bridge, applications of Wheatstone bridge.

Measurement of high resistance: Loss of charge method, Meggar method.

GLAVANOMETERS: D’Arsonval Galvanometer: Construction, working principle, equation of motion, critical resistance.

A.C. BRIDGES: Measurement of Inductance using: Maxwell’s Inductance-Capacitance bridge, Anderson’s bridge Campbell’s bridge, Measurement of Capacitance using De-Sauty’s bridge, Schering bridge Measurement of Frequency using Wein’s bridge.

POTENTIOMETERS: DC Potentiometers: Crompton’s Potentiometer, Vernier Potentiometer, uses of DC Potentiometers. A.C Potentiometers: Drysdale polar Potentiometer, uses of AC Potentiometers.

SECTION-II

MEASURING INSTRUMENTS: Classification, effects utilized in measuring instruments.

Indicating instruments:- Deflection, controlling and damping forces, various dampings.

Ammeters and Voltmeters: Moving coil, moving iron and electro-dynamics type ammeter and voltmeters, electrostatic voltmeter, Errors in Ammeters and Voltmeters.

Extension of instrument range: Ammeter shunts, Voltmeter multipliers, C.T & P.T.

MEASUREMENT OF POWER: Wattmeter measurement in single phase A.C. circuits, Wattmeter errors. Measurement of three phase power by three wattmeter, two wattmeter, and one wattmeter method.

MEASUREMENT OF ENERGY: Energy meters for A.C. circuits, Theory of Induction type meters. Single phase Induction type Watt-hour meters, construction, theory and operation.

RECOMMENDED BOOKS :

1. Electrical Measurements and measuring instruments Golding Widdis.
2. A course in Electrical and Electronics Measurement & instrumentation A.K. Sawhney.

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-403	
TITLE: ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS	
COURSE OUTCOMES: Students will be able to	
CO403.1	Develop an understanding of construction and working of different AC and DC bridges and its applications.
CO403.2	Measure various electrical parameters like potential, resistance and current with accuracy, precision and resolution.
CO403.3	Develop an understanding of construction and working of different measuring instruments.
CO403.4	Extend the range of Ammeter and Voltmeter using Shunt/series resistance and instrument transformers.
CO403.5	Measure power and energy using various measurement devices.

CLASS: B.E. 4TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: M-413

TITLE: ELECTRICAL ENGINEERING MATERIALS

Hours/Week			Marks Distribution	
L	T	P	Theory	Practical
3	2	0	100	40

DURATION OF EXAM: 3 HOURS

UNIT-1

Classification of Engineering materials (with special reference to Electrical and Electronics engineering materials), Engineering requirements of materials.

Crystal structure-- space lattice, Bravais lattice, Miller indices of cubic and hexagonal systems, closed-packed plane and directions, Packing in solids, voids, diamond cubic structure, packing in conic solids, crystal imperfections, point defect, line defect, surface defects (in brief).

UNIT-2

Solid solutions, Hume-Rothery rule, phase diagrams, binary phase diagrams, Fe-C phase diagrams, Alloys, alloys transformations, properties of various alloys, applications of Iron –silicon, Iron-nickel and Iron-cobalt alloys, heat treatment processes- annealing, normalizing, hardening, case-hardening etc.

UNIT-3

Conductors- Free electron theory, equation of conductivity, conducting materials, material requirement for contact resistors, precision resistors, thermometers, heating elements, transmission line etc.

Semi-conductors—Band theory, equation for conductivity, zone theory (for explaining energy gaps), types of semi-conductors, semi-conductor materials, method of glowing, technique for producing single crystal, zone referring technique.

UNIT-4

Magnetism, types of magnetisms, dipole moment, domains, ferrimagnetisms, anti-ferromagnetism, ferrite magnets, soft and hard magnetic materials and heat treatment cycles.

Dielectric materials, polarization, types, dielectric strength, dielectric losses etc., Piezo-electric effect, Ferro-electric materials, optical properties of materials.

RECOMMENDED BOOKS :

- | | |
|-------------------------------------|----------------|
| 1. Electrical Engineering Materials | A.J. Dekker. |
| 2. Material Science and Engineering | V Rahghvan. |
| 3. Electrical Engineering Materials | P.C. Kapoor. |
| 4. Electrical Engineering Materials | NITTTR, Madras |

NOTE : There shall be total eight questions, two from each unit. Five questions have to be attempted selecting at least one question from each unit. Use of calculator is allowed.

COURSE CODE: M-413	
TITLE: ELECTRICAL ENGINEERING MATERIALS	
COURSE OUTCOMES: Students will be able to	
CO413.1	Understand the mechanical behavior of materials and calculations of same using appropriate equations.
CO413.2	Understand and suggest the heat treatment process and types, significance of properties vs. microstructure, surface hardening and its types.
CO413.3	Explain features, classification, applications of newer class materials like smart materials, piezoelectric materials, biomaterials, optical materials, composite materials, magnetic materials.
CO413.4	Understand the functioning of conducting materials and magnetic materials and apply them in practical life and also understand the concept of conduction theory and their involvement in practical lives.
CO413.5	Explain the concept of phase and phase diagram and understand the basic terminologies

associated with metallurgy.

CLASS: B.E. 4TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: ECE-417
TITLE: ANALOG ELECTRONICS-I LAB

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	40

LIST OF EXPERIMENTS:

1. To study the Forward & Reverse Characteristics of the pn junction, Ge/Si diodes
2. To study the Forward & Reverse characteristics of Zener diode.
3. Steady of Half wave Rectifier.
4. Steady of Full wave / Bridge Rectifier.
5. Steady Diode as clipper and Clamper Circuits
6. To study the Input and Output characteristics of PNP/ NPN Transistor Common Emitter / Common Base configurations.
7. To study the frequency response of a BJT Amplifiers.
8. To study the characteristics of FET.
9. Determination of h parameter from transistor characteristics.
10. Design of self Bias circuits using BJT.
11. Design of self Bias circuits using FET.

COURSE CODE: ECE-417
TITLE: ANALOG ELECTRONICS-I LAB

COURSE OUTCOMES: Students will be able to

CO417.1	To study the forward and reverse characteristics of p-n junction and zener diodes.
CO417.2	Understand the working of half, full and bridge rectifiers and designing.
CO417.3	Apply diode as clipper and clamper circuits.
CO417.4	Study the input and output characteristics of BJT and FET.
CO417.5	Determine the h-parameters from transistor characteristics.
CO417.6	Design self bias circuit using BJT and FET.

CLASS: B.E. 4TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-406
TITLE: ELECTRICAL MACHINES LAB-I

Hours/Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	40

LIST OF EXPERIMENTS:

1. To study the magnetic characteristics of a D.C. Machines at various operating speeds and finds the operating point of D.C. shunt machine from the same.
2. To determine the load characteristics of a D.C. Shunt generator and find its overall efficiency.
3. To determine the Torque speed characteristics of a D.C. Shunt motor and compound motor (Short & long shunt). Also study of these using armature control and field control.
4. To study the torque/speed characteristics of a D.C. series motor using various field tapings.
5. To find the efficiency and study various losses of D.C. Machines using Hopkinson test.
6. To study a single phase transformer, its Voltage ratio and turns ratio relationship. Perform open & short circuit test to determine losses, efficiency and voltage regulation and also its various parameters.

7. To perform polarity test on single phase transformers for parallel operation and study the load sharing of two parallel operated transformers.

COURSE CODE: EE-406	
TITLE: ELECTRICAL MACHINES LAB-I	
COURSE OUTCOMES: Students will be able to	
CO406.1	Identify the parts of cut-sectional model of D.C. machines.
CO406.2	Study the operating characteristics of D.C. machines.
CO406.3	Perform the turn's ratio and polarity test on single-phase transformer.

CLASS: B.E. 4TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: EE-407

TITLE: ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS LAB.

LIST OF EXPERIMENTS:	Hours/Week			Marks Distribution	
	L	T	P	Theory	Practical
1. Measurement of R, L, & C by using RLC bridge instruments.	0	0	2/2	0	40
2. Measurements of Resistance by using <ol style="list-style-type: none"> a) Wheatstone bridge. b) Kelvin's Double Bridge. 					
3. Study of various types of Multi-meters.					
4. Demonstration of M.C., M.I. and Dynamo-meter type instruments.					
5. Measurement of self inductance, mutual inductance and coupling coefficient of <ol style="list-style-type: none"> a) Transformer windings and b) Air-cored coils. 					
6. Extension of the range of Ammeter, Voltmeter, and Wattmeter, using Shunt/series resistance and instrument transformers.					
7. Calibration of single phase energy meter by <ol style="list-style-type: none"> a) Direct loading b) Phantom loading at various points. 					
8. Calibration of three phase energy meter using standard Wattmeter.					
9. Measurement of Capacitance using Schering Bridge.					
10. <ol style="list-style-type: none"> a) Measurement of Power factor at Consumers terminals. b) Measurement of Maximum KVA demand of a consumer. c) Measurement of A.C. Potentials using A.C. Potentiometer. 					

COURSE CODE: EE-407**TITLE: ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS LAB.****COURSE OUTCOMES:** Students will be able to

CO407.1	The student will be able to perform experiments to determine value of R, L, and C using different bridges.
CO407.2	The students will be familiar with various measuring instruments like M.C., M.I. and Dynamometer type instruments used to detect various electrical quantities.
CO407.3	The students will be able to measure power and energy using various measurement devices.
CO407.4	The students will be able to experimentally calibrate & test energy meter.
CO407.5	The students will get familiarized with extension of the range of Ammeter and Voltmeter using Shunt/series resistance and instrument transformers.

CLASS: B.E. 4TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: EE-408****TITLE: CONTROL SYSTEMS-I LAB.**

Hours/Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2/2	0	40

LIST OF EXPERIMENTS:

1. Transient response of Second order system comprising R.L&C finding therefore maximum overshoot, rise time, settling time, damping factor/ratio natural undammed frequency.
2. Frequency response of a first order and second order system comprising RC, RLC and draw the Bode plots and Nyquist Plots.
3. Transient response of a first, second and higher order Pneumatic servo system.
4. Transient response of a first, second and higher order Hydraulic system.
5. To find the torque speed, torque voltage characteristics of a servo motor and determine its transfer function.
6. Study of synchros, transmitter, receiver and control transformer. Voltage angular wave forms and zeroing.
7. To simulate a second and higher order system on an analog simulator and find its transient response to step, ramp and other input functions.
8. Study of a demonstration servo system (both open & closed) loop comprising error detector, amplifier, a motor cum load having a tacho feed back.
9. Study of phase lag and phase lead networks.

COURSE CODE: EE-408**TITLE: CONTROL SYSTEMS-I LAB.****COURSE OUTCOMES:** Students will be able to

CO408.1	Calculate the frequency response of first and second order system.
CO408.2	Verify the torque/speed characteristics of servo motors.
CO408.3	Study of synchros, transmitter and receiver.
CO408.4	Study PID controller.

COURSE SCHEME
5th SEMESTER ELECTRICAL ENGINEERING

Course		Hours/Week			Marks			
Course Code	Title	L	T	P	Theory	Sessional	Practical	Total
EE-501	Electrical Machines-II	3	2	-	100	40	-	140
EE-502	Electrical Machine Design-I	3	2	-	100	40	-	140
ECE-507	Analog Electronics-II	3	2	-	100	40	-	140
ECE-503	Digital Electronics	3	2	-	100	40	-	140
ECE-509	Communication Engineering	3	2	-	100	40	-	140
C-511	Hydraulics & Hydraulic Machines	3	2	-	100	40	-	140
EE-503	Electrical machine-II Lab.	-	-	2/2	-	-	40	40
ECE-516	Analog Electronics-II Lab.	-	-	2	-	-	40	40
ECE-512	Digital Electronics Lab	-	-	2	-	-	40	40
ECE-515	Communication Engineering Lab	-	-	2/2	-	-	40	40
Total		18	12	6	600	240	160	1000

CLASS: B.E. 5TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-501
TITLE: ELECTRICAL MACHINES-II
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Induction Machines: Constructional features, principle of operation, Rotor e.m.f., current power, frequency, equivalent circuit, Phasor diagram of induction motor, Losses and efficiency. Torque-Slip characteristics.

Testing of Induction Motor: No load test and blocked rotor test.

Starting, cogging and crawling, Speed control of Induction motors. Applications

Single Phase Induction Motors: Constructional features, Principle of working: cross-field theory and double revolving field theory, equivalent circuit, determination of parameters, starting methods & applications.

SECTION-II

Synchronous Machines: Constructional features, Cylindrical rotor machine- Synchronous Generators- Generated e.m.f., phasor diagram, armature reaction, Voltage regulation: synchronous impedance, M.M.F. and Zero power factor method. Hunting, Synchronous Condenser.

Synchronous Motor: Operating principle, phasor diagram, operating characteristics of synchronous machines, V-curves, starting methods of synchronous motors.

Salient pole Machine: Two reaction theory, analysis of phasor diagram, power angle characteristics, determination of X_d and X_q .

Parallel operation of Alternators- Synchronization and load division.

RECOMMENDED BOOKS:

- | | |
|-------------------------|-----------------------------|
| 1. Electrical Machinery | Fitzgerald Umans & Kingsley |
| 2. AC Machines | Alexander S. Langsdorf |
| 3. Electrical machines | Charles S. Siskind |
| 4. Electric Machines | Nagrath & Kothari |
| 5. Electrical Machinery | PS Bhimbra |
| 6. Electrical machines | SK Bhattacharya |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-501	
TITLE: ELECTRICAL MACHINES-II	
COURSE OUTCOMES: Student will be able to	
CO501.1	To acquire knowledge about the operating principle and construction of induction machines.
CO501.2	To understand the torque-slip characteristics, testing and speed control of induction motors
CO501.3	To impart knowledge on the principle of operation and performance of synchronous machines as generators and motors.
CO501.4	To acquire concepts on Construction and performance of salient and non – salient type synchronous machines.

CLASS: B.E. 5TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-502
TITLE: ELECTRICAL MACHINE DESIGN-1
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Design of D.C. Machines: Output equation, Choice of average Gap Density & ampere conductors per meter, selection of number of poles.

Armature Design: Choice of Armature winding, No. of armature conductors, No. of armature slots, cross section of armature. Insulation of armature windings. Depth of armature core, armature voltage drop.

Design of Field System: Pole design, magnetic circuit, design of Shunt and series field.

Design of Interpoles: Time of communication, width of communication zone, width of interpole shoe, calculation of reactance voltage.

Design of commutation & Brushes: Commutator length and diameter, Dimensions of brushes, losses at commutator surface.

Losses and efficiency: Rotational losses, I²R losses, Efficiency.

SECTION-II

Design of Three Phase Transformers: - Output of transformer, Output equation, Relation between Core area and weight of Iron & Copper, Ratio of iron loss to copper loss.

Optimum Design: Design for minimum cost, design for minimum loss or maximum efficiency.

Design for core: Square & stepped core.

Window space factor, window dimensions: Width of window for optimum output. Design of Yoke.

Design of small single phase transformer: Core design, winding design, core area.

RECOMMENDED BOOKS:

- | | |
|---|-------------------------------|
| 1. Electrical Machine Design | A.K. Sawhney & A. Chakrabatti |
| 2. The performance and design of alternating current machines | M.G. Say |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-502
TITLE: ELECTRICAL MACHINE DESIGN-I

COURSE OUTCOMES: Student will be able to	
CO502.1	Discuss about the design of armature winding, number of armature slots, number of armature conductors for dc machine.
CO502.2	Understand the design of field system, interpoles for dc machine and analyze the problems on design of commutation and brushes.
CO502.3	Know how to design a 3 phase transformer for minimum cost, design for maximum efficiency.
CO502.4	Know how to design core and winding of a single phase transformer.

CLASS: B.E. 5TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE NO: ECE-507
TITLE: ANALOG ELECTRONICS-II
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

FEEDBACK AMPLIFIERS: Classification of amplifiers, Limitation of basic amplifier, Distortion in amplifier, need for feedback, Feedback concept, Advantages of negative feedback, Ways of introducing negative feedback in amplifiers, Gain with & without feedback, Effect of negative feedback on input, output resistance & bandwidth of the amplifiers, Their respective analysis for feedback amplifiers, Procedure for analysis of feedback amplifiers, Analysis of different Topologies.

SINUSOIDAL OSCILLATORS: Necessarily of oscillator, Gain with feedback, Barkhausen criteria, Types of oscillators, Collpitts, clapp, Hartley, RC phase shift oscillators with necessary derivations to determine gain required for oscillation & frequency of oscillation, Crystal oscillators.

POWER AMPLIFIERS: General features of power transistor, Difference between power and voltage amplifier, Need for power amplifier, Classification of power amplifiers with necessary load lines concept & derivations (Efficiency, power dissipation), Crossover distortion & its remedy, Determination of harmonic distortion, Single ended, & push-pull amplifiers.

SECTION-II

OPERATIONAL AMPLIFIERS AND APPLICATIONS: Operational amplifiers, Block diagram characteristics of ideal & practical operational amp, Inverting & non-inverting amplifier configuration, DC & AC Amplifier, AC amplifier with single power supply, Applications of Op-amp as Summing & difference amplifier, Voltage follower, Differential amplifiers using one and two Op-amp, Differentiator, Integrator, Active filters, comparator ,zero crossing detector, Schmitt trigger, Square wave generator, Triangular wave generator. Digital to Analog (D/A) Converter, Binary Weighted Resistor, R-2R Resistor type D/A Converters, A/D Converters & its types-successive approximation type A/D Converter.

RECOMMENDED BOOKS:

- | | |
|-----------------------------------|--------------------------|
| 1. Integrated Electronics | J.Millman & C.C. Halkias |
| 2. Electronics Devices & Circuits | Millman & Halkias |
| 3. Electronics Devices & Circuits | Robert Bolysted |
| 4. Op-Amp. & Linear IC,s | Ramakant & Gayakwad |
| 5. Design with Op-Amp. | Franco |
| 6. Microelectronics | Sedra & Smith |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE NO: ECE-507	
TITLE: ANALOG ELECTRONICS-II	
COURSE OUTCOMES: Student will be able to	
CO507.1	Apply concepts of basic circuit laws to the analysis of feedback amplifiers and oscillators
CO507.2	Obtain the frequency response and bandwidth of feedback amplifiers.
CO507.3	Outline the necessity of oscillators with required computations to determine gain and frequency of oscillations of different oscillators and design.
CO507.4	Analyze power amplifiers with necessary load line concepts and derivations.
CO507.5	Study Operational amplifiers and their application in the analog electronics.

CLASS: B.E. 5TH SEMESTER

BRANCH: ECE / EE

COURSE CODE: ECE-503

TITLE: DIGITAL ELECTRONICS

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Number System, Radix conversion, Arithmetic with base other than ten, Data representation – fixed & floating points, Binary codes – weighted/Non weighted codes, Error detecting & correcting code (Hamming code), Alphanumeric code, Subtraction of signed/unsigned number.

Logic Gates, Boolean algebra, Simplification of Boolean expressions, Minimization techniques, Karnaugh map (up to five variables), Simplification of Logic families – RTL, DTL, TTL, ECE & MOS families and their characteristics.

SECTION-II

Combinational logic circuits: Half and Full adders, Subtractors, BCD Adder, Comparators, Multiplexer, Realization of function using MUX, Demultiplexer, Decoder, Encoder, Code converters, General problems, PLA, Design of combinational circuit using PLA & PAL.

Introduction to sequential logic circuits, Synchronous and Asynchronous operation, Flip-Flops – R-S, J-K, D, T & Master-Slave flip-flop, Conversion of flip-flops, Shift registers, Analysis of asynchronous & synchronous sequential counter, Design of sequential logic circuits, Problem formulations, State minimization techniques.

RECOMMENDED BOOKS :

- | | |
|---|------------------------|
| 01. Digital Electronics | R.P Jain |
| 02. Digital Electronics & Microcomputer | R.K. Gaur |
| 03. Computer System Architecture | M.M. Mano |
| 04. Digital Electronics | Jamini & K.M. Backward |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: ECE-503	
TITLE: DIGITAL ELECTRONICS	
COURSE OUTCOMES: Student will be able to	
CO503.1	Understand and examine various number systems to be used in digital design
CO503.2	Minimize the expressions using karnaugh map up to five variables and implement them using logic gates in different logic families
CO503.3	Analyze and design various combinational and sequential circuits
CO503.4	Formulate problems and simplify with state minimizing techniques

CLASS: B.E. 5TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: ECE-509****TITLE: COMMUNICATION ENGINEERING****DURATION OF EXAM: 3 HOURS**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Introduction to Elect. Comm. System, Concept & need for modulation, Definition of signal to noise ratio & noise figure, Representation of signal & system (periodic non-periodic etc.), Spectral analysis of signal (Fourier series & Fourier Transforms), Representation of AM. Frequency spectrum of AM wave, Power relation in AM wave, Modulation & demodulation of AM, SSB techniques, Balanced modulator, Type of SSB, Modulation & demodulation of SSB signals.

Theory of FM, Representation & frequency spectrum of FM, Pre-Emphasis, De-Emphasis, Wide band & narrow band FM, Generation & detection of FM signal, Comparison with PM & AM.

SECTION-II

Pulse modulation techniques, Sampling & sampling theorem, Natural & flat top sampling principle generation & detection of PAM, PWM, PCM, DM, ADM, Time division multiplexing, Frequency division multiplexing, Introduction of Digital Modulation Techniques.

Information Theory: Information rate, Entropy, Source-coding & coding Efficiency, Shannon-Fano coding, Huff-man coding, Channel capacity theorem.

RECOMMENDED BOOKS :

01. Electronics Comm. System G. Kennedy

02. Principles of Comm. System Taub & Schilling

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: ECE-509	
TITLE: COMMUNICATION ENGINEERING	
COURSE OUTCOMES: Student will be able to	
CO509.1	Understand the significance of modulation index in communication system.
CO509.2	Evaluate fourier series and fourier transform in order to obtain frequency spectrum of periodic and non-periodic signals respectively.
CO509.3	Explain various methods of generating and detecting different forms of amplitude and frequency modulated signals.
CO509.4	Gain knowledge of various sampling techniques and be able to apply the concept in pulse analog modulation techniques.
CO509.5	Calculate code efficiency, redundancy for various entropy/source coding techniques.

CLASS: B.E. 5TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: C-511

TITLE: HYDRAULIC AND HYDRAULIC MACHINES

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Properties of fluids: Mass density, Specific weight, Specific volume, Viscosity, bulk modulus of elasticity, Surface tension and capillarity.

Pressure exerted by liquids, hydrostatic pressure on immersed bodies, simple manometers, kinematics of flow, Bernoulli's theorem, flow measuring devices like venturimeter, Pilot tube orifice plate. Discharge measurement- flow through orifice and mouthpiece, coefficients of discharge and velocity.

Flow through pipes, hydraulic gradient, Darcy-Weisbach formula, equivalent diameter of pipes, transmission of power through pipes, two- reservoir and three reservoir problem etc.

Flow through open channels, Chezy's and Manning's formulae, design of economic section etc.

SECTION-II

Impact of jets on flat and curved surfaces, impact of jets on fixed and moving vanes, velocity triangles, work done and efficiency.

Turbines- their types, unit quantities, specific speed, work done, power & efficiency, selection of turbines, penstocks. Dimensional analysis, principles of similarity, models & prototypes.

Typical turbine installation, layout of power house, pumps-types, working of centrifugal pump, selection of pumps.

RECOMMENDED BOOKS :

- | | |
|---|-------------------------------------|
| 1. Fluid Mechanics | Victor L. Streeter & Benjamin Wylie |
| 2. Engineering fluid mechanics | R.J. Garde & A.C. Mirajgaoker |
| 3. Theory of application to fluid mechanics | K. Subramaniam |
| 4. Fluid Mechanics | Shames. |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: C-511

TITLE: HYDRAULIC AND HYDRAULIC MACHINES

COURSE OUTCOMES: Student will be able to

CO511.1 Describe and categorize different types of flow.

CO511.2 Solve basic hydrostatics problems involving manometers and submerged surfaces.

CO511.3 Know the significance of pressure gradients parallel to, and normal to a streamline.

CO511.4 Understand the concept of continuity and Bernoulli's equation and be able to use the continuity equation to calculate the flow rate.

CO511.5 Solve basic problems involving pressure losses through pipes and pipe bends and fittings.

CO511.6 Design hydraulic components including pumps and culverts

CLASS: B.E. 5TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-503
TITLE: ELECTRICAL MACHINES-II LAB
DURATION OF EXAM: 3 HOURS

LIST OF EXPERIMENTS :

UNIT-I : Synchronous Machines:

1. Determination of voltage regulation of a 3-phase synchronous generator/alternator by E.M.F., M.M.F. & A.S.A. method (Non-Salient Pole type).
2. Determination of positive, negative and zero sequence reactance's of 3-phase synchronous machine.
3. Determination of V curves of a 3- phase synchronous Motor.
4. Power Angle characteristics of a 3-phase synchronous machine.
5. Determination of various direct and quadrature Axis reactance's of an Alternator.
6. Study of parallel operation & synchronization of 3-phase synchronous generators.

UNIT-II : Induction Machines :

7. Determination of operating characteristics of a single phase induction motor.
8. Speed control of 3-phase Induction motor by varying supply frequency & of 3-phase slip Ring Induction motor by Rotor Impedance Control.
9. Determination of complete Torque/Slip or Torque/Speed characteristics of a 3-phase Induction-motor.
10. To study the Torque/Sped, Voltage/Speed, characteristics of a single phase repulsion motor & universal motor.

COURSE CODE: EE-503

TITLE: ELECTRICAL MACHINES-II

COURSE OUTCOMES: Student will be able to

CO503.1	Familiarize with different cut-sectional model of ac machines.
CO503.2	Determine the voltage regulation by various methods.
CO503.3	Understand the characteristics of induction and synchronous machines.

CLASS: B.E. 5TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: ECE-516
TITLE: ANALOG ELECTRONICS-II LAB

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	40

LIST OF EXPERIMENTS:

1. Determination of voltage gain, Input and output resistance of feedback amplifier. Steady the voltage gain of the Amplifier with and without feedback.
2. Determinations of Distortion, output power of push pull class-B Amplifier.
3. Study of single ended class-A power amplifier & determine its output power & efficiency.
4. Study of complimentary symmetry push-pull amplifier.
5. Design & determination of stability factor series of zener shunt Regulator / IC Regulator.
6. Design of Shunt and Series regulators using BJT.
7. Study of sinusoidal Oscillators Colpitt, Clapp, Hartley, Wein bridge, Phase shift oscillator & Determine the frequency of output waveforms.
8. Study of Op-amp applications as Adder, Subtractor, Differentiator, Integrator, Differential Amp, Comparator, Inverter, Non-Inverting amplifier, Square wave generator.

COURSE CODE: ECE-516 TITLE: ANALOG ELECTRONICS-II LAB
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COURSE OUTCOMES: Students will be able to
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CO516.1	Determine the voltage gain, input and output resistance of feedback amplifiers.
CO516.2	Study output power of power amplifiers.
CO516.3	Design and determine the stability factors of regulators.
CO516.4	Study frequency of output waveforms of sinusoidal oscillators.
CO516.5	Study applications of Op-amp.

CLASS: B.E. 5TH SEMESTER
BRANCH: ECE / EE
COURSE CODE: ECE-512
TITLE: DIGITAL ELECTRONICS LAB.
DURATION OF EXAM.: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	40

LIST OF EXPERIMENTS:

01. Verification of truth tables of logical gates AND / OR / NOT, NAND, NOR, EXOR, EXNOR, gates.
02. Implementation of Boolean expression using AND, OR, NOT, NAND, & NOR logic.
03. Implementation of Decoder, Encoder using IC's & gates.
04. To implement half adder, half subtractor, full adder, full subtractor using different IC's & gates.
05. Implementation of multiplexer, Demultiplexer using IC's & gates.
06. Design of BCD to seven segment display using logical gates & IC's.
07. To design & verification of truth table of SR, JK, MS-JK Flip Flops.

08. To design various asynchronous counters using flip flops, gates & IC's.
09. To design various synchronous counters using flip flops, gates & IC's.
10. To design & Verify the Truth tables of shift Registers.

COURSE CODE: ECE-512	
TITLE: DIGITAL ELECTRONICS LAB.	
COURSE OUTCOMES: Students will be able to	
CO512.1	Implementation and verification of Boolean expressions using logic gates.
CO512.2	Design and implementation of various combinational circuits using digital IC's.
CO512.3	Design seven segment decoder using logical gates.
CO512.4	Design and implementation of various sequential circuits using digital IC's.

CLASS: B.E. 5TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: ECE-515
TITLE: COMMUNICATION ENGG. LAB.

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2/2	0	40

List of Experiments:

01. To plot the response of RF Tuned Amp.
02. To find the modulation under of AM signal
03. Hardware realization of AM demodulation circuit
04. Hardware realization of FM modulation circuit using IC 8038
05. To plot the response of IF transformer
06. Hardware realization of sample & hold circuit
07. Hardware realization of ASK modulation
08. Study of PCM signal

COURSE CODE: ECE-515	
TITLE: COMMUNICATION ENGG. LAB.	
COURSE OUTCOMES: Students will be able to	
CO515.1	Plot frequency response of RF Tuned Amplifier and IFT by calculating gain at different range of frequencies.
CO515.2	understand the significance of modulation index in communication system by observing maximum and minimum value in AM modulated wave
CO515.3	Design frequency modulation circuit using IC 8038
CO515.4	Design sampler using IC-LF398, ASK modulation circuit using transistor BC547.

COURSE SCHEME
B.E. 6th SEMESTER ELECTRICAL ENGINEERING

Course		Hours/Week			Marks			
Course Code	Title	L	T	P	Theory	Sessional	Practical	Total
HUM-601	Organizational Behavior	3	2	0	100	40	-	140
EE-602	Power System-I	3	2	0	100	50	-	150
EE-603	Power Electronics	3	2	0	100	40	-	140
EE-604	Control Systems-II	3	2	0	100	40	-	140
ECE-601	Microprocessor(8085) and Peripheral Interfacing	3	2	0	100	40	-	140
EE-605	Electrical Machine Design -II	3	2	0	100	50	-	150
EE-606	Power Electronics Lab	-	-	2	-	-	40	40
ECE-606	Microprocessor(8085) and Peripheral Interfacing Lab	-	-	2	-	-	40	40
EE-607	Power System-I Lab.	-	-	2	-	-	60	60
	Total	18	12	6	600	260	140	1000

CLASS: B.E. 6TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: HUM-601****TITLE: ORGANIZATIONAL BEHAVIOUR****DURATION OF EXAM: 3 HOURS**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I**BASIC CONCEPT OF ORGANIZATIONAL BEHAVIOR**

- 1) Individual Difference: Meaning, Factors & implications of individual difference
- 2) Motivation: Concept & importance
 - Theories of motivation: Maslow's need hierarchy
 - Herzberg's motivation hygiene theory
 - Mcclelland's need theory
- 3) Personality: Concept & determinants of personality
- 4) Perception attitude: Meaning, definition, perceptual process, internal and external factors in perceptual selectivity

MANPOWER PLANNING

- 1) Manpower planning: Definition, objectives, importance, steps & factors affecting manpower planning.
- 2) Recruitment & selection process : Meaning, sources, scientific selection, selection procedure
- 3) Training & placement: Need, importance, methods

SECTION-II**ORGANISATION DYNAMICS:**

- 1) Organisation: Meaning, definition, need & principles, formal & informal organization
- 2) Organisation structure: Line, Line & staff, functional organizational structure
- 3) Authority: Concept, kinds, sources, limits
- 4) Power: Importance, sources, traits, bases
- 5) Organisational change: Meaning, forces, resistance to change, measures of overcoming resistance to change

6) ORGANISATIONAL CONFLICT:**CONCEPT, SOURCES, CONFLICT RESOLUTION MANAGEMENT:**

- 1) Organisation & environment interface: Introduction, nature of environment---- General & Task environment, Environment uncertainty, strategies to deal with environment
- 2) Scientific management: Meaning, principles, advantages & criticism
- 3) Fatigue: Causes & ways of eradicating fatigue
- 4) Accidents: Causes of accidents & accident prevention

RECOMMENDED BOOKS:

Organizational behaviour (Humane behaviour at work)

Keith Davis

Organisational theory & behavior

B.P. Singh 1

Organisational Behaviour

T.N. Chhabra, Parag

Organisational Behaviour

L.M. Parsad

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: HUM-601	
TITLE: ORGANIZATIONAL BEHAVIOUR	
COURSE OUTCOMES: Student will be able to	
CO601.1	Understand the concepts of motivation, personality and perception and apply the knowledge in the field to influence individual behaviour.
CO601.2	Have the leadership styles and processes used in developing communication.
CO601.3	Understand and apply the knowledge that how people work in organizations.
CO601.4	Play a vital role in team building by becoming a good team leader.

CLASS: B.E. 6TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: EE-602

TITLE: POWER SYSTEM-I

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

D.C. & A.C Distribution Systems: Introduction to a Power System (an overall view). Distribution Systems- Feeder, Distribution, service mains. Classification of distribution system. Various types of D.C. and A.C. distributors, Voltage drop calculations.

Overhead AC Transmission Lines Parameters: Types of conductors, bundling of conductors, Resistance calculations, skin effect, proximity effect. Inductance and Capacitance of single phase, 3-phase, single circuit and double circuit lines.

Interference of Power Lines with Communication Lines: Electrostatic and electromagnetic effects.

SECTION-II

Performance Of Transmission Lines: Representation and performance of short, medium and long lines. A,B,C,D constants, surge impedance, Ferranti effect.

Insulators for Overhead Lines: Materials for insulators, types of insulators, potential distribution over a string of suspension insulators, methods for equalizing the potential.

Corona: Visual and critical disruptive voltage conditions effecting corona, power loss due to corona, practical considerations.

Mechanical Design of transmission line

Calculation of sag and tension, equivalent span length and sag, effect of ice and wind loading, conductor vibrations and vibration dampers

RECOMMENDED BOOKS:

- | | |
|---|-------------------------|
| 1. Elements of power System Analysis | C.W. Stevenson |
| 2. Transmission and distribution of Electric Energy | H. Cotton and H. Barber |
| 3. Electric Power System | C.L. Wadhwa |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-602	
TITLE: POWER SYSTEM-I	
COURSE OUTCOMES: Students will be able to	
CO602.1	Acquire knowledge about general structure of power system and different types of distribution systems.
CO602.2	Analyze the mechanical & electrical design aspects of transmission lines.
CO602.3	Understand the role of insulators and their characteristics.
CO602.4	Determine the performance of transmission lines under various conditions.

CLASS: B.E. 6TH SEMESTER
BRANCH: EE/ECE ENGINEERING
COURSE CODE: EE-603
TITLE: POWER ELECTRONICS
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Concept of Power Electronics, Applications, Advantages and disadvantages. Power electronic system and devices.

Solid state devices: SCR: Basic theory of operation, characteristics: Static and Dynamic, SCR ratings, Protection of SCR against over current, over voltage high dV/dt, de/dt. Snubber circuit, series and Parallel operation of SCR. Gate protection. Firing circuits of SCR. SCR gate characteristics, Two-transistor analogy of SCR. Thyristor family: SCR, TRIAC, DIAC, GITO, PUT, LASCR

Classification of Rectifiers, Phase Controlled rectifiers: Single phase and three phase, half wave and full wave fully controlled and half controlled rectifiers with R, L, E loads with and without free wheeling diodes.

SECTION-II

Methods of commutation.

AC phase control: Operation of Single phase, Half and full wave AC controller with R, R-L Load, Integral cycle control, sequence control.

Choppers: Principles and basic ckt. Operation, classification, steady state analysis, Control strategies. Commutation in chopper circuits.

Inverters: Single phase voltage source Inverters, Voltage control of single phase inverters.

Cycloconverters: Classification, single phase to single phase cycloconverters with resistive inductive load.

RECOMMENDED BOOKS:

- | | |
|---|------------------------------|
| 1. Power Electronics | PS Bhimbira, |
| 2. Power Electronics | MD Singh and KB Khanchandani |
| 3. Power Electronics | AF Gupta and LP Singh |
| 4. Fundamental of Power Electronics | Rama Reddy |
| 5. Power Electronics Converters,
Applications & Design | Mohan, Undeland and Robbins |
| 6. Advanced Power Electronics | B.K.Bose |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-603	
TITLE: POWER ELECTRONICS	
COURSE OUTCOMES: Student will be able to	
CO603.1	Understand fundamental concepts of power electronics, characteristics, series-parallel operation, protection and firing circuits of SCR and operation of various thyristor devices.
CO603.2	Analyze various single phase and three phase controlled converter circuits with different loads.
CO603.3	Understand various commutation techniques and working and control of ac voltage controller and chopper.
CO603.4	Understand the concept of cycloconverters and inverters.

CLASS: B.E. 6TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-604
TITLE: CONTROL SYSTEMS-II
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

State Space Analysis of continuous System: Concept of state, state variable and state space representation. Block diagrams, transfer function and signal flow graphs in the state space. Review of state variable representation of continuous system, conversion of state variable models to transfer function and vice versa, solution of state equations and state transition matrix, controllability and observability, design of state observer and controller.

Stability: Lyapunov's stability theorems for continuous and discrete systems, methods for generating Lyapunov function for continuous and discrete system, Popov's criterion.

Analysis of Discrete System: Discrete system and discrete time signals, state variable model and transfer model of discrete system, conversion of state variable model to transfer function model and vice versa, modeling of sample hold circuit, solution of state different equations, steady state accuracy, stability on the z-plane and Jury stability criterion, bilinear transformation.

SECTION-II

Non-Linear Systems: Types of non linearities, phenomena related to non-linear systems. Analysis of non-linear systems- Linearization method, second order non-linear system on the phase plane, types of phase portraits, singular points, system analysis by phase-plane method, describing function and its application to system analysis.

Adaptive Control: Introduction, modal reference adaptive control systems, controller structure, self tuning regulators.

Introduction to neural network, fuzzy logic and genetic algorithms.

RECOMMENDED BOOKS:

- | | |
|--|--|
| 1. Digital Control and State variable methods | M. Gopal |
| 2. Introduction to Control Engineering : Modeling, Analysis and Design | Ajit K. Mandal |
| 3. Adaptive Control | D. Landau |
| 4. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications | S. Rajasekaran & G.A. Vijayalakshmi Pai. |
| 5. Optimal Control Theory: An introduction | Donaland E. Kiv |
| 6. Digital Control Systems | B. C. Kuo |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-604

TITLE: CONTROL SYSTEMS-II

COURSE OUTCOMES: Student will be able to

CO604.1	Understand the concepts of a state space analysis for a dynamic system.
CO604.2	Acquire knowledge on response of a discrete system in time domain and in frequency domain
CO604.3	Analyze the behavior of non linear control system using phase plane method and describing functions.
CO604.4	Check the stability of the continuous and discrete system.

CLASS: B.E. 6TH SEMESTER

BRANCH: ECE / EE / AEI

COURSE NO.: ECE-601

COURSE TITLE: MICROPROCESSOR (8085) & PERIPHERAL INTERFACING

DURATION OF EXAM: 3 Hours

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
3	2	0	100	40

SECTION-I

1. Microprocessor 8085 pin diagram, Architecture, Addressing modes, Instruction set, Instruction format, Timing diagram, Programming techniques with additional instructions, looping, Counting design of counters & time delays, debugging & memory mapping.
2. Stack & Subroutines, Advanced subroutines concept, Call & Ret instructions, Advanced programming (Code conversions, BCD addition/subtraction, Multiplication etc), 8085 interrupts & process....

SECTION-II

1. Interfacing I/O devices, Basic interfacing concept, Interfacing with scanned multiplexed displays & LCD's, Interfacing output displays, Interfacing i/p devices, Memory mapped i/o design, Memory wait states & access time.
2. Serial I/O data communication, Basic concepts in serial I/O, 8085 serial I/O lines – SID & SOD, Synchronous & asynchronous data communication, Software controlled asynchronous serial I/O.
3. Interfacing to 8085 Microprocessor: PPI – 8155 I/O & timer, PPI – 8255 (mode-0, 1, 2 & BSR), PID 8279 keyboard/display interface, PIC 8259, DMA controller 8257/8237.

RECOMMENDED BOOKS:

- | | |
|--|------------------|
| 01. Microprocessor Architecture Programming & App. | Ramesh Gaonkar |
| 02. Introduction to Microprocessor | Aditya P. Mathur |
| 03. The Intel Microprocessor | Brey |
| 04. Fundamental of Microprocessor & Microcomputers | B. Ram |
| 05. Microprocessor and Interfacing | D.V. Hall |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE NO.: ECE-601

COURSE TITLE: MICROPROCESSOR (8085) & PERIPHERAL INTERFACING

COURSE OUTCOMES: Student will be able to

CO601.1	Understand the logical and the functional design of microprocessor 8085 with the architecture.
CO601.2	Perform various arithmetic and logical operations using the microprocessor.
CO601.3	Write assembly language programs for performing various operations involving practical applications.
CO601.4	Perform advanced programming using the microprocessor for various computations.
CO601.5	Perform interfacing of the microprocessor with input output devices, displays, LCD's, LED's, microcontroller etc.

CLASS: B.E. 6TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: EE-605

TITLE: ELECTRICAL MACHINE DESIGN-II

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION- I

Design of 3-phase Induction Motors: Output equation, choice of average flux density in air gap and Ampere conductors per meter, Main dimensions.

Stator Winding: Turn per phase and stator conductors. Shape, Number and area of stator slots. Stator core and teeth.

Rotor Design: Length of air gap, Rotor teeth and rotor core. Losses and Efficiency.

Design of Single-Phase Induction Motors: Output equations, Choice of specific loading, Main dimensions, Number and size of stator slots, Stator teeth and core.

Design of Rotor: No. of rotor slots, area of rotor bars, area of end rings, rotor resistance, teeth and core.

SECTION-II

Synchronous Machines: Output equation, Choice of specific Electric & Magnetic Loading.

Design of Salient Pole Machine: Main dimensions, Length of air gap.

Armature Design: No. of armatures slots, coil span, Turns per phase, conductor section, Slot Dimension, Length of mean turn, Depth of core, Estimation of air gap length.

Design of Rotor: Height of pole and pole shoe, Design of damper windings.

Magnetic Circuit: MMF for air gap, armature teeth, core poles and yoke.

Design of field windings and losses.

RECOMMENDED BOOKS:

- | | |
|---|--------------------------------|
| 1. Electrical Machine Design | A.K. Sawhney & A. Chakrabatti. |
| 2. The performance and design of alternating current machines | M.G. Say |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-605

TITLE: ELECTRICAL MACHINE DESIGN-II

COURSE OUTCOMES: Student will be able to

CO605.1	Understand how to design stator and rotor of three phase induction motor.
CO605.2	Know how to design stator and rotor of single phase induction motor.
CO605.3	Acquire knowledge about the choice of specific and magnetic loading of synchronous machines.
CO605.4	Understand how to design armature and rotor of synchronous machines.

CLASS: B.E. 6TH SEMESTER
BRANCH: EE/ECE
COURSE CODE: EE-606
TITLE: POWER ELECTRONICS LAB

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	40

LIST OF EXPERIMENTS:

1. SCR Triggering circuits.
2. Forced Commutation Circuits in Converters.
3. SCR Phase Control Circuits.
4. Triac Phase Control Circuits.
5. Fully Controlled Single - Phase thyristor bridge.
6. SCR DC Circuit breaker.
7. Zero Voltage switching.
8. Voltage Commutated DC chopper.
9. Current commutated DC chopper.
10. Microprocessor based three – phase thyristor bridge.
11. Series connected single – phase converters.
12. Series inverters.
13. Converter fed drive.
14. Chopper fed drive.

COURSE CODE: EE-606 TITLE: POWER ELECTRONICS LAB

COURSE OUTCOMES: Students will be able to
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CO606.1	Observe the voltage across load and thyristor of SCR by R-triggering method.
CO606.2	Observe the voltage across load and thyristor for half–wave circuit by RC-triggering method.
CO606.3	Observe the voltage across load and thyristor for full–wave circuit by RC-triggering method.
CO606.4	Analyze voltage waveforms in single phase controlled rectifier circuit using Lamp load.
CO606.5	Understand the concept of series inverter by observing waveforms.

CLASS: B.E. 6TH SEMESTER
BRANCH: ECE/EE/AEI
COURSE CODE: ECE-606
TITLE: MICROPROCESSOR (8085) & PERIPHERAL INTERFACING LAB.

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	40

LIST OF EXPERIMENTS:

01. Programs of data transfer group and block transfer of data from Source memory to destination memory.
02. Programs on Arithmetic, Logical group of instruction, Multiplication of two unsigned 8 bit number & factorial of a number.
03. Programs on time delay & counters.
04. Advanced programming such as binary to ASCII, Vice versa & BCD addition.
05. Study of 8255-PPI interfacing card, 8257-DMA controller interfacing card, 8259-PIC interfacing card, 8253-Timer & counter interfacing card.

COURSE CODE: ECE-606**TITLE: MICROPROCESSOR (8085) & PERIPHERAL INTERFACING LAB.****COURSE OUTCOMES:** Students will be able to

CO606.1	Write assembly language programs using 8085 kit.
CO606.2	Perform arithmetic and logical operations using 8085 kit.
CO606.3	perform advanced programming such as BCD addition, binary to ASCII, etc.
CO606.4	perform peripheral interfacing of microprocessor with 8255, 8257, 8259, etc.

CLASS: B.E. 6TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: EE-607****TITLE: POWER SYSTEM-I LAB**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	60

LIST OF EXPERIMENTS:

1. Performance Characteristics of a Short Transmission Line.
2. Performance Characteristics of a Medium Power Transmission Line.
3. Performance Characteristics of a long Power Transmission Line.
4. Study of all types of Overhead Line Conductors.
5. Study of all types of Overhead Line Insulators.
6. Study of Corona formation of High Voltage Overhead Lines

COURSE CODE: EE-607**TITLE: POWER SYSTEM-I LAB****COURSE OUTCOMES:** Students will be able to

CO607.1	Determine the various parameters of transmission line.
CO607.2	Understand types of overhead line conductors and insulators.
CO607.3	Understand the concept of formation corona

COURSE SCHEME
7th SEMESTER ELECTRICAL ENGINEERING

Course		Hours / Week			Marks			
Course Code	Title	L	T	P	Theory	Sessional	Practical	Total
EE-701	Switchgear & Protection	3	2	--	100	40	--	140
EE-702	Power System-II	3	2	--	100	40	--	140
EE-703	Electronic Measurements & Instrumentation	3	2	--	100	40	--	140
Elective-I EE-704	Advanced Electrical Machines Power Station Practice Energy Auditing	3	2	--	100	40	--	140
EE-705	Minor Project	--	2	4	--	--	150	150
EE-706	Seminar	--	--	4	--	--	100	100
EE-707	Industrial Training	--	--	--	--	--	50	50
EE-708	Switch Gear & Protection Lab.	--	--	2	--	--	50	50
EE-709	Power System-II Lab.	--	--	2	--	--	50	50
EE-710	Electronic Measurements & Instrumentation Lab.	--	---	2	--	--	40	40
Total		12	10	14	400	160	440	1000

CLASS: B.E. 7TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: EE-701****TITLE: SWITCHGEAR AND PROTECTION****DURATION OF EXAM: 3 HOURS.**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Switching Surges, traveling waves, surge impedance, open and short-circuited lines, reflected and transmitted waves.

Relay principles and types, general equations for relays, phase and amplitude comparator, static over current, directional and distance relays, carrier current protection, protection of transformers, Alternators, bus bars and lines.

SECTION-II

Circuit breaker: principle of arc interruption, recovery and restriking voltage, RRRV, current chopping, Bulk and minimum oil CB, Vacuum interrupters, rating and testing of CBs, HRC fuses.

Causes of over voltages, over voltage protection, ground wires, protection against surges, surge absorbers, rating of lightning arresters.

Neutral grounding, effectively grounded system, resonant grounding.

RECOMMENDED BOOKS:

1. A Course in Electrical Power Soni Gupta & Bhatnagar
2. Electric Power System C.L. Wadhwa
3. Travelling Waves Bewley
4. Power System Engg. Nagrath & Kothari

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-701**TITLE: SWITCHGEAR AND PROTECTION****COURSE OUTCOMES:** Students will be able to

CO701.1	Analyze the concept of switching surges and travelling waves mathematically.
CO702.2	Understand different types of protective relays and their applications in power systems.
CO702.3	Explain the working of different type of circuit breakers and causes of over-voltages with their methods of protection.
CO702.4	Acquire the knowledge about the grounding system.

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-702
TITLE: POWER SYSTEM-II
DURATION OF EXAM: 3 HOURS.

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Underground Cables: Construction of cable, insulating materials, types of cables-Mass impregnated, oil filled and gas filled paper cables, Solid dielectric cables, Gas filled cables, super conducting cables. Electrostatic stresses in a cable, grading of cables, insulation resistance of cables, capacitance of single core and three core cables, heating of cables, current carrying capacity of a cable.

Symmetrical Components and their Applications to Unsymmetrical Fault Analysis: Symmetrical components, sequence impedance's, Sequence networks, unsymmetrical faults: single line to ground , line-to-line , double line ground faults on unloaded alternator and on power system, 3-phase short circuits, short circuits capacity of a bus, selection of circuit breakers.

SECTION-II

Per Unit Representation of a Power System: Single line diagram, impedance and reactance diagram of a power system, per unit system of calculations, per unit representation of a power system.

Insulation Co-ordination: Generation of over voltages in power system, resonance over voltages, switching over voltages, lightning over voltages, lightning phenomenon, protection of power system against over voltages, ground wires, lightning arrestors, concept of insulation coordination, basic impulse insulation level, standard impulse test wave, volt- time curve, location and ratings of lightning arrestors.

Introduction to H.V.D.C. Transmission lines.

RECOMMENDED BOOKS:

1. Elements of Power System Analysis W.D. Stevenson
2. Electrical Power System C.L. Wadhwa
3. Power System Engg Nagrath & Kothari
4. Power System Analysis B.R. Gupta

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-702	
TITLE: POWER SYSTEM-II	
COURSE OUTCOMES: Students will be able to	
CO702.1	Acquire detailed knowledge about the construction and working of different types of underground cables.
CO702.2	Apply symmetrical component techniques for symmetrical and unsymmetrical fault analysis.
CO702.3	Acquire the knowledge about the various methods of protection against over-voltages in power systems and insulation co-ordination.
CO702.4	Learn the description of DC transmission system planning for HVDC transmission

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-703
TITLE: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
DURATION OF EXAM: 3 HOURS.

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Magnetic Measurement: A.C. and D.C.: Determination of hysteresis, loop permeability and Iron loss measurements, separation of losses. Ferromagnetic properties.

Signal Analyzers: Introduction, Wave Analyzers- Frequency selective wave analyzer, Heterodyne wave Analyzer, Distortion Analyzers. Spectrum Analyzer- Basic Spectrum analyzer, Spectral Displays, Spectra of different signals.

Oscilloscopes: Introduction- CRO, cathode ray tube, Block diagram of CRO, deflection amplifier and delay line, source and coupling of trigger generator, Automatic time base. Dual trace Oscilloscopes, sweep modes, Measurement of voltage, frequency & phase.

SECTION-II

Phase and frequency measurements:

Power Factor Meters: Single- phase and three- phase Electrodynamometer power factor meter, Moving iron power factor meters.

Frequency meters: Mechanical resonance type frequency meter.

Electrical resonance type frequency meters:- Weston type frequency meter, Ratiometer type frequency meter, Saturable core type frequency meter.

Transducers: Introduction, Principles of operation, Classification of transducers. Summary of factors influencing the choice of transducer, Qualitative treatment of Strain Guage, LVDT, Thermocouple, Piezo- electric crystal and photoelectric transducers.

High Voltage Measurements: Measurement of RMS and peak value of voltage.

RECOMMENDED BOOKS:

1. Electrical Measurements Golding.
2. Electronic Measurements Petit and Terman.
3. Electronic Instrumentation J.A. Alloca
4. Electronic Instrumentation B.H. Oliver & J.M. Cage.

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-703	
TITLE: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	
COURSE OUTCOMES: Student will be able to	
CO703.1	Attain knowledge about different types of electronic instruments used in different circuits
CO703.2	Analyse different analog and digital instruments and wave analyzers as the metering circuits in different circuits.
CO703.3	Understand how to handle and operate the electronic instrument and measure values for current, voltage, etc.
CO703.4	Identify the errors and provide necessary calibration for accurate readings and decide which instrument is required for a particular circuit.
CO703.5	Work on different instruments like Oscilloscopes, transducers and bridges.

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-704(A), ELECTIVE-I
TITLE: ADVANCED ELECTRICAL MACHINES
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Commutator Machines: Effect of injected emf in the rotor circuit of 3-phase inductor motor, slip power, constant torque and constant H.P. Drive, Kramer control, Schrage motor construction, principle of operation, characteristics and applications.

Single-phase series motor: torque expression plain series motor (Universal motor), phasor diagram commutation, operation on A.C. and D.C. supplies, Compensated series motor phase diagram and commutation.

2-phase A.C. Servomotor: Requirements for control applications: Development of equivalent Circuit: Torque-speed Characteristics and transfer function.

SECTION-II

Unbalanced operation of 3-phase induction motor: Expression for sequence impedance matrix, analysis with stator unbalance for unbalanced supply and faulty operation such as open- circuit stator phases, analysis for rotor unbalance.

Synchronous Machine Dynamic Modeling: Introduction, park's transformation, flux linkage, voltage and torque equations, Formation of state- space equations, transient and sub-transient inductances and time constants.

Dynamic Model of 3-phase induction motor.

RECOMMENDED BOOKS:

- | | |
|--|-------------------------|
| 1. Performance and design of commutator machines | Openshaw Taylog Wheeler |
| 2. Symmetrical Components | Wagen & Evans |
| 3. Power System Control & stability | P.M. Anderson-A.A. Foud |
| 4. Advance Electrical Machine | P.S. Bhimbra. |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-704(A), ELECTIVE-I	
TITLE: ADVANCED ELECTRICAL MACHINES	
COURSE OUTCOMES: Students will be able to	
CO704.1	Acquire the knowledge on construction, principle of operation, characteristics and applications of various drives.
CO704.2	Draw the phasor diagrams of single phase series motors and equivalent circuit, characteristics of 2-phase A.C. servomotors.
CO704.3	Apply mathematics to formulate solutions to solve problems in Unbalanced operation of 3-phase induction motor.
CO704.4	Design the dynamic model of synchronous and induction machines.

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-704(B), ELECTIVE-I
TITLE: POWER STATION PRACTICE
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Choice of Generating Power stations, Power Scenario of India, factors affecting the cost of generation, choice of size and number of generating units. Power factor, disadvantages of low power factor, methods of improving power factor, location of power factor improvement apparatus, economics of power factor improvement.

Power Tariff: Cost of generating station, fixed capital, running capital, annual cost, running charges, fixed charges, factors influencing the rate of tariff, designing tariff, different types of tariff, flat rate tariff, block rate tariff, two part tariff, maximum demand tariff, power factor tariff

Types of substations, Key diagrams.

Safety and maintenance.

SECTION-II

Automatic Voltage regulators, Voltage control and reactive power requirements

Frequency Control.

Power Plant Instrumentation, major electrical equipments in power stations.

Commissioning and operation of alternators control of unit emergency operation.

RECOMMENDED BOOKS:

1. Power Station Practices M.V. Dashpandey
2. Power Station Practices Soni, Gupta.

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-704(B) , ELECTIVE-I TITLE: POWER STATION PRACTICE
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COURSE OUTCOMES: Students will be able to
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CO704.1	Acquire the knowledge of factors affecting the choice of generating power plants and power scenario of India.
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CO704.2	Familiarize with the concept of power factor, tariff, factors influencing the tariff rate and types of substation.
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CO704.3	Acquire the knowledge on voltage and frequency control.
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CO704.4	Understand power plant instrumentation, Commissioning and operation of alternators control of unit emergency operation.
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CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-704(C), ELECTIVE-I
TITLE: ENERGY AUDITING
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	40

SECTION-I

Energy Scenario: Energy needs of growing economy, Long term energy scenario, Energy pricing, Energy sector reforms, Energy and environment: Air pollution, Climate change, Energy security, Energy conservation and its importance, Energy strategy for the future, Energy conservation Act-2001 and its features.

Energy Management and Audit: Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments

Material and Energy Balance: Facility as an energy system, Methods for preparing process flow, Material and energy balance diagrams.

SECTION-II

Financial Management : Investment-need, Appraisal and criteria, Financial analysis techniques- Simple payback period, Return on investment, Net present value, Internal rate of return, Cash flows, Risk and sensitivity analysis, Financing options, Energy performance contracts and role of ESCOs.

Electrical System: Electricity tariff, Load management and maximum demand control, Power factor improvement, Distribution and transformer losses. Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues, energy efficient motors. Light source, Choice of lighting, Luminance requirements, and Energy conservation avenues

RECOMMENDED BOOKS:

- | | |
|--|--------------------------------------|
| 1. Handbook on Energy Audit and Environment Management | Y.P.Abbi and S.Jain |
| 2. Energy Conservation | P.Diwan and P.Dwivedi |
| 3. Handbook of Energy Audits | A.Thumann, W.J. Younger and T.Niehus |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-704(C), ELECTIVE-I TITLE: ENERGY AUDITING
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COURSE OUTCOMES: Student will be able to

CO704.1	Discuss about the energy scenario.
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CO704.2	Understand the energy management concepts and methods of preparing energy balance flow diagrams.
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CO704.3	Discuss about the financial management of energy auditing.
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CO704.4	Familiarize with tariff and energy conservation avenues.
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CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-705
TITLE: MINOR PROJECT

Hours/ Week			Marks
L	T	P	
0	2	4	150

The project will be assigned to the students towards the end of 6th semester and will start working on these projects at the commencement of their 7th semester. The topic of the project will be decided as per the developments taking place in the field of Electrical Engineering.

This may require complete literature survey, design, fabrication, simulation of models and/or some preliminary laboratory experiments etc. The same project can be extended to 8th semester also.

Distribution of Marks as per University statutes:

Total Marks for End semester Evaluation = 150 marks

- | | | |
|--------------------------------|------------|-----|
| 1. Presentation/ Demonstration | = 45 marks | 30% |
| 2. Viva-voce | = 45 marks | 30% |
| 3. Actual work done | = 60 marks | 40% |

Award of Marks

- Marks under (1) and (2) will be awarded by the Departmental committee constituted comprises of convener and at least two members.
- Marks under (3) will be awarded by the concerned Project Guide(s)/supervisor(s).

COURSE CODE: EE-705 TITLE: MINOR PROJECT
COURSE OUTCOMES: Students will be able to
CO705.1 Work in a team to select a topic for project work.
CO705.2 Review the available literature on the selected topic.
CO705.3 Design, fabricate or simulate the project model.
CO705.4 Apply the methods and techniques to solve the problems and can be extended for major project also.

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-706
TITLE: SEMINAR

Hours/ Week			Marks
L	T	P	
0	0	4	100

This will involve a detailed study of a topic of interest reproduced in the candidate's own style. For this, a student has to prepare a seminar by doing proper survey of literature, compilation of information so gathered and then presentation of the same followed by question-answer session. The report of which has to be submitted by the student well before the conduct of seminar. The handout submitted by the student will be in accordance with the standards of technical papers.

Guidelines and evaluation of Seminar in 7th semester:

The topic of the Seminar is to be finalized and approved by the departmental committee by the end of 6th Semester. The committee shall have a convener and atleast two members.

Distribution of Marks:

Total Marks for Seminar Evaluation = 100 marks

- 1. Project Report = 30 marks
- 2. Presentation = 50 marks
- 3. Attendance = 20 marks.

Award of Marks:

- Marks Under (1) will be awarded by the Seminar Incharge.
- Marks Under (2) and (3) will be awarded by the Departmental committee constituted for the purpose.

COURSE CODE: EE-706	
TITLE: SEMINAR	
COURSE OUTCOMES: Students will be able to	
CO706.1	Select a topic relevant to the field of electrical engineering system.
CO706.2	Undertake a review of the literature on the chosen topic.
CO706.3	Prepare and present a technical report.

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-707
TITLE: INDUSTRIAL TRAINING

Hours/ Week			Marks
L	T	P	
0	0	0	50

The students are required to take practical training during summer vacations for about 4 to 6 weeks duration in PSUs/Private Industries/DRDO/ISRO/BARC/Power Grid Corporation /Power Stations/Electric sub-stations/ Practical Training Centre etc. After completion of the training, the students should submit a training report along with the certificate issued by the Concerned Department for evaluation purpose.

Guidelines for evaluation of Practical Training:

The evaluation shall be done by the departmental committee by the end of 7th semester. The committee shall have a convener and atleast two members.

Distribution of Marks as per the University statues:

1. Report	= 20	40%
2. Viva-Voce	= 15	30%
3. Miscellaneous Marks	= 15	30%

Due weightage will be given those who have undertaken outside the state & based on the profile of the Industry.

Award of the Marks:

Marks (1), (2) & (3) will be awarded by the committee constituted for the purpose.

COURSE CODE: EE-707

TITLE: INDUSTRIAL TRAINING

COURSE OUTCOMES: Students will be able to

CO707.1	Interact and study with a range of students and to practice multiple management skills, including communication, independent action and teamwork.
CO707.2	Understand the engineering code of ethics and be able to apply them as necessary.
CO707.3	Demonstrate knowledge of practical application of training.
CO707.4	Submit a training report along with the certificate issued by the concerned department.

CLASS: B.E. 7TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: EE-708

TITLE: SWITCHGEAR AND PROTECTON LAB

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	50

LIST OF EXPERIMENTS:

1. Study of an induction disc type over current Relay.
2. To plot the time-current characteristics of an over current Relay.
3. To plot the operating characteristics of a percentage Differential Relay.
4. To plot the operating characteristics of a state over current Relay.
5. To study the operation of a Buchholz's Relay.
6. To plot the operating characteristics of an impedance/Mho type distance Relay.
7. To plot the operating characteristics of a given M.C.B.
8. To study the various parts of a given Air Circuit Breaker.
9. To study the various parts of a given Oil Circuit Breaker.
10. To study the grounding system provided in the Laboratory.

COURSE CODE: EE-708

TITLE: SWITCHGEAR AND PROTECTON LAB

COURSE OUTCOMES: Students will be able to

CO708.1	Understand the characteristics of MCB or Fuse.
CO708.2	Acquire knowledge of operation of Gas –actuated Buchholz's Relay.
CO708.3	Observe the dielectric strength of given transformer oil.
CO708.4	Familiarize with the electromechanical disc type directional over current relay.
CO708.5	Understand the various parts of Air Circuit breaker.

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-709
TITLE: POWER SYSTEM-II LAB

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	50

LIST OF EXPERIMENTS :

1. To study the various types of underground Cable samples.
2. To derive positive sequence component of given sample of phase current/phase voltage.
3. To derive negative sequence component of a given samples of phase currents/Phase voltage.
4. To derive zero sequence components of a given samples of phase currents/phase voltages.
5. To derive the zero sequence impedance of a given transformer.
6. To derive the positive, negative and zero sequence impedance of a given alternator.

CLASS: B.E. 7TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-710
TITLE: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION LAB.

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	2	0	40

LIST OF EXPERIMENTS :

1. Measurement of displacement.
2. Measurement of force.
3. Measurement of temperature.
4. Measurement of pressure.
5. Measurement of flow
6. Digital measurement of A.C. Voltage.
7. Digital measurement of D.C. voltage.
8. Digital measurement of Low Resistance.
9. Digital measurement of Medium & High Resistance.
10. Digital measurement of Electrical power.
11. Measurement of phase & frequency.

COURSE CODE: EE-710

TITLE: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION LAB.

COURSE OUTCOMES: Students will be able to

CO710.1	Measure displacement using LVDT.
CO710.2	Employ strain gauge for measuring pressure.
CO710.3	Determine the temperature using thermocouple.
CO710.4	Analyze phase and frequency using CRO.

COURSE SCHEME
B.E. 8th SEMESTER ELECTRICAL ENGINEERING

Course		Hours Per Week			Marks			
Course Code	Title	L	T	P	Theory	Sessional	Practical	Total
HUM- 813	Industrial Engineering & Production Management	3	2	--	100	50	--	150
EE-802	Power System-III	3	2	--	100	50	--	150
Elective-II EE-803	(A) High Voltage Engineering (B) EHV Transmission (C) Power System Operation & Control (D) Utilization of Electric	3	2	--	100	50	--	150
Elective-III EE-804	(A) Computer aided Design of Electric Machines (B) Industrial Drives (C) Advanced Power Electronics (D) Static Relay	3	2	--	100	50	--	150
EE-805	Major Project	--	--	12	--	--	350	350
EE-806	Power System-III Lab	--	--	4	--	--	50	50
Total		12	8	16	400	200	400	1000

CLASS: B.E. 8TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: HUM-813
TITLE: INDUSTRIAL ENGG. & PRODUCTION
MANAGEMENT
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Unit 1: Management: Meaning, Characteristics, Functions and Scope. Classical Theory of Management: Henry Fayol’s Administrative Management Theory & Taylor’s Scientific Management Theory. Elton Mayo’s Neo-Classical Theory of Human Relations Prospective, Modern Theory of Management: Contingency Approach

Unit 2: Entrepreneur: Concept, Difference between Entrepreneur & Intrapreneur, Qualities of Good Entrepreneur, Types of Entrepreneur, Role of Entrepreneur in Economic Development, Entrepreneurship as a career option for Technocrats. Decision Making: Meaning, Characteristics, Importance, Types & Process of Decision making.

Unit 3: Total Quality Management (TQM): Concept, Elements & Benefits of TQM. Quality Control: Objectives, Significance, Methods of Quality Control.

SECTION-II

Unit 4: Production Planning and Control: Meaning, Definition, Objectives, Functions and Elements of Production Planning and Control. Advantages of Production Planning and Control.

Just in Time (JIT) Production: Concept, Characteristics, Goals, Components and Elements of JIT Production.

Unit 5: Inventory Control: Meaning, Objectives, Classification, Functions of Inventories. Inventory Costs: Simple Economic Order Quantity (EOQ) Model.

Unit 6: Plant Location: Importance, Nature of Plant location, Choice of Site for Plant Location. Plant Layout: Definition, Objectives, Types of layout, Factors influencing Plant Layout, Steps in Plant Layout.

RECOMMENDED BOOKS:

- | | |
|--|------------------------|
| 1. Principles and Practice of Management | Koontz |
| 2. Quantitative Techniques in Management | N.D. Vohra |
| 3. A Management guide to PERT and CPM | Wiest and Levy |
| 4. Introduction to operations research | Hiller and Lieberman |
| 5. Production Planning and Control | Samuel Dllon |
| 6. Principles of Management | Sharma, Bhalla & Gupta |
| 7. Industrial Engineering | O.P. Khanna |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: HUM-813

TITLE: INDUSTRIAL ENGG. & PRODUCTION MANAGEMENT

COURSE OUTCOMES: Students will be able to

CO813.1	Understand the basic concepts of management and production control.
CO813.2	Utilize different techniques of quality control for improving quality of the products while working in the future.
CO813.3	Use appropriate models for inventory control.
CO813.4	Integrate and coordinate the use of manpower, machines and material for the efficient production to meet the sales requirement.
CO813.5	Suggest appropriate plant layouts according to the need of the organizations.

CLASS: B.E. 8TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-802
TITLE: POWER SYSTEM-III
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Network Equations: Introduction, Network model formulation, Formation of Y bus by singular transformation.

Load flow studies: Introduction, Gauss- Siedel method, Newton- Raphson method, Decoupled load flow studies, comparison of load flow methods.

Stability Steady State/Transient stability: Introduction, Dynamics of synchronous machines, power angle equation, node elimination technique, simple systems, steady state stability, transient stability, equal area criterion, numerical solution of swing equations, multi machines stability, factors effecting transient stability.

SECTION-II

Optimum Power System: Introduction, optimal operation of generators on a bus bar, optimal unit commitment, reliability considerations, optimal generation scheduling, power system security, maintenance scheduling, power system reliability.

Surge performance of transmission lines.

RECOMMENDED BOOKS:

- | | |
|--------------------------|-------------------|
| 1. Power System Analysis | Stevenson |
| 2. Power System Analysis | Nagrath & Kothari |
| 3. Power System Analysis | C.L. Wadhwa |
| 4. Traveling Waves | Bewley |
| 5. Electrical Power | Bhatnagar/Soni |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-802

TITLE: POWER SYSTEM-III

COURSE OUTCOMES: Students will be able to

CO802.1	Compute Y_{bus} and Z_{bus} matrices for power system networks
CO802.2	Formulate the power flow problem and solve the same using different methods.
CO802.3	To solve the economic dispatch and unit commitment problem using mathematical Programming techniques.
CO802.4	To solve the optimal power flow problem and scheduling of electrical power systems
CO802.5	To do analysis of power system stability, security and reliability Impart knowledge about the surge problems and its performance of transmission lines.

CLASS: B.E. 8TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: EE-803 (A), ELECTIVE-II****TITLE: HIGH VOLTAGE ENGINEERING****DURATION OF EXAM: 3 HOURS**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Breakdown of gases : Kinetic theory of gases production of charged particles in gases, collision ionization, thermal ionization, photo ionization, production of charged particles on solid surface.

Uniform and non-uniform fields, Impulse breakdown of gases, lighting phenomena compresses gases, Electronegative gases and vacuum.

Breakdown of liquid and solid Dielectrics.

Generation of H.V.A.C, D.C and Impulsive voltages.

Cascade transformers, H.V. rectifier circuits, electrostatic generator, impulse generator, equivalent circuit and waveshape control switching surge generators, high frequency generator, laboratory earthing and safety measures.

SECTION-II

Measurement of H.V.A.C, D.C. and Impulsive Voltages.

Sphere gaps, E.S. Voltmeters, Resistance potential dividers, Capacitance potential dividers, Mixed potential dividers, C.R.O.,

Insulation Design Principles.

Classification of insulating materials, composite dielectrics, fields plotting, H.V bush, awarding and shields insulation coordination.

H.V. Testing

I.S.I Specifications, D.C.A.C. High frequency and impulse testing of insulators/bushing/transformers/arrestors, generators and cables.

RECOMMENDED BOOKS :

1. High Voltage Engineering C.L. Wadhwa

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-803 (A), ELECTIVE-II
TITLE: HIGH VOLTAGE ENGINEERING

COURSE OUTCOMES: Student will be able to

CO803.1	Describe the generation and measurement of HVAC, HVDC and impulse voltages.
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CO803.2	Knowledge of the breakdown of solid, liquid and gases dielectrics.
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CO803.3	Understand the concepts used for the measurement of high voltages.
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CO803.4	Discuss insulation design principles and concept of HV testing.
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CLASS: B.E. 8TH SEMESTER**BRANCH: ELECTRICAL ENGINEERING****COURSE CODE: EE-803 (B), ELECTIVE-II****TITLE: EHV TRANSMISSION****DURATION OF EXAM: 3 HOURS**

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Introduction, need for EHV Transmission, use of bundled conductors, conductor surface gradients, radio noise from EHV lines, insulation requirement of EHV line, electrostatic field of EHV lines, design of EHV lines, Shunt and series compensation, tuned power lines.

SECTION-II

Development of H.V.D.C Transmission system-an overview, economic comparison, types of D.C. links, advantages of D.C transmission, operation of converters and inverters, CC and CEA Control, reactive KVA requirement, two terminal of parallel operation of DC and AC lines, use of thyristors, field of application and circuit breaking.

RECOMMENDED BOOKS :

1. EHV-AC Transmission Beghamudrae
2. HVDC Power Transmission Systems K.R. Padiyar

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-803 (B), ELECTIVE-II**TITLE: EHV TRANSMISSION****COURSE OUTCOMES:** Student will be able to

CO803.1	Demonstrate the knowledge of Power handling capacity of different Transmission systems.
CO803.2	Understand the effect of Electrostatic and electromagnetic fields and corona due to EHVAC lines.
CO803.3	Study the voltage control and current control systems for power flow controls in HVDC system.
CO803.4	Develop an overview of HVDC system, protection and substation layout of HVDC power plant.

CLASS: B.E. 8TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-803 (C), ELECTIVE-II
TITLE: POWER SYSTEM OPERATION AND CONTROL
DURATION OF EXAM: 3 HOURS

Hours/Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Steady state operation, real and reactive power balance and their effects on system operation. Optimum operating strategies, optimum dispatch neglecting losses. Development of loss formulae, optimum dispatch including losses.

SECTION-II

Optimum load flow. Optimal operation of hydrothermal systems. Automatic generation control for single and multi-area cases. Real time control.

RECOMMENDED BOOKS:

1. Power System Operation & Control A.J. Wood
2. Power System Engineering Nagrath & Kothari

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-803 (C), ELECTIVE-II TITLE: POWER SYSTEM OPERATION AND CONTROL

COURSE OUTCOMES: Student will be able to

CO803.1	Acquire the knowledge of optimization techniques used in the power system
CO803.2	Develop loss formulae for optimum dispatch.
CO803.3	Learn the concept of optimum load flow and real time control.
CO803.4	Acquire the knowledge of optimal operation of hydro thermal system, single area and multi area cases.

CLASS: B.E. 8TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: EE-803 (D)

TITLE: UTILIZATION OF ELECTRIC ENERGY

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Electrical Utilization. (a) Braking of Motors. (b) Choice of Motors

Traction: Various system of electric traction, feeding of distribution systems, traction motors, series parallel control of train movement, mechanical consideration, trolleys and trams. Electrical cranes and passenger lifts.

SECTION-II

Heating and welding: resistance ovens, inductor and dielectric heating, Arc furnaces, Electrical Welding and methods of control.

Illumination: Nature and production of light. Photometric definitions. Incandescent lamps, arc and discharge lamps. Design of illumination schemes for indoor and outdoor uses. Flood lighting.

RECOMMENDED BOOKS:

1. Utilization of Electrical Energy J.B. Gupta
2. Utilization of Electrical Energy H. Pratap

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-803 (D)

TITLE: UTILIZATION OF ELECTRIC ENERGY

COURSE OUTCOMES: Student will be able to

CO803.1	Choose a right electric drive for a particular application.
CO803.2	Figure-out the different schemes of traction and its main components.
CO803.3	Understand various types of Heating and welding systems and maintain various electric heating and welding equipments used in industries.
CO803.4	Design Illumination systems for various applications.

CLASS: B.E. 8TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: EE-804 (A), ELECTIVE-III

**TITLE: COMPUTER-AIDED DESIGN OF
ELECTRICAL MACHINES**

DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Computer Aided Basic Considerations; standards and standardizations specifications; construction and materials; class and duty.

Main dimensions and output equations of transformer and rotating machines; specific loading, separation of parameters.

Magnetic Circuits and Electrical circuit calculations.

SECTION-II

Computer Aided Design of transformers and rotating machine.

Computers in design, computer algorithms and flow charts for magnetic circuit and electrical circuit quantities, heating and cooling performance calculations. Complete computer-aided design of transformer and 3-phase induction motors.

RECOMMENDED BOOKS :

1. Principle of Electrical Machine with computer Programme S.K. Sen Oxford.
2. Computer-aided design of Electrical Machines M. Ramamoorthy

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-804 (A), ELECTIVE-III

TITLE: COMPUTER-AIDED DESIGN OF ELECTRICAL MACHINES

COURSE OUTCOMES: Students will be able to

CO804.1	Understand the concept of computer-aided design and specifications.
CO804.2	Calculate the problems related to magnetic and electrical circuits
CO804.3	Develop computer aided design of transformers and rotating machines.
CO804.4	Create algorithms and flow charts for magnetic and electrical circuits along with calculations on heating and cooling systems.

CLASS: B.E. 8TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-804 (B)
TITLE: INDUSTRIAL DRIVES
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Drives and their classification, speed torque characteristics of industrials equipment; Four-quadrant operation of electric motors, speed-torque characteristics of shunt, series, compound and induction motors under running and braking operation, starting and braking control of induction motors.

SECTION-II

Automatic starting control principles; typical automatic starting braking and reversing control circuits of shunt series and induction motor using magnetic contactors. Master switches and relays.

RECOMMENDED BOOKS:

1. Electrical Drives Chilkin
2. Electrical Drives G.K. Dubey
3. Electrical Drives S.K. Pillay

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed

COURSE CODE: EE-804 (B) TITLE: INDUSTRIAL DRIVES

COURSE OUTCOMES: Student will be able to

CO804.1	Identify the need and choice of various drives.
CO804.2	Learn the General characteristics, operation and maintenance of different types of electrical AC & DC Motors with respect to the applications.
CO804.3	Understand the operation of different types of DC electrical drives, three Phase Synchronous Motor Drives and three Phase Induction Motors
CO804.4	Study the application of master switches and relays in automatic starting and control of industrial drives.

CLASS: B.E. 8TH SEMESTER

BRANCH: ELECTRICAL ENGINEERING

COURSE CODE: EE-804 (C)

TITLE: ADVANCED POWER ELECTRONICS

DURATION OF EXAM: 3 HOURS

Hours/ Week

Marks Distribution

L T P

Theory Sessional

3 2 0

100 50

SECTION-I

DC- DC Converters :

Non-isolated DC-DC converters : Buck, Boost, Buck-Boost, Cuk converters in DCM and CCM.

Isolated DC-DC converters : Fly back, Forward, Push-Pull, Half Bridge and Full-Bridge converters in DCM and CCM.

AC to AC Converters : Three phase to single phase cycloconverters: Half wave and full wave. Three phase to three phase cycloconverters. Output voltage equation of cycloconverters.

Phase controlled rectifiers : Effect of source impedance. Single-phase and three phase Dual converter.

Inverters : Forced-commuted Thyristor, Three phase bridge inverters, Reduction of harmonics.

SECTION-II

Facts Devices: Concept of FACTs, FACT Devices: TCR (Thyristor Controlled Reactor), TSC (Thyristor Switched Capacitor), STATCOM (Static Synchronous Compensator), SSSC (Static Series Synchronous Compensator), UPFEC (Unified Power Flow Controller)

HVDC Systems : Evolution of HVDC systems, Comparison of HVDC and HVAC systems, Choice of HVDC transmission systems, Types of HVDC Systems.

Various applications of Power Electronics in residential, commercial and industrial environments, Interdisciplinary nature of Power Electronics.

RECOMMENDED BOOKS :

- | | |
|---|-------------------|
| 1. Power Electronics Converters, Applications & Design Mohan, | Undeland, Robbins |
| 2. Power Electronics | M.H. Rasid |
| 3. Power Electronics & Motor Drives: Advance & Trends | Bimal K. Bose |
| 4. Understanding Facts | Hingorani |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-804 (C)

TITLE: ADVANCED POWER ELECTRONICS

COURSE OUTCOMES: Student will be able to

CO804.1 Analyze different types of converters.

CO804.2 Know the effect of source impedance in phase controlled rectifiers.

CO804.3 Understand the concept of various FACTS devices.

CO804.4 Understand the concept of HVDC systems.

CLASS: B.E. 8TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-804 (D), ELECTIVE-III
TITLE: STATIC RELAY
DURATION OF EXAM: 3 HOURS

Hours/ Week			Marks Distribution	
L	T	P	Theory	Sessional
3	2	0	100	50

SECTION-I

Philosophy of power system protection and its requirements-conventional Vs static relays-generalized characteristics and operational equations of relay-steady state and transient performance of signal deriving elements, signal mixing techniques and measuring techniques CTs and PTs in relaying schemes-saturation –stabilizing resistors.

Static relay circuit using analog and digital ICs for overcurrent, differential and directional relays.

Static relay circuits for generators loss of field, under frequency, desistance, impedance, reactance mho and reverse power relays.

SECTION-II

Static relay circuits for carrier current protection – steady state and transient behaviour of static relays-testing and maintenance of relays-tripping circuits using thyristors.

Microprocessor based relay-hardware and software for the measurement of voltage, current, frequency and phase angle, Microprocessor based implementation of overcurrent, directional, impedance and mho relays.

RECOMMENDED BOOKS :

- | | |
|---|------------------|
| 1. Protective Relays-Their Theory and Practice (Vols. I & II) | VAN.C.Warrington |
| 2. Power system Protection –Static Relays | T.S. MADHVAN RAO |
| 3. Fundamentals of Microprocessors and Microcomputers | B.RAM |

NOTE : There shall be total eight questions, four from each section. Five questions have to be attempted selecting at least two questions from each section. Use of calculator is allowed.

COURSE CODE: EE-804 (D), ELECTIVE-III TITLE: STATIC RELAY
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COURSE OUTCOMES: Students will be able to
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CO804.1	Differentiate between conventional and static relays.
CO804.2	Understand the characteristics and operational equations of relay, static relay circuit using analog and digital ICs..
CO804.3	Understand the concept of static relay circuits for carrier current protection.
CO804.4	Acquire knowledge about microprocessor based implementation of overcurrent, directional, impedance and mho relays.

CLASS: B.E. 8TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-805
TITLE: MAJOR PROJECT

Hours/ Week			Marks
L	T	P	
0	0	12	350

The student will complete their assigned project work initiated in 7th semester under course Code EE-705 and submit a detailed project report individually to the Head of the department.

Guidelines for evaluation of Project work in 8th semester :

Sub-distribution of marks :

- For External Examiner : 100
- For Internal Examiner : 250

Sub distribution of internal Marks :

- Mark distribution of internal Project work as per the University statues shall be based on :

1. Viva-Voce	=	75	30%
2. Presentation	=	75	30%
3. Report	=	100	40%

Total	=	250
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COURSE CODE: EE-805
TITLE: MAJOR PROJECT

COURSE OUTCOMES: Students will be able to
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CO805.1	Complete their assigned project work initiated in minor project.
CO805.2	Demonstrate the project work followed by question-answer session.
CO805.3	Present and submit the detailed project report.

CLASS: B.E. 8TH SEMESTER
BRANCH: ELECTRICAL ENGINEERING
COURSE CODE: EE-806
TITLE: POWER SYSTEM-III LAB

Hours/ Week			Marks Distribution	
L	T	P	Theory	Practical
0	0	4	0	50

The following problems are to be worked out by the students with the help of a computer.

1. Load flow Analysis of a given power system G.S. Technique
2. Load flow analysis of a given power system N.R. Technique
3. Fault analysis of a given power system

RECOMMENDED BOOKS :

1. Computer Analysis of a Power System Stag El. Abid.

COURSE CODE: EE-806 TITLE: POWER SYSTEM-III LAB
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COURSE OUTCOMES: Students will be able to
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CO806.1	Understand the computational methods in power system analysis
CO806.2	Acquire the knowledge in solving power system problems using digital techniques.
CO806.3	Analyze the faults of a given power system.