KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : COMMON FOR ALL BRANCHES
SEMESTER : FIRST

S. No.	Course Code	Course Name	Periods			Credits (C)	Evaluation Scheme				
							CIE			ESE	Total Marks
			L	T	P		TA	MSE	Total		
1	U14MH101	Engineering Mathematics-I	3	1	-	4	15	25	40	60	100
2	U14CS102	Programming in C	3	1	-	4	15	25	40	60	100
3	U14PH103	Engg. Physics /	3	1	-	4	15	25	40	60	100
	U14CH103	Engg. Chemistry	3	1	-	4	15	25	40	60	100
4	U14MH104	English for Communication /	2	2	-	3	15	25	40	60	100
	U14ME104	Engineering Drawing	2	4	-	4	15	25	40	60	100
5	U14EI105	Basic Electronics Engg. /	3	-	-	3	15	25	40	60	100
	U14EE105	Basic Electrical Engg.	3	-	-	3	15	25	40	60	100
6	U14ME106	Basic Mechanical Engg.	3	-	-	3	15	25	40	60	100
	U14CE106	Basic Engg. Mechanics	3	1	-	4	15	25	40	60	100
7	U14CS107	Programming in "C" Lab	-	-	3	2	40	-	40	60	100
8	U14PH108	Engg. Physics Lab /	-	-	3	2	40	-	40	60	100
	U14CH108	Engg. Chemistry Lab	-	-	3	2	40	-	40	60	100
9	U14ME109	Engg. Workshop Practice /	-	-	3	2	40	-	40	60	100
	U14CH109	Environmental Studies #	2	-	-	2	15	25	40	60	100
10	U14EA110	EAA: Physical Education & NSS #	-	-	2	1	100	-	100	-	100
		Total	17/ 19	5/ 8	11/ 8	28/ 30					1000

Note: **L** – Lectures; **T**- Tutorials; **P** – Practicals; **CIE** – Continuous Internal Evaluation; **TA** – Teachers Assessment; **MSE** – Mid Semester Examination; **ESE** – End Semester Examination; **EAA** – Extra Academic Activity;

 # indicates Mandatory Course

Student Contact Hours / Week : Stream – I = 33 (periods/week); Stream-II = 35 (periods/week)

Total Credits (C) : Stream – I = 28 Credits; Stream-II = 30 Credits

U14MH101 ENGINEERING MATHEMATICS- I

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to enable the student to acquire fundamental knowledge of mathematical concepts and mathematical methods and apply in engineering disciplines.

LO2 : to introduce the basic concepts such as convergence and divergence of series, tests for convergence of series; limit, continuity, differentiability of a function, mean value theorems, expansion of a function in series

LO3 : to introduce the concept of partial differentiation and total differentiation , and maxima & minima of functions of two/several variables

LO4: to introduce the concept of double integral and triple integral

LO5: to introduce differential equations of first order along with simple applications

UNIT-I (9+3)

Infinite Series:

Sequences & Series, General properties of series, Series of positive terms, Comparison test, Limit comparison test, Integral test, D'Alembert's Ratio test, Cauchy's nth root test; Alternating series-absolute convergence.

Differential Calculus (Functions of One variable):

Limits, Continuity, Differentiability, Rolle's theorem (Physical and algebraic interpretations), Lagrange's mean value theorem (Geometrical interpretation), Cauchy's mean value theorem. Taylor's theorem and Power series representation of functions, Maclaurin's series, Asymptotes and Tracing of Simple Curves.

UNIT-II (9+3)

Differential Calculus (Functions of Several variables):

Partial differentiation, Total differentiation, Change of variables, Jacobians, Application to find Tangent plane and Normal to a surface. Taylor's theorem for function of two variables (without proof), Maximum and minimum values of functions of two variables. Langrage's method of undetermined multipliers. Differentiation under integral sign.

UNIT-III (9+3)

Multiple Integrals and Applications:

Double integral, Change of order of integration, Double integration in polar coordinates, Triple integrals, Applications: Area enclosed by plane curves, Volumes of solids, Calculation of mass, Center of gravity, Moment of Inertia of plane lamina.

Beta and Gama functions and their relations. Evaluation of improper integrals in terms of Beta and Gamma functions.

UNIT-IV (9+3)

Differential Equations of first order:

Practical approach to differential equations. Formation and solution of differential equation. Solution of first order and first degree differential equation, variables separable form,

homogeneous form, reducible to homogeneous form, First order linear equations, Equations reducible to linear equation (Bernoulli's equation), Exact differential equations, Equations reducible to exact form.

Applications of first order differential equations: Simple examples of Physical applications (Orthogonal trajectories, RL series circuit problem)

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Text Books:

1. Grewal, B.S., "Higher Engineering Mathematics", *Khanna Publishers,* Delhi
2. Shanti Narayan, "Differential Calculus", *S. Chand & Co.*, New Delhi

Reference Books:

1. Jain R.K.& Iyengar SRK , "Advanced Engineering Mathematics", *Narosa Publishers*
2. Kreyszig E., "Advanced Engineering Mathematics", *New Age International*
3. Sastry S.S., "Engineering Mathematics - Vol. I & II", *Prentice Hall of India*

Course Learning Outcomes (COs):

After completion of the course, the student will be able to

CO1: test the convergence/divergence of a given series by Comparison test, Limit comparison test, Integral test, D'Alembert's Ratio test, Cauchy's nth root test

CO2 : understand the basic concepts of limit, continuity, differentiability of a function, and will be able to expand a given function in series

CO3 : trace a given curve

CO4 : apply the technique of differentiation under integral sign to solve an integral

CO5 : find maxima & minima of functions of two/several variables

CO6 : find double integral and triple integral and apply them to find moment of inertia, centre of gravity of plane lamina

CO7 : understand Beta and Gama functions and their relations and evaluate an improper integral in terms of Beta and Gamma functions

CO8 : solve a given differential equations of first order and understand the application of differential equations of first order

U14CS102 PROGRAMMING IN C

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to expose the students to the concepts of problem solving using structured programming language
LO2: to improve students capability in applying logical skills in problem solving
LO3: to improve students expertise in C Programming concepts.
LO4 : to make students capable of using memory management techniques like pointers, files, dynamic memory allocation in c programming

UNIT-I (9+3)

Introduction:
Definition of a computer, Types of computers, Operating system functions, Computer languages, Problem solving and Program development steps, Algorithm, Flowchart. **C Language Preliminaries:**
History, Character set, Identifiers, Keywords, Data types, Variable declarations, Expressions, Symbolic constants, Input-Output statements. **Operators:** Arithmetic, Relational, Increment, Decrement, Conditional, Logical, Bit-wise and Special operators**.**

UNIT-II: (9+3)

Flow Control Statements: Simple if, If-Else, Nested–if, Else-If ladder, Switch and Goto.
Iterative Statements: While, Do-While and For statements, Nested loops, Break, Continue.
Arrays: One dimensional, Two dimensional arrays. Linear search, Binary search, Bubble sort.

UNIT-III (9+3)

Functions: Definition, Function prototypes, Types of arguments, Parameter passing mechanisms, Recursion, Storage classes.
Strings: Operations on strings, String-Handling functions.
Structures and Unions: Definition, Declaration of structure and union variables, Memory allocation, Nested structures, Array of structures

UNIT-IV (9+3)

Pointers: Pointer declaration, pointers arithmetic, Pointer to arrays, Array of pointers, Pointer to strings, Pointer to function, and Pointer to Structures, Dynamic memory allocation.
Files: File operations, File handling functions, Random access files

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Text Books:

1. E.Balagurusamy, "Programming in ANSIC", *Tata McGraw Hill*, 6/e, ISBN-13: 978-1-25- 90046-2, 2012.
2. Herbert Schildt, "Complete Reference with C", *Tata McGraw Hill,* 4/e., ISBN-13: 9780070411838, 2000.

Reference Books:

1. Kerninghan and Ritchie, "The C Programming Language", *Prentice Hall of India*, 2/e., SBN-13:007-6092003106, 1988
2. Yaswanth Kkanetkar, "Let Us C", *BPB Publications*, 13/e., ISBN-13: 9788183331630, 2012

Course Learning Outcomes (COs):

After completion of the course, the student will be able to

CO1: know the fundamentals of computers
CO2: understand applying logical skills for problem solving
CO3: learn C programming language concepts
CO4: apply C programming language concepts for problem solving
CO5: gain knowledge in using memory management techniques in c programming
CO6: develop modular programming using functions

U14PH103 ENGINEERING PHYSICS

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to make the bridge between physics in intermediate level and its applications in engineering by giving proper inputs.

LO2: to introduce the basic concepts of all types of oscillations with illustrations by mechanical examples.

LO3: to introduce the basic concepts of coherence and polarized nature (interference, diffraction & polarization) of light waves and their applications.

LO4: to introduce and explore the knowledge of high frequency sound waves & their application in different fields.

LO5: to introduce the basic concepts of modern physics by introducing the fundamental elements of Quantum mechanics, which are essential to understand the mechanics of microscopic particles.

LO6: to introduce the basic concepts of modern science like Photonics (lasers, Fiber optics, etc.,.), modern materials (magnetic materials, superconductors, nano material etc.,.)

UNIT-I (9+3)

Oscillations:

Physical examples of simple harmonic motion –Torsional pendulum, Physical pendulum, Spring - Mass systems and Loaded beams - Two body oscillations – Qualitative treatment of Free, Damped & Forced Oscillations and Resonance.

Interference:

The Superposition principle –Coherence –Phasor method of adding wave disturbances – Phase changes on reflection - Anti reflection coating –Interference of reflected light from uniform and wedge shaped film –Newton's rings in reflected light-Determination of wavelength of monochromatic light using Newton's rings experiment –Michelson's Interferometer, Types of fringes, Determination of wavelength of monochromatic light, thickness and refractive index of a thin transparent sheet using Michelson's Interferometer.

UNIT-II (9+3)

Diffraction:

Fraunhofer diffraction at a single slit, measurement of slit width –Fraunhofer diffraction at a circular aperture –Rayleigh's criterion for resolution - Diffraction grating (Qualitative) – Experimental determination of wavelength using a plane transmission grating- Dispersion and Resolving power of a grating.

Polarization:

Polarized light-Double refraction, Geometry of calcite crystal, Construction and working of a Nicol prism – Theory of polarized light - Production and Detection of plane, circularly and elliptically polarized light – Quarter and Half-wave plates - Optical activity – Laurent's half-shade Polarimeter – Application of polarization in LCDs.

Ultrasonics:

Ultrasonic waves – Properties - Production of Ultrasonic waves - Magnetostriction method, Piezo-electric method – Detection of Ultrasonics - Determination of wavelength (Acoustic grating) - Application of ultrasonic waves.

UNIT-III (9+3)

Lasers (Qualitative):

Absorption, Spontaneous and Stimulated emission – Relation among Einstein coefficients – Difference between conventional and laser light – Population inversion, Methods of achieving population inversion – Types of Lasers – Ruby Laser, Helium-Neon Laser, Carbon dioxide Laser and Nd-YAG Laser – Applications of lasers.

Holography: Introduction – Formation and Reconstruction of a Hologram – Applications of Holography.

Fiber Optics (Qualitative):

Introduction – Total internal reflection – Fiber construction – Numerical aperture and Acceptance angle – Types of Optical fibers (Step and Graded index) – Power losses in Optical fibers –Attenuation, Dispersion, Bending – Light wave Communication using Optical fibers – Applications of Optical fibers - Fiber optic Sensors (Temperature and Displacement), Endoscope.

UNIT-IV (9+3)

Elements of Quantum Mechanics:

De-Broglie concept of matter waves – De-Broglie wavelength, Properties of matter waves – Schrodinger's wave equation – Time independent wave equation (one dimension), Particle in a box (one dimension), energy quantization, Wave functions.

Modern Materials (Qualitative):

Magnetic materials: Introduction –Permeability - Magnetization –Classification of magnetic materials . Applications of magnetic materials – magnetic recording, magnetic memories.

Superconducting materials: Superconductivity – Meissner effect –Transition temperature – Isotope effect. Types of Superconductors - Soft and Hard Superconductors – Applications of Superconductors.

Nanomaterials: Introduction – Classification of nanomaterials – Properties of nanomaterials – Physical, Chemical, Electrical, Optical, Magnetic and Mechanical properties (in brief) - Applications of nanomaterials (in brief).

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Text Books:

1. Bhattacharya and Bhaskaran, "Engineering Physics", *Oxford University Press.*
2. V.Rajendran, "Engineering Physics", *McGraw Hill Education*.

Reference Books:

1. David Halliday and Robert Resnick, "Physics Part I & II", *Wiley Eastern Limited.*
2. R.K. Gaur and S.L.Gupta, "Engineering Physics", *Dhanpath Rai and Sons.*
3. P.K. Palanisamy, "Engineering Physics", *Scitech Publishers.*

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: understand the basic concepts of physics for its applications to Engineering.

CO2: understand the basic principles of oscillations that can be applied to all types of oscillatory phenomena like acoustic, mechanical, electromagnetic, atomic, nuclear etc.,.

CO3: appreciate the knowledge acquired in studying interference, diffraction and polarization in the application of thickness measurement of thin films, refractive indices and wavelength determinations using interferometric techniques, fringe pattern etc.,.

CO4: appreciate the knowledge gained in studying ultrasonics and their multi dimensional applications in various fields like industrial, engineering (like NDT etc.,.) and medical etc.,.

CO5: understand the fundamental principles and applications of lasers and Optical fibers.

CO6: exposed to various material properties which are used in engineering applications and devices.

U14CH103 ENGINEERING CHEMISTRY

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to understand the fundamental principles and applications of chemistry.
LO2: to identify the significance of electro chemistry.
LO3: to introduce and explore the knowledge of corrosion and its prevention
LO4: to impart and inculcate proper understandings of energy sources, phase rule, organic and polymer chemistry
LO5: to acquire the techniques of water analysis and treatment
LO6: to understand the role of chemistry in the field of engineering

UNIT-I (9+3)

Electrochemistry:

Specific and equivalent conductance, Conductometric titrations, Electrode potential, Nernst equation, Electrochemical series, Reference electrodes : Calomel electrode, Ag/AgCl electrode, Ion-selective electrode : glass electrode, Determination of pH using Glass, Quinhydrone and Hydrogen electrodes, Potentiometric titrations, Commercial cells: Hydrogen-Oxygen fuel cell, Lead-acid storage cell.

UNIT-II (9+3)

Corrosion:

Introduction: Corrosion by pure chemical reaction, Electrochemical theory of corrosion, Galvanic corrosion, Differential aeration corrosion, Factors influencing corrosion, Prevention of corrosion: Cathodic Protection, Hot Dipping, Cementation, Cladding, Electroplating, Corrosion inhibitors, Anodized coatings.

Phase Rule:

Description of the terms: 'Phase', 'Component' and 'Degrees of freedom'. Gibbs Phase rule equation. Application of the phase rule to one-component system (Water system) and two-component system (silver-lead system).

Energy Sources:

Characteristics of fuels for internal combustion (IC) engines, Knocking, Octane number. Unleaded petrol, Cetane number, Power alcohol, Compressed Natural gas (CNG), Liquified petroleum gas (LPG).

UNIT-III (9+3)

Introduction to Methods of Chemical Analysis:

Introduction to spectroscopy, Microwave spectra: Theory, Application of microwave spectra in the determination of bond length of a diatomic molecule. Infra-Red spectra: Theory, Applications: Calculation of force constant and identification of functional groups in organic compounds. UV-Visible spectra: Lambert-Beer's law and its applications, Types of electronic transitions.

Water Analysis and Treatment:
Hardness of Water, determination of hardness of water by using EDTA, determination of Alkalinity, determination of Chloride by argentometry, determination of Fluoride by spectrophotometry, determination of Dissolved Oxygen, Biochemical Oxygen Demand and Chemical Oxygen Demand, Softening of water by Zeolite process and Ion-exchange process, Reverse Osmosis, Electrodialysis.

UNIT-IV (9+3)

Organic Chemistry:
Fission of a covalent bond, Types of electron effects: Inductive effect, Mesomeric effect and Hyperconjugation, Reaction intermediates and their stabilities, Types of reagents: Electrophilic, Nucleophilic and Free radical reagents. Study of the mechanisms of substitution (SN^1 and SN^2) and Addition (Electrophilic, Nucleophilic and Free radical) reactions, Role of inductive effect, mesomeric effect and hybridazation on the dissociation constant of carboxylic acids.

Polymers:
Introduction : Types of Polymerization reactions (Addition and Condensations), Mechanism of free radical, cationic and anionic addition polymerization, Condensation polymerization, Thermo setting and thermo plastic resins, Silicone rubber, Conducting polymers, Laminated plastics.

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Text Books:

1. Jain and Jain, "Engineering Chemistry", *Dhanpat Rai Publishers.*
2. Shashi Chawla, "Text book of Engineering Chemistry", *Dhanpat Rai Publishers.*

Reference Books:

1. J C Kuriacose and J.Rajaram, "Chemistry in Engineering and Technology (Vol .I&II)", *Tata McGraw Hill Publishers.*
2. Suba Ramesh, Vairam et. al "Engineering Chemistry", *Wiley India.*
3. O P Agarwal, "Engineering Chemistry", *Khanna Publishers.*
4. S.S.Dara, "A Text book of Engineering Chemistry", *S.Chand & Company Ltd.*

Course Learning Outcomes (COs):
After completion of the course, the student will be able to,
CO1: understand basic principles and role of chemistry in the field of engineering
CO2: gain the knowledge of interrelationship between electrical and chemical energy
CO3: make a judicious selection of materials in the field of engineering
CO4: understand the phase rule and its application in the study of material science
CO5: understand the methods of chemical analysis of water and its treatment
CO6: know the synthetic methods and versatile applications of polymers
CO7: understand the advantage of spectrometric methods of chemical analysis over the conventional methods

U14MH104 ENGLISH FOR COMMUNICATION

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	2	-	3

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to acquire writing skills with a focus on accuracy avoiding common errors in English.
LO2: to acquire word power enabling to use them in speaking and writing.
LO3: to develop reading comprehension skills with local and global comprehension.
LO4: to acquire listening and speaking skills using language laboratory.

UNIT-I (6)

Grammar

1. Clause Analysis
2. Tenses
3. Reported Speech

UNIT-II (6)

Vocabulary

1. Collocations
2. Idioms & Phrasal verbs

UNIT-III (6)

Reading Comprehension

1. "Stopping by Woods on a Snowy Evening" by Robert Frost
2. " Adivasis" by Kancha Ilaiah

UNIT-IV (6)

Writing Devices

1. Application for jobs and preparing a curriculum vitae
2. Report writing
3. Project Writing

Text Books:

1. Damodar G., & Surender Kumar M., "English for Communication", *KGA Publications,* Warangal.
2. Purushotham K., "English for fluency", *Orient Blackmen*, Hyderabad.

Reference Book:

1. Krishna Swamy N., "Modern English Grammar"**,** *MacMillan India Ltd.*

English Language Lab:
{Teacher Assessment (TA) is done through English Language Lab}

Listening Skills (6x2)

1. Listening to sounds, stress and intonation
2. Listening for information

Speaking Skills (6x2)

a. Presentation Techniques

- Group Discussions
- Interview Skills

b. Assignment

Students have to prepare and present an assignment on the following through PPT in the communication skills laboratory.

- Presentation of Oneself

Course Learning Outcomes (COs):
After completion of the course, the student will be able to,
CO1: develop writing skills with a focus on accuracy to develop error free English.
CO2: develop word power to enable to use them in speaking and writing.
CO3: develop reading skills with a focus on developing reading comprehension skills .
CO4: enhance listening and speaking skills.

Note:

Teacher Assessment	:	15 marks
• Assignment	:	05 marks
• Lab Performance	:	05 marks
• Lab Attendance	:	05 marks
Total	**:**	**15 marks**

U14ME104 ENGINEERING DRAWING

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	4	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
LO1: to understand the importance of Engineering Drawing
LO2: to communicate effectively through Engineering Drawing
LO3: to impart and inculcate proper understanding of theory of projections
LO4: to identify the significance and application of the orthographic and isometric drawings.

UNIT – I (6+12)

Introduction:
Importance of Engineering Drawing, instruments- uses; Conventions - ISO and BIS, Layout of drawing sheets, Types of Lines, Lettering and dimensioning.

Geometrical Constructions:
Bisection of a line, arc and angle; division of a line, Construction of polygons- triangle, square, pentagon and hexagon.

Projection of Points:
Introduction to orthographic projections-Vertical Plane, Horizontal plane; Views-Front view, Top view and Side view; Projection of Points.

Projection of Straight lines - I:
Line parallel to both the planes, Line parallel to one plane and perpendicular to the other reference plane, Line parallel to one plane and inclined to the other reference plane.

UNIT – II (6+12)

Projection of Straight lines – II: Line- inclined to both the planes-Traces.

Projection of Planes:
Planes - Perpendicular and Oblique planes; Projections of planes - parallel to one of the reference plane, inclined to one of the reference plane and perpendicular to the other; Projections of oblique planes.

UNIT – III (6+12)

Projection of Solids:
Types-prisms, pyramids, cylinder and cone; Simple Positions-axis parallel to a reference plane and perpendicular to the other plane, axis parallel to one plane and inclined to other reference plane; axis inclined to both the reference planes.

Sections of Solids:
Types-prisms and pyramids; Section planes, Sectional views and true shape of a section.

UNIT – IV (6+12)

Isometric Projections:
Terminology; difference between isometric projection and view; Construction of isometric projection of different solids-box method and offset method.
Orthographic projections: Conversion of isometric views into orthographic views.

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Text Books:

1. Bhatt N.D., "Elementary Engineering Drawing", *Charotar Publishing House,* Anand.

Reference Books:

1. Dhananjay A Jolhe, "Engineering Drawing", *TMH,* 2008.
2. Venugopal K. "Engineering Graphics with Auto CAD", *New Age International Publishers Ltd.*, Hyderabad.
3. K. L. Narayana & P. Kannaiah, "Engineering Drawing'', *SciTech Publications,* Chennai
4. W J Luzadder and J M Duff, "Fundamentals of Engineering Drawing", *Prentice-Hall of India*, 1995.

Course Learning Outcomes (COs):
After completion of the course, the student will be able to,
CO1: develop concepts on Engineering Drawing in order to become professionally efficient
CO2: understand the theory of projections
CO3: improve their spatial imagination skills to develop new products.

U14EI105 BASIC ELECTRONICS ENGINEERING

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

LO1: to introduce basic concepts of semi conductors and conductivity in semiconductors
LO2: to introduce the operation and applications of semiconductor diodes
LO3: to introduce the basic concepts of BJT & its DC biasing concepts and FET
LO4: to introduce the fundamental concepts and basic principles of Electronic Measuring instruments

UNIT-I (9)

Introduction to Electronics:
Analog Signals (DC & AC), Sources (DC & AC), Digital Signals
Semiconductors:
Energy bands in solids, Concept of forbidden gap, Insulator, Metals and Semiconductors, Transport phenomenon in semiconductors: Mobility and conductivity, Intrinsic semiconductor, Donor and Acceptor impurities, Fermi level, Recombination and Minority carrier Injection, Drift currents and Diffusion currents, Temperature dependence of conductivity, Hall Effect
Semiconductor Diode:
P-N Junction, Band diagram, Depletion layer, V-I characteristics of P-N Diode, Diode resistance and capacitance, Avalanche and Zener breakdown mechanisms

UNIT-II (9)

Diode Circuits:
Rectifier circuits – Half wave, Full wave & Bridge rectifiers, Ripple voltage and Diode current with and without filters, Voltage regulation using Zener diode, Block diagram of DC adapter, Operation of LED & Photodiode
Bipolar Junction Transistor:
Physical structure, Transistor current components, CE, CB & CC configurations and their Input & Output characteristics

UNIT-III (9)

DC Analysis of BJT Circuits:
DC load line, Need for biasing, Transistor biasing methods for CE configuration, Basic transistor applications: Switch and Amplifier, Block diagram of a Public Address system
Field Effect Transistor:
Physical **s**tructure, Operation and Characteristics of a Junction Field Effect Transistor (JFET)

UNIT-IV (9)

Measurement Systems:
Block diagram of Measurement system, Ideal requirements of Measurement system, Performance characteristics of Measurement system, Errors in Measurement system
Electronic Instruments:

PMMC Mechanism, Ammeter, Voltmeter & Ohmmeter, Loading effects of Ammeter & Voltmeter, Block diagram of Digital Multimeter (DMM), Block Diagram of Cathode Ray Oscilloscope (CRO), Expression for deflection sensitivity, CRT Screens, Measurement of time period and amplitude

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Text Books:

1. David.A.Bell, "Electronic Devices and Circuits", *Oxford University Press,* New Delhi, India.
2. Neil storey, "Electronics: A systems Approach", *4/e-Pearson Education Publishing company Pvt. Ltd*, India.
3. Helfrick. A.D and Cooper W.D., "Modern Electronic Instrumentation and Measurement Techniques", *PHI,* India.

Reference Books:

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", 3/e, *TMH,* India.
2. Bhargava and Kulashresta, "Basic Electronics and Linear Circuits", *TTTI, TMH,* India.
3. Sawhney A.K, "Electrical and Electronic Measurements and Instrumentation", *Dhanpat Rai & Sons,* New Delhi, India.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: learn the concepts of conductivity in semi conductors

CO2: learn the operation of basic semi conductor devices and their V-I characteristics

CO3: get familiarized with the concepts of BJT& FET

CO4: use basic electronic measuring instruments like DMM and CRO

U14EE105 BASIC ELECTRICAL ENGINEERING

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	**:**	40 marks
End Semester Exam	**:**	60 marks

Course Learning Objectives (LOs):

LO1: to impart basic knowledge about the Electrical & Magnetic Circuits.
LO2: to apply Kirchhoff's laws and Equivalent circuit models to analyze voltage & current relationship in passive circuit.
LO3: to inculcate the understanding about A.C. fundamentals and transformers.
LO4: to understand the working principles and applications of DC and AC Machines.

UNIT – I (9)

D.C. Circuits:
Ohm's Law, Network Elements, Kirchhoff's Laws, Source Transformation, Mesh and Nodal Analysis, Power in D.C. Circuits, Series, Parallel and Series Parallel combination of Resistances ,network reduction by Star – Delta Transformation.

Magnetic Circuits:
Introduction, Magnetic Circuits, Magnetic Field Strength, Magnetomotive Force, Permeability, Relative Permeability, Analogy between Electric and Magnetic Circuits, Series Magnetic Circuit, Parallel Magnetic Circuit, Self-Inductance and Mutual Inductance.

UNIT – II (9)

D.C. Machines:
Constructional features, Methods of Excitation, E.M.F. Equation, Torque development in D.C motor, Characteristics of Series, Shunt and Compound motors and Applications.

1-ϕ A.C. Circuits:
Phasor representation of sinusoidal quantities, Average, R.M.S. values and Form factor, A.C. through Resistor, Inductor and Capacitor, Analysis of R-L-C series and Power factor, Power triangle, Series Resonance.

Measurements:
Working principle of Moving coil, Moving Iron Ammeters and Voltmeters Dynamometer type Wattmeter.

UNIT – III (9)

3-ϕ A.C. Circuits:
Production of 3 **-**ϕVoltages, Voltage & Current relationships of Line and Phase values for Star and Delta connections , 3-ϕ Power Measurement by two-wattmeter method.

1-ϕ Transformers:
Construction and operation principle, Development of No Load & On Load Phasor diagrams, Equivalent circuit, O.C. and S.C. tests, Losses and Efficiency, Voltage regulation.

UNIT – IV (9)

3-ϕ Induction Motor:
Constructional features, Principle of Operation, Production of Rotating Magnetic Field, Torque – Slip Characteristics, Applications.

1-ϕ Induction Motors:
Production of Rotating Field in various type of 1 – Phase Motors Split Phase, Capacitor Start, Capacitor run, Shaded Pole motors and Applications.

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Text Books:

1. Edward Hughes, "Electrical & Electronics Technology", 10/e., *Pearson Education,*2010

Reference Books:

1. M.S. Naidu & S.Kamakshaiah, "Introduction to Electrical Engineering", *Tata McGraw Hill Ltd*, New Delhi.
2. B.L.Thereja, A.K.Thereja, "Electrical Technology Vol. I & II", *S.Chand & Company Ltd,* 2005 Edn.
3. Chakravarthy A, Sudhipanath and Chandan Kumar, "Basic Electrical Engg.", *Tata McGraw Hill Ltd*, New Delhi.

Course Learning Outcomes (COs):

After completion of the course, the students will be able to,

CO1: predict the behavior of any Electrical & Magnetic Circuits.
CO2: solve Electrical Networks by mesh & nodal analysis.
CO3: analyze 1-ϕ & 3 -ϕ AC Basic network and measure the 3-ϕ power
CO4: identify the type of Electrical Machines used for that particular application.

U14ME106 BASIC MECHANICAL ENGINEERING

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to identify various engineering materials and applications.
LO2: to understand the basic elements of power transmission.
LO3: to know the basic manufacturing processes.
LO4: to understand fundamental principles and applications of thermodynamics.
LO5: to know working principles of SI and CI engines.

UNIT- I (9)

Engineering Materials: Classification; properties and applications.
Power Transmission: Classification; Flat belt drives - open and cross belts; Introduction to Gears.
Bearings: Types - Sliding and rolling contact; Lubricants - Objectives, types, properties and applications.

UNIT- II (9)

Manufacturing Processes: Classification and their applications.
Sand Casting: Terminology; Mould cross section; Moulding sand-types and properties; Patterns-types, materials and allowances.
Welding: Principle and applications of gas and arc welding
Machining: Classification; Lathe machine-line diagram and functions of various parts.

UNIT- III (9)

Fundamental Concepts: Introduction to SI units, System, Thermodynamic state, Property, Process and Cycle; Energy, Work and Heat; Thermodynamic Equilibrium, Zeroth law of Thermodynamics, Laws of perfect gases.
First Law Of Thermodynamics: First law- Applications to Closed system, Internal energy, Enthalpy; Processes of Closed systems- Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic.

UNIT- IV (9)

Second Law Of Thermodynamics: First law limitations, Second law Statements and their equivalence, Carnot Cycle, Carnot Theorem, Heat engine, Heat pump and Refrigerator.
IC Engines: Classification; Working principle of two and four stroke SI and CI engines.

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Text Books:

1. Basant Agrawal and C M Agrawal, "Basic Mechanical Engineering", *Wiley India Pvt. Ltd,* New Delhi

2. Mathur, Mehta and Tiwari, "Elements of Mechanical Engineering", *Jain Brothers*, New Delhi
3. Hazra Chowdary. S. K and Bose, "Basic Mechanical Engineering", *Media Promoters and Publishers Pvt. Ltd,* India.

Reference Books:

1. P. K. Nag, "Engineering Thermodynamics", *Tata McGraw Hill*, New Delhi.
2. Hazra Chowdary. S. K and Bose, "Workshop Technology, Vol. I & II", *Media Promoters and publishers Pvt Ltd,* India.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: know the properties and applications of various engineering materials
CO2: learn the basic concepts of power transmission
CO3: follow the principles and operations of manufacturing technology
CO4: understand the laws of thermodynamics and their applications
CO5: know the working principle of Heat engine, Heat pump and Refrigerator.

U14CE106 BASIC ENGINEERING MECHANICS

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: study the concept of force, principles of force and their application on engineering structures and machines.

LO2: to expose the students various kinds of statically determinate pin jointed structures and methods of analysing the truss.

LO3: to know the importance of geometric centre, cross sectional areas of plane bodies through centre of gravity and moment of inertia respectively.

LO4: study the dynamic behavior of particles in motion subjected to force system.

UNIT – I (9+3)

Introduction:

Basic Definitions – Mass, Particles, Rigid Body, Time, Space, Force, Branches of Mechanics, Fundamental principles of Mechanics – Parallelogram and Triangle laws of Forces, Newton's laws of Gravitation and Motion, Laws of superposition and Transmissibility of Forces.

Force Systems:

Types of Forces – Co-planar, Concurrent and Parallel Forces, Moment and Couple, Free Body Diagram, Types of Supports, Resultant of Force Systems, Resolution of Forces, Composition of Forces, Equilibrium equations of Forces, Lami's Theorem, Varignon's Theorem, Moment Equilibrium Equations, Distributed Forces, Resultant and Equilibrium of General Force System.

UNIT –II (9+3)

Friction:

Introduction, Classification, Laws of Friction, Coefficient of Friction, Angle of Friction, Angle of Repose, Ladder Friction, Wedge Friction .

Plane Trusses and Frames:

Basic Definitions, Stability and Determinacy Conditions, Rigid truss, Basic assumptions for a perfect truss, Assumptions in the Analysis of Trusses, Methods of Analysis of Trusses: Method of Joints and method of Sections of a Cantilever and simply supported statically determinate trusses.

Frames: Analysis of a Frames using Method of Members

UNIT– III (9+3)

Centroid and Centre of Gravity:

Introduction, Computation of Centroid, Centre of gravity of one dimensional and two dimensional figures- centroids of composite line, simple sections, composite sections-Centre of gravity of composite areas and composite bodies.

Moment of Inertia:

Introduction to Moment of Inertia, Transfer theorems of Moment of Inertia – Parallel Axis theorem and Perpendicular Axis theorem.

UNIT - IV (9+3)

Kinematics:

Introduction to Dynamics, Rectilinear Motion of a particle – Displacement, Velocity and Acceleration, Motion with uniform Acceleration and Motion with variable Acceleration.

Curvilinear Motion- Components of motion, Rectangular Components, Components of Normal and Tangential Acceleration.

Kinetics:

Rectilinear motion-Equations of Rectilinear motion, Equations of Dynamic Equilibrium, D'Alembert's Principle.

Curvilinear Motion-Equations of Motion in Rectangular components, Tangential and Normal Components, Equations of Dynamic Equilibrium.

Applications of Work-Energy, Impulse –Momentum principles of Rectilinear Motion and Curvilinear Motion.

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Text Books:

1. Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers,* New Delhi, 40/e., 2014.
2. Timoshenko S., Young D.H., Rao J.V., and Sukumar Pati, "Engineering Mechanics in SI units", *McGraw Hill Education Pvt. Ltd.,* New Delhi, 5/e., 2013.
3. Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press*, 9/e., 2013.

Reference Books:

1. Singer F.L., "Engineering Mechanics: Statics and Dynamics", *Harper and Row Publishers,* 3/e., 1975.
2. Bhavikatti S.S., "Engineering Mechanics", *New Age International,* New Delhi, 4/e., 2013 (reprint).

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: understand the physical action of forces on the bodies through free body diagrams and analyse the forces using principles of force.

CO2: determine the axial forces in members of pin jointed structures subjected to various types of loadings.

CO3: understand the technical importance of geometrical shapes and centre of various cross sections.

CO4: understand equilibrium condition of particles in dynamic condition and can analyse the problems using various applications such as conservation of work energy principle.

U14CS107 PROGRAMMING IN C LABORATORY

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to expose the undergraduate students to the practical implementation of C Programming concepts
LO2: to improve students capability in applying C Programming for problem solving.
LO3: to make students use effective memory management techniques in programming
LO4: to expose students to modular programming concepts in problem solving

LIST OF EXPERIMENTS

1. Programs using input output functions, operators (arithmetic, relational, conditional etc).
2. Programs using operators (bit-wise, logical, increment and decrement etc).
3. Programs using conditional control structures: if, if-else, nested if.
4. Programs using else if ladder, switch and goto.
5. Programs using loop control structures: while, do-while, for.
6. Programs on one dimensional array and two dimensional arrays.
7. Programs using functions: different types, parameter passing using call-by-value, call-by-reference, recursion and storage classes.
8. Programs using strings: one dimensional array, two dimensional array, string handling functions.
9. Programs using pointers, string pointers.
10. Programs using, structure pointers, functions pointers.
11. Programs using dynamic memory allocation.
12. Programs using file operations and file handling functions.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,
CO1: learn practical implementation of C programming language concepts.
CO2: debug and document programs in C.
CO3: know usage of logical skills in developing C programs.
CO4: apply effective memory management techniques for problem solving
CO5: understand the file management techniques

U14PH108 ENGINEERING PHYSICS LABORATORY

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to understand the oscillatory phenomena in determining the various properties like rigidity modulus, moment of inertia, acceleration due to gravity and other elastic properties.

LO2: to determine the wavelengths, slit widths, diameters of thin wires etc., with high degree of accuracy using interference and diffraction techniques.

LO3: to study the optical activity of some substances.

LO4:to determine the optical fiber characteristics.

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LIST OF EXPERMENTS

1. Newton's Rings: Determination of wavelength of a monochromatic light
2. Determination of slit width using He-Ne Laser
3. To find dispersive power of a prism using Spectrometer
4. Torsional pendulum: Determination of rigidity modulus of given wire and moment of inertia of ring
5. Diffraction Grating: Determination of wave lengths of white light using normal incidence method
6. To determine resolving Power of a Telescope
7. To find the acceleration due to gravity (g) by Compound pendulum
8. Polarimeter (Saccharimeter): Determination of specific rotation of sugar solution
9. Photo Cell: To study the characteristics of a photo cell
10. Determination of wavelength of He-Ne Laser
11. Spiral spring: Determination of force constant of spiral spring
12. Determination of Numerical Aperture of an Optical fiber
13. Determination of diameter of a thin wire using Interference method

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: handle and apply the powerful radiations like lasers and radioactive rays.

CO2: know the interference and diffraction patterns and apply them in precise measurements.

CO3: make preferential selection of Optical fibers.

CO4: determine the various optical, mechanical and magnetic properties

U14CH108 ENGINEERING CHEMISTRY LABORATORY

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To gain hands-on experience of conventional and instrumental methods of chemical analysis
LO2: To introduce water analysis techniques
LO3: To understand the principles involved in the polymerization reactions
LO4: To gain the knowledge of estimation of metals from their ores
LO5: To expose the experiments such as estimation of metal ion by using ion-exchange resin, instrumental methods of chemical analysis, adsorption
LO6: To introduce a photo chemical reduction

LIST OF EXPERIMENTS

1. Determination of Alkalinity of test sample of water
2. Estimation of Available Chlorine in test sample of Bleaching powder
3. Determination of Hardness of water using complexometric method
4. Determination of Calcium in Lime Stone / Dolomite
5. Estimation of Cupric ions in the test solution
6. Adsorption of an acid on a charcoal -Applicability of adsorption Isotherm
7. Photochemical reduction of Ferric salt
8. Synthesis of a polymer
9. Conductometric Titrations
10. Potentiometric Titrations
11. Colorimetric analysis – Verification of Lambert-Beer's Law
12. Estimation of Metal ion using ion-exchange resin

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,
CO1: handle analytical instruments for chemical analysis.
CO2: determine alkaline species, temporary and permanent hardness of a water sample.
CO3: estimate some metals from their ores.
CO4: understand the advantages of instrumental methods of chemical analysis over conventional methods.
CO5: understand the principles involved in photo chemical and polymerization reaction.

U14ME109 ENGINEERING WORKSHOP PRACTICE

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
LO1: to understand the importance of workshop practice in Engineering
LO2: to acquire proper understanding of various manufacturing processes
LO3: to identify the significance and application of various tools and equipment used in workshop

LIST OF EXPERIMENTS

Foundry:

1. Prepare a Sand Mould using bracket pattern
2. Prepare a Sand Mould using dumbbell pattern

Fitting:

3. Prepare a Square fit using Mild Steel Plates
4. Prepare a Half round fit using Mild Steel Plates

Welding:

5. Prepare a Lap joint on Mild Steel Plates using Arc Welding
6. Prepare a Single V – Butt Joint on Mild Steel Plates using Arc Welding

Carpentry:

7. Prepare a Half lap joint of a given Wooden pieces
8. Prepare a Bridle joint of a given Wooden pieces

Plumbing:

9. Prepare a Pipe joint with elbows & tee using PVC pipes
10. Prepare a Pipe joint with union & coupling using PVC pipes

Machine Shop:

11. Perform a Step turning operation on mild steel bar
12. Perform a Taper turning operation on mild steel bar

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Text Books:

1. Hazra Chowdary. S.K and Bose, "Elements of Workshop Technology, Vol-I &II", *Media Promoters and publishers Pvt. Ltd,* India.
2. W.A.J.Chapman, "Workshop Technology, Vol-I", *Edward Arnold*

Course Learning Outcomes (COs):
After completion of the course, the student will be able to,
CO1: know and understand the types of trades in engineering
CO2: improve their practical skills to develop new products

U14CH109 ENVIRONMENTAL STUDIES

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	-	-	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To incorporate the basic knowledge of the environmental studies
LO2: To understand the need to use resources more equitably
LO3: To understand the knowledge of conversation of biodiversity
LO4: To introduce the causes, effects and control measures of environmental pollution
LO5: To know the issues involved in enforcement of environmental legislation

UNIT-I (6)

Introduction:

The Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance.

Natural Resources:

Forest Resources: Use and over – exploitation of forests, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.

Water Resources: Use and over- utilization of surface and ground water, floods; drought; conflicts over water.

Mineral Resources: Environmental effects of extracting and using mineral resources.

Agricultural Land: Land as a resource, land degradation, soil erosion and desertification.

Food Resources :World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II (6)

Ecosystem and Biodiversity:

Ecosystem: Concepts of an ecosystem: Food chain, food webs and ecological pyramids: Energy flow in the ecosystem: ecological succession.

Biodiversity and its conservation: Introduction: Definition. genetic, species and ecosystem diversity; value of biodiversity. Biodiversity in India, Hot spots of biodiversity, Man- wildlife conflicts, Endangered and endemic species of India, In-situ and Ex-situ conservation

UNIT-III (6)

Environmental Pollution:

Global climatic change, Green house gases, Acid rain.

Causes and effects of Air, Water, Soil, Marine and Noise pollution with case studies.

Solid and Hazardous waste management, effects of urban, industrial and nuclear waste. Natural disaster management: flood, earthquake, cyclone and landslides.

UNIT-IV (6)

Environment Protection and Society:

Role of Individual and Society: Role of individual in prevention of pollution, Water conservation, Rain water harvesting, Watershed management, wasteland reclamation.

Environmental Protection / Control Acts: Environmental legislation with respect to Air, Water, Forest and Wildlife, Enforcement of environmental legislations, Population growth, Role of Information Technology in Environment and Human Health.

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Text Books:

1. Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses – 2/e., *Universities Press (India) Private Limited*
2. Anjaneyulu Y., "Environmental Studies", *B.S. Publications*.

Reference Books:

1. Bharucha Erach, "The Biodiversity of India" *Mapin Publishing Pvt. Ltd.*
2. Odum, E.P. 1971, "Fundamental of Ecology", *W.B. Saunders Co.,* USA, 574p.
3. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", *Technoscience Publications.*
4. Gilbert M. Masters, **"Introduction to Environmental Engineering & Science",** 1991, *PHI*
5. A.S. Chauhan, "Environmental Studies", *Jain Brothers* (New Delhi) 3rd revised and enlarged edition
6. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford University Press*

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: understand human interaction with the environment
CO2: understand utmost importance of the sustainable use of natural resources
CO3: get acquainted with ecosystem and conservation of biodiversity
CO4: gain the knowledge of control measures of environmental pollution and natural disaster management
CO5: understand the conflict between the existing development strategies and need for environmental conservation
CO6: understand various environmental protection / control acts
CO7: understand the role of individual in the environment protection

U14EA110 EAA: PHYSICAL EDUCATION & NSS

Class: B.Tech. I Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation :	100 marks
End Semester Exam :	-

I. PHYSICAL EDUCATION

Course Learning Objectives & Outcomes:

- *To perform and engage in a variety of physical activities*
- *To develop and maintain physical health and fitness through regular participation in physical activities*
- *To demonstrate positive self esteem, mental health and physiological balance through body awareness and control*
- *To exhibit the spirit of fair play, team work and sportsmanship*

Activities related to:

1. Physical Fitness
2. Games & Sports

II. NATIONAL SERVICE SCHEME (NSS)

Course Learning Objectives (LOs):

The objectives of the NSS is to
LO1: arouse the social consciousness of the students
LO2: provide them with opportunity to work with people in villages and slums
LO3: expose them to the reality of life
LO4: bring about a change in their social perceptions
LO5: develop competence required for responsibility sharing and team work

List of Activities:

1. Shramadanam
2. Tree Plantation
3. General Medical Camps in Villages
4. Awareness on Eye Donation
5. Awareness on "Child Labour and Child Marriages"
6. Awareness programs on "Literacy, Good Health Practices, etc."
7. Safe Riding Program
8. Awareness program on "RTI Act"
9. Awareness on Blood Donation

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,
CO1: develop his / her personality through community service rendered
CO2: apply their education to find solutions to individual and community problems
CO3: acquire capacity to meet emergencies and natural disasters
CO4: acquire a democratic attitude, leadership qualities and practice national integration

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL – 15

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : COMMON FOR ALL BRANCHES
SEMESTER : SECOND

S. No.	Course code	Course Name	Periods			Credits (C)	Evaluation Scheme				
							CIE			ESE	Total Marks
			L	T	P		TA	MSE	Total		
1	U14MH201	Engineering Mathematics-II	3	1	-	4	15	25	40	60	100
2	U14CS202	Object Oriented Programming through C++	3	1	-	4	15	25	40	60	100
3	U14CH203	Engg. Chemistry /	3	1	-	4	15	25	40	60	100
	U14PH203	Engg. Physics	3	1	-	4	15	25	40	60	100
4	U14ME204	Engineering Drawing /	2	4	-	4	15	25	40	60	100
	U14MH204	English for Communication	2	2	-	3	15	25	40	60	100
5	U14EE205	Basic Electrical Engg. /	3	-	-	3	15	25	40	60	100
	U14EI205	Basic Electronics Engg.	3	-	-	3	15	25	40	60	100
6	U14CE206	Basic Engg. Mechanics	3	1	-	4	15	25	40	60	100
	U14ME206	Basic Mechanical Engg.	3	-	-	3	15	25	40	60	100
7	U14CS207	Object Oriented Programming (OOP) Lab	-	-	3	2	40	-	40	60	100
8	U14CH208	Engg. Chemistry Lab /	-	-	3	2	40	-	40	60	100
	U14PH208	Engg. Physics Lab	-	-	3	2	40	-	40	60	100
9	U14CH209	Environmental Studies #	2	-	-	2	40	-	40	60	100
	U14ME209	Engg. Workshop Practice	-	-	3	2	15	25	40	60	100
10	U14EA210	EAA: Physical Education & NSS #	-	-	2	1	100	-	100	-	100
		Total	19/ 17	8/ 5	8/ 11	30/ 28					1000

Note: **L** – Lectures; **T**- Tutorials; **P** – Practicals; **CIE** – Continuous Internal Evaluation; **TA** – Teachers Assessment; **MSE** – Mid Semester Examination; **ESE** – End Semester Examination; **EAA** – Extra Academic Activity;

***indicates Mandatory Course***

Student Contact Hours / Week : Stream – I = 35 (periods/week); Stream- II = 33 (periods /week)

Total Credits (C) : Stream – I = 30 Credits; Stream –II = 28 Credits

U14MH201 ENGINEERING MATHEMATICS- II

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to enable the student to acquire fundamental knowledge of mathematical concepts and methods and apply in engineering disciplines
LO2: to introduce the methods of solving higher order linear differential equations with constant coefficients and introduce simple applications
LO3: to introduce the concept of vector function and vector differential calculus
LO4: to introduce integration of vector valued functions
LO5: to introduce functions of complex variables and the property of analyticity of a function of complex variable

UNIT-I (9+3)

Higher order linear differential equations with constant coefficients:

Liner differential Equations of higher order with constant coefficients, General solution, Complementary function, Particular Integral. Methods of evaluation of particular Integrals.
Simple examples of Physical applications (Free oscillations of Spring - Mass system, RLC series circuit problem)
Wronskian, Linear dependence of solutions, Method of Variation of parameters.
Cauchy's homogenous linear equation.

UNIT-II (9+3)

Vector Differential Calculus:

Vector functions - Derivative of a vector function of a scalar variable, Velocity and acceleration, Curves in Space, Tangent, Principal normal, Binormal, Curvature, Torsion of a given curve and Frenet -Serret Formulae.
Scalar and vector point functions, Vector operators – Gradient of a scalar field, Divergence of a vector field, Curl of a vector field and their physical interpretations. Directional derivative, Application to find angle between two surfaces and to find scalar potential of a vector field, Irrotational fields & Solenoidal fields.

UNIT-III (9+3)

Vector integration:

Integration of vector valued functions of a scalar variable, Application to find velocity and displacement of a particle;
Line integral of scalar point and vector point functions, Applications: Work done by a force, Circulation; Surface Integral & Volume integral.
Green's theorem in plane, and area of a plane region using Green's theorem, Stokes theorem & Gauss divergence theorems (without proof).

UNIT-IV (9+3)

Complex Variables:

Functions of complex variables, Limit, Continuity, Differentiability, Analytic Functions, Cauchy-Riemann Equations in Cartesian and Polar coordinates. Elementary functions, Harmonic Functions, Construction of Analytic functions.
Applications to find velocity potential and stream function of a fluid flow.

Conformal mapping and bilinear transformation.

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Text Books:

1. Grewal, B.S., "Higher Engineering Mathematics", *Khanna Publishers,* Delhi,

Reference Books:

1. Churchill R.V., "Complex Variable and its Applications", *McGraw Hill*
2. Kreyszig E., "Advanced Engineering Mathematics" , *New Age International*
3. Spiegel M., "Vector Analysis -Schaum Series", *McGraw Hill*

Course Learning Outcomes (COs):

After completion of the course, the student will be able to

CO1: solve a given higher order linear differential equation with constant coefficients

CO2: understand few simple applications

CO3: understand the concept of a vector function and vector differentiation and will be able to find the characteristics of a space curve such as tangent, normal, binormal, curvature and torsion

CO4: understand the concept of gradient , divergence and curl of a vector point function and will be able to apply them to find angle between two surfaces, scalar potential

CO5: find line, surface and volume integrals of vector valued functions and understand Green's theorem, Stokes theorem and Gauss theorem

CO6: understand the concept of a function of complex variable and verify whether a function is analytic or not.

CO7: construct analytic function when real/imaginary part of the function is known

CO8: find velocity potential and stream function of a fluid flow using complex analytical methods

U14CS202 OBJECT ORIENTED PROGRAMMING THROUGH C++

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to expose the students to the concepts of Object-Oriented Paradigm
LO2: to improve students capability in applying object oriented programming concepts in problem solving
LO3: to improve students expertise in implementing object oriented concepts using C++ Programming
LO4: to enable students to understand concepts of templates and exceptional handling

UNIT – I (9+3)

Programming Paradigms: Procedural Programming, Modular Programming, Object-Oriented Programming and Generic Programming.
Introduction to C++: Structure of C++ program, Basic I/O, Tokens, Data types, Reference variables, Operators, Manipulators, Expressions, Control Structures, Name Spaces.
Functions in C++: Inline function, Default arguments, Overloading, Parameter passing mechanisms, Name Spaces.

UNIT – II (9+3)

Classes and objects: Structures, Access Control, Specifying a Class, Defining member functions, Making an outside function inline, Nesting of member functions, Arrays within class, Arrays of objects, Static data members, Static member functions, Friend functions, Objects as arguments, Returning objects, Pointers to members, Constructors and Destructors.
Operator Overloading: Overloading of Unary and Binary operators, Overloading of Unary and Binary operators using friend functions, String operations, Type conversions.

UNIT – III (9+3)

Inheritance: Single inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical inheritance, Hybrid inheritance, Making private member inheritable, Virtual Base class, Abstract class, Constructors in derived classes.

Polymorphism: Pointers to objects, Pointers to derived classes, This pointer, Virtual Functions, Pure virtual functions.
Managing Console I/O operations: Introduction, C++ Streams, C++ Stream Classes, Un formatted I/O Operations, Formatted I/O Operations, Managing output with manipulators.

UNIT – IV (9+3)

Files: Classes for file stream operations, Opening and closing a file, Detecting EOF, File Modes, File pointers and their manipulators, Sequential input and output operations, Random access files, Command line arguments.
Templates: Class templates, Class templates with multiple parameters, Function templates, Function templates with multiple parameters, Overloading of template functions.
Exception Handling: Exception handling mechanism, Throwing mechanism, Catching mechanism, Rethrowing of exception, Specifying the exceptions.

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Text Books:

1. E.Balagurusamy, "Object-Oriented Programming with C++", *McGraw-Hill Education India Pvt. Ltd* , Sixth Edition, ISBN-13:978-1-25-902993-6, 2012.
2. Bjarne Stroustrup, "The C++ Programming Language", *Addison-Wesley Publications*, Second Edition, ISBN No. 81-7808-126-1, 1991.

Reference Books:

1. K.R. Venugopal, Rajkumar, T.Ravishankar, "Mastering C++", *McGraw-Hill Education India Pvt.Ltd*, Second Edition, ISBN: 0-07-463454-2, 1997.
2. Timothy Bud, "An Introduction to Object Oriented Programming", *Pearson Education,* Second Edition, ISBN 81-7808-228-4, 2004.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to

CO1: know the differences between procedural language and object-oriented languages
CO2: gain knowledge of Object-Oriented Paradigm for problem solving
CO3: will be able to gain practical knowledge of OOP concepts using C++
CO4: apply reusability concepts like inheritance, polymorphism in application development
CO5: use generic programming concepts
CO6: develop modular programming using classes

U14CH203 ENGINEERING CHEMISTRY

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to understand the fundamental principles and applications of chemistry.
LO2: to identify the significance of electro chemistry.
LO3: to introduce and explore the knowledge of corrosion and its prevention
LO4: to impart and inculcate proper understandings of energy sources, phase rule, organic and polymer chemistry
LO5: to acquire the techniques of water analysis and treatment
LO6: to understand the role of chemistry in the field of engineering

UNIT-I (9+3)

Electrochemistry:

Specific and equivalent conductance, Conductometric titrations, Electrode potential, Nernst equation, Electrochemical series, Reference electrodes : Calomel electrode, Ag/AgCl electrode, Ion-selective electrode : glass electrode, Determination of pH using Glass, Quinhydrone and Hydrogen electrodes, Potentiometric titrations, Commercial cells: Hydrogen-Oxygen fuel cell, Lead-acid storage cell.

UNIT-II (9+3)

Corrosion:

Introduction: Corrosion by pure chemical reaction, Electrochemical theory of corrosion, Galvanic corrosion, Differential aeration corrosion, Factors influencing corrosion, Prevention of corrosion: Cathodic Protection, Hot Dipping, Cementation, Cladding, Electroplating, Corrosion inhibitors, Anodized coatings.

Phase Rule:

Description of the terms: 'Phase', 'Component' and 'Degrees of freedom'. Gibbs Phase rule equation. Application of the phase rule to one-component system (Water system) and two-component system (silver-lead system).

Energy Sources:

Characteristics of fuels for internal combustion (IC) engines, Knocking, Octane number. Unleaded petrol, Cetane number, Power alcohol, Compressed Natural gas (CNG), Liquified petroleum gas (LPG).

UNIT-III (9+3)

Introduction to Methods of Chemical Analysis:

Introduction to spectroscopy, Microwave spectra: Theory, Application of microwave spectra in the determination of bond length of a diatomic molecule. Infra-Red spectra: Theory, Applications: Calculation of force constant and identification of functional groups in organic compounds. UV-Visible spectra: Lambert-Beer's law and its applications, Types of electronic transitions.

Water Analysis and Treatment:

Hardness of Water, determination of hardness of water by using EDTA, determination of Alkalinity, determination of Chloride by argentometry, determination of Fluoride by spectrophotometry, determination of Dissolved Oxygen, Biochemical Oxygen Demand and

Chemical Oxygen Demand, Softening of water by Zeolite process and Ion-exchange process, Reverse Osmosis, Electrodialysis.

UNIT-IV (9+3)

Organic Chemistry:

Fission of a covalent bond, Types of electron effects: Inductive effect, Mesomeric effect and Hyperconjugation, Reaction intermediates and their stabilities, Types of reagents: Electrophilic, Nucleophilic and Free radical reagents. Study of the mechanisms of substitution (SN^1 and SN^2) and Addition (Electrophilic, Nucleophilic and Free radical) reactions, Role of inductive effect, mesomeric effect and hybridazation on the dissociation constant of carboxylic acids.

Polymers:

Introduction : Types of Polymerization reactions (Addition and Condensations), Mechanism of free radical, cationic and anionic addition polymerization, Condensation polymerization, Thermo setting and thermo plastic resins, Silicone rubber, Conducting polymers, Laminated plastics.

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Text Books:

1. Jain and Jain, "Engineering Chemistry", *Dhanpat Rai Publishers.*
2. Shashi Chawla, "Text book of Engineering Chemistry", *Dhanpat Rai Publishers.*

Reference Books:

1. J C Kuriacose and J.Rajaram, "Chemistry in Engineering and Technology (Vol .I&II)", *Tata McGraw Hill Publishers.*
2. Suba Ramesh, Vairam et. al "Engineering Chemistry", *Wiley India.*
3. O P Agarwal, "Engineering Chemistry", *Khanna Publishers.*
4. S.S.Dara, "A Text book of Engineering Chemistry", *S.Chand & Company Ltd.*

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: understand basic principles and role of chemistry in the field of engineering
CO2: gain the knowledge of interrelationship between electrical and chemical energy
CO3: make a judicious selection of materials in the field of engineering
CO4: understand the phase rule and its application in the study of material science
CO5: understand the methods of chemical analysis of water and its treatment
CO6: know the synthetic methods and versatile applications of polymers
CO7: understand the advantage of spectrometric methods of chemical analysis over the conventional methods

U14PH203 ENGINEERING PHYSICS

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to make the bridge between physics in intermediate level and its applications in engineering by giving proper inputs.

LO2: to introduce the basic concepts of all types of oscillations with illustrations by mechanical examples.

LO3: to introduce the basic concepts of coherence and polarized nature (interference, diffraction & polarization) of light waves and their applications.

LO4: to introduce and explore the knowledge of high frequency sound waves & their application in different fields.

LO5: to introduce the basic concepts of modern physics by introducing the fundamental elements of Quantum mechanics, which are essential to understand the mechanics of microscopic particles.

LO6: to introduce the basic concepts of modern science like Photonics (lasers, Fiber optics, etc.,.), modern materials (magnetic materials, superconductors, nano material etc.,.)

UNIT-I (9+3)

Oscillations:

Physical examples of simple harmonic motion –Torsional pendulum, Physical pendulum, Spring - Mass systems and Loaded beams - Two body oscillations – Qualitative treatment of Free, Damped & Forced Oscillations and Resonance.

Interference:

The Superposition principle –Coherence –Phasor method of adding wave disturbances – Phase changes on reflection - Anti reflection coating –Interference of reflected light from uniform and wedge shaped film –Newton's rings in reflected light-Determination of wavelength of monochromatic light using Newton's rings experiment –Michelson's Interferometer, Types of fringes, Determination of wavelength of monochromatic light, thickness and refractive index of a thin transparent sheet using Michelson's Interferometer.

UNIT-II (9+3)

Diffraction:

Fraunhofer diffraction at a single slit, measurement of slit width –Fraunhofer diffraction at a circular aperture –Rayleigh's criterion for resolution - Diffraction grating (Qualitative) – Experimental determination of wavelength using a plane transmission grating- Dispersion and Resolving power of a grating.

Polarization:

Polarized light-Double refraction, Geometry of calcite crystal, Construction and working of a Nicol prism – Theory of polarized light - Production and Detection of plane, circularly and elliptically polarized light – Quarter and Half-wave plates - Optical activity – Laurent's half-shade Polarimeter – Application of polarization in LCDs.

Ultrasonics:

Ultrasonic waves – Properties - Production of Ultrasonic waves - Magnetostriction method, Piezo-electric method – Detection of Ultrasonics - Determination of wavelength (Acoustic grating) - Application of ultrasonic waves.

UNIT-III (9+3)

Lasers (Qualitative):

Absorption, Spontaneous and Stimulated emission – Relation among Einstein coefficients – Difference between conventional and laser light – Population inversion, Methods of achieving population inversion – Types of Lasers – Ruby Laser, Helium-Neon Laser, Carbon dioxide Laser and Nd-YAG Laser – Applications of lasers.

Holography: Introduction – Formation and Reconstruction of a Hologram – Applications of Holography.

Fiber Optics (Qualitative):

Introduction – Total internal reflection – Fiber construction – Numerical aperture and Acceptance angle – Types of Optical fibers (Step and Graded index) – Power losses in Optical fibers –Attenuation, Dispersion, Bending – Light wave Communication using Optical fibers – Applications of Optical fibers - Fiber optic Sensors (Temperature and Displacement), Endoscope.

UNIT-IV (9+3)

Elements of Quantum Mechanics:

De-Broglie concept of matter waves – De-Broglie wavelength, Properties of matter waves – Schrodinger's wave equation – Time independent wave equation (one dimension), Particle in a box (one dimension), energy quantization, Wave functions.

Modern Materials (Qualitative):

Magnetic materials: Introduction –Permeability - Magnetization –Classification of magnetic materials . Applications of magnetic materials – magnetic recording, magnetic memories.

Superconducting materials: Superconductivity – Meissner effect –Transition temperature – Isotope effect. Types of Superconductors - Soft and Hard Superconductors – Applications of Superconductors.

Nanomaterials: Introduction – Classification of nanomaterials – Properties of nanomaterials – Physical, Chemical, Electrical, Optical, Magnetic and Mechanical properties (in brief) - Applications of nanomaterials (in brief).

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Text Books:

1. Bhattacharya and Bhaskaran, "Engineering Physics", *Oxford University Press.*
2. V.Rajendran, "Engineering Physics", *McGraw Hill Education*.

Reference Books:

1. David Halliday and Robert Resnick, "Physics Part I & II", *Wiley Eastern Limited.*
2. R.K. Gaur and S.L.Gupta, "Engineering Physics", *Dhanpath Rai and Sons.*
3. P.K. Palanisamy, "Engineering Physics", *Scitech Publishers.*

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: understand the basic concepts of physics for its applications to Engineering.

CO2: understand the basic principles of oscillations that can be applied to all types of oscillatory phenomena like acoustic, mechanical, electromagnetic, atomic, nuclear etc.,.

CO3: appreciate the knowledge acquired in studying interference, diffraction and polarization in the application of thickness measurement of thin films, refractive indices and wavelength determinations using interferometric techniques, fringe pattern etc.,.

CO4: appreciate the knowledge gained in studying ultrasonics and their multi dimensional applications in various fields like industrial, engineering (like NDT etc.,.) and medical etc.,.

CO5: understand the fundamental principles and applications of lasers and Optical fibers.

CO6: exposed to various material properties which are used in engineering applications and devices.

U14ME204 ENGINEERING DRAWING

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	4	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
LO1: to understand the importance of Engineering Drawing
LO2: to communicate effectively through Engineering Drawing
LO3: to impart and inculcate proper understanding of theory of projections
LO4: to identify the significance and application of the orthographic and isometric drawings.

UNIT – I (6+12)

Introduction:
Importance of Engineering Drawing, instruments- uses; Conventions - ISO and BIS, Layout of drawing sheets, Types of Lines, Lettering and dimensioning.

Geometrical Constructions:
Bisection of a line, arc and angle; division of a line, Construction of polygons- triangle, square, pentagon and hexagon.

Projection of Points:
Introduction to orthographic projections-Vertical Plane, Horizontal plane; Views-Front view, Top view and Side view; Projection of Points.

Projection of Straight lines - I:
Line parallel to both the planes, Line parallel to one plane and perpendicular to the other reference plane, Line parallel to one plane and inclined to the other reference plane.

UNIT – II (6+12)

Projection of Straight lines – II: Line- inclined to both the planes-Traces.

Projection of Planes:
Planes - Perpendicular and Oblique planes; Projections of planes - parallel to one of the reference plane, inclined to one of the reference plane and perpendicular to the other; Projections of oblique planes.

UNIT – III (6+12)

Projection of Solids:
Types-prisms, pyramids, cylinder and cone; Simple Positions-axis parallel to a reference plane and perpendicular to the other plane, axis parallel to one plane and inclined to other reference plane; axis inclined to both the reference planes.

Sections of Solids:
Types-prisms and pyramids; Section planes, Sectional views and true shape of a section.

UNIT – IV (6+12)

Isometric Projections:
Terminology; difference between isometric projection and view; Construction of isometric projection of different solids-box method and offset method.

Orthographic projections: Conversion of isometric views into orthographic views.

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Text Books:

1. Bhatt N.D., "Elementary Engineering Drawing", *Charotar Publishing House,* Anand.

Reference Books:

1. Dhananjay A Jolhe, "Engineering Drawing", *TMH,* 2008.
2. Venugopal K. "Engineering Graphics with Auto CAD", *New Age International Publishers Ltd.*, Hyderabad.
3. K. L. Narayana & P. Kannaiah, "Engineering Drawing'', *SciTech Publications,* Chennai
4. W J Luzadder and J M Duff, "Fundamentals of Engineering Drawing", *Prentice-Hall of India*, 1995.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: develop concepts on Engineering Drawing in order to become professionally efficient

CO2: understand the theory of projections

CO3: improve their spatial imagination skills to develop new products.

U14MH204 ENGLISH FOR COMMUNICATION

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	2	-	3

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to acquire writing skills with a focus on accuracy avoiding common errors in English.
LO2: to acquire word power enabling to use them in speaking and writing.
LO3: to develop reading comprehension skills with local and global comprehension.
LO4: to acquire listening and speaking skills using language laboratory.

UNIT-I (6)

Grammar

1. Clause Analysis
2. Tenses
3. Reported Speech

UNIT-II (6)

Vocabulary

3. Collocations
4. Idioms & Phrasal verbs

UNIT-III (6)

Reading Comprehension

3. "Stopping by Woods on a Snowy Evening" by Robert Frost
4. " Adivasis" by Kancha Ilaiah

UNIT-IV (6)

Writing Devices

4. Application for jobs and preparing a curriculum vitae
5. Report writing
6. Project Writing

Text Books:

1. Damodar G., & Surender Kumar M., "English for Communication", *KGA Publications,* Warangal.
2. Purushotham K., "English for fluency", *Orient Blackmen*, Hyderabad.

Reference Book:

1. Krishna Swamy N., "Modern English Grammar"**,** *MacMillan India Ltd.*

English Language Lab:

{Teacher Assessment (TA) is done through English Language Lab}

Listening Skills (6x2)

1. Listening to sounds, stress and intonation
2. Listening for information

Speaking Skills (6x2)

a. Presentation Techniques

- Group Discussions
- Interview Skills

b. Assignment

Students have to prepare and present an assignment on the following through PPT in the communication skills laboratory.

- Presentation of Oneself

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: develop writing skills with a focus on accuracy to develop error free English.

CO2: develop word power to enable to use them in speaking and writing.

CO3: develop reading skills with a focus on developing reading comprehension skills .

CO4: enhance listening and speaking skills.

Note:

Teacher Assessment	:	15 marks
• Assignment	:	05 marks
• Lab Performance	:	05 marks
• Lab Attendance	:	05 marks
Total	**:**	**15 marks**

U14EE205 BASIC ELECTRICAL ENGINEERING

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	**:**	40 marks
End Semester Exam	**:**	60 marks

Course Learning Objectives (LOs):

LO1: to impart basic knowledge about the Electrical & Magnetic Circuits.
LO2: to apply Kirchhoff's laws and Equivalent circuit models to analyze voltage & current relationship in passive circuit.
LO3: to inculcate the understanding about A.C. fundamentals and transformers.
LO4: to understand the working principles and applications of DC and AC Machines.

UNIT – I (9)

D.C. Circuits:
Ohm's Law, Network Elements, Kirchhoff's Laws, Source Transformation, Mesh and Nodal Analysis, Power in D.C. Circuits, Series, Parallel and Series Parallel combination of Resistances ,network reduction by Star – Delta Transformation.

Magnetic Circuits:
Introduction, Magnetic Circuits, Magnetic Field Strength, Magnetomotive Force, Permeability, Relative Permeability, Analogy between Electric and Magnetic Circuits, Series Magnetic Circuit, Parallel Magnetic Circuit, Self-Inductance and Mutual Inductance.

UNIT – II (9)

D.C. Machines:
Constructional features, Methods of Excitation, E.M.F. Equation, Torque development in D.C motor, Characteristics of Series, Shunt and Compound motors and Applications.

1-ϕ A.C. Circuits:
Phasor representation of sinusoidal quantities, Average, R.M.S. values and Form factor, A.C. through Resistor, Inductor and Capacitor, Analysis of R-L-C series and Power factor, Power triangle, Series Resonance.

Measurements:
Working principle of Moving coil, Moving Iron Ammeters and Voltmeters Dynamometer type Wattmeter.

UNIT – III (9)

3-ϕ A.C. Circuits:
Production of 3 -ϕVoltages, Voltage & Current relationships of Line and Phase values for Star and Delta connections , 3-ϕ Power Measurement by two-wattmeter method.

1-ϕ Transformers:
Construction and operation principle, Development of No Load & On Load Phasor diagrams, Equivalent circuit, O.C. and S.C. tests, Losses and Efficiency, Voltage regulation.

UNIT – IV (9)

3-ϕ Induction Motor:
Constructional features, Principle of Operation, Production of Rotating Magnetic Field, Torque – Slip Characteristics, Applications.

1-ϕ Induction Motors:
Production of Rotating Field in various type of 1 – Phase Motors Split Phase, Capacitor Start, Capacitor run, Shaded Pole motors and Applications.

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Text Books:

1. Edward Hughes, "Electrical & Electronics Technology", 10/e., *Pearson Education,*2010

Reference Books:

1. M.S. Naidu & S.Kamakshaiah, "Introduction to Electrical Engineering", *Tata McGraw Hill Ltd*, New Delhi.
2. B.L.Thereja, A.K.Thereja, "Electrical Technology Vol. I & II", *S.Chand & Company Ltd,* 2005 Edn.
3. Chakravarthy A, Sudhipanath and Chandan Kumar, "Basic Electrical Engg." *Tata McGraw Hill Ltd*, New Delhi.

Course Learning Outcomes (COs):
After completion of the course, the students will be able to,
CO1: predict the behavior of any Electrical & Magnetic Circuits.
CO2: solve Electrical Networks by mesh & nodal analysis.
CO3: analyze 1-ϕ & 3 -ϕ AC Basic network and measure the 3-ϕ power
CO4: identify the type of Electrical Machines used for that particular application.

U14EI205 BASIC ELECTRONICS ENGINEERING

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

LO1: to introduce basic concepts of semi conductors and conductivity in semiconductors
LO2: to introduce the operation and applications of semiconductor diodes
LO3: to introduce the basic concepts of BJT & its DC biasing concepts and FET
LO4: to introduce the fundamental concepts and basic principles of Electronic Measuring instruments

UNIT-I (9)

Introduction to Electronics:
Analog Signals (DC & AC), Sources (DC & AC), Digital Signals
Semiconductors:
Energy bands in solids, Concept of forbidden gap, Insulator, Metals and Semiconductors, Transport phenomenon in semiconductors: Mobility and conductivity, Intrinsic semiconductor, Donor and Acceptor impurities, Fermi level, Recombination and Minority carrier Injection, Drift currents and Diffusion currents, Temperature dependence of conductivity, Hall Effect
Semiconductor Diode:
P-N Junction, Band diagram, Depletion layer, V-I characteristics of P-N Diode, Diode resistance and capacitance, Avalanche and Zener breakdown mechanisms

UNIT-II (9)

Diode Circuits:
Rectifier circuits – Half wave, Full wave & Bridge rectifiers, Ripple voltage and Diode current with and without filters, Voltage regulation using Zener diode, Block diagram of DC adapter, Operation of LED & Photodiode
Bipolar Junction Transistor:
Physical structure, Transistor current components, CE, CB & CC configurations and their Input & Output characteristics

UNIT-III (9)

DC Analysis of BJT Circuits:
DC load line, Need for biasing, Transistor biasing methods for CE configuration, Basic transistor applications: Switch and Amplifier, Block diagram of a Public Address system
Field Effect Transistor:
Physical **s**tructure, Operation and Characteristics of a Junction Field Effect Transistor (JFET)

UNIT-IV (9)

Measurement Systems:
Block diagram of Measurement system, Ideal requirements of Measurement system, Performance characteristics of Measurement system, Errors in Measurement system
Electronic Instruments:
PMMC Mechanism, Ammeter, Voltmeter & Ohmmeter, Loading effects of Ammeter & Voltmeter, Block diagram of Digital Multimeter (DMM), Block Diagram of Cathode Ray Oscilloscope (CRO), Expression for deflection sensitivity, CRT Screens, Measurement of time period and amplitude

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Text Books:

1. David.A.Bell, "Electronic Devices and Circuits", *Oxford University Press,* New Delhi, India.
2. Neil storey, "Electronics: A systems Approach", *4/e-Pearson Education Publishing company Pvt. Ltd*, India.
3. Helfrick. A.D and Cooper W.D., "Modern Electronic Instrumentation and Measurement Techniques", *PHI,* India.

Reference Books:

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", 3/e, *TMH,* India.
2. Bhargava and Kulashresta, "Basic Electronics and Linear Circuits", *TTTI, TMH,* India.
3. Sawhney A.K, "Electrical and Electronic Measurements and Instrumentation", *Dhanpat Rai & Sons,* New Delhi, India.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: learn the concepts of conductivity in semi conductors

CO2: learn the operation of basic semi conductor devices and their V-I characteristics

CO3: get familiarized with the concepts of BJT& FET

CO4: use basic electronic measuring instruments like DMM and CRO

U14CE206 BASIC ENGINEERING MECHANICS

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: study the concept of force, principles of force and their application on engineering structures and machines.

LO2: to expose the students various kinds of statically determinate pin jointed structures and methods of analysing the truss.

LO3: to know the importance of geometric centre, cross sectional areas of plane bodies through centre of gravity and moment of inertia respectively.

LO4: study the dynamic behavior of particles in motion subjected to force system.

UNIT – I (9+3)

Introduction:

Basic Definitions – Mass, Particles, Rigid Body, Time, Space, Force, Branches of Mechanics, Fundamental principles of Mechanics – Parallelogram and Triangle laws of Forces, Newton's laws of Gravitation and Motion, Laws of superposition and Transmissibility of Forces.

Force Systems:

Types of Forces – Co-planar, Concurrent and Parallel Forces, Moment and Couple, Free Body Diagram, Types of Supports, Resultant of Force Systems, Resolution of Forces, Composition of Forces, Equilibrium equations of Forces, Lami's Theorem, Varignon's Theorem, Moment Equilibrium Equations, Distributed Forces, Resultant and Equilibrium of General Force System.

UNIT –II (9+3)

Friction:

Introduction, Classification, Laws of Friction, Coefficient of Friction, Angle of Friction, Angle of Repose, Ladder Friction, Wedge Friction .

Plane Trusses and Frames:

Basic Definitions, Stability and Determinacy Conditions, Rigid truss, Basic assumptions for a perfect truss, Assumptions in the Analysis of Trusses, Methods of Analysis of Trusses: Method of Joints and method of Sections of a Cantilever and simply supported statically determinate trusses.

Frames: Analysis of a Frames using Method of Members

UNIT– III (9+3)

Centroid and Centre of Gravity:

Introduction, Computation of Centroid, Centre of gravity of one dimensional and two dimensional figures- centroids of composite line, simple sections, composite sections-Centre of gravity of composite areas and composite bodies.

Moment of Inertia:

Introduction to Moment of Inertia, Transfer theorems of Moment of Inertia – Parallel Axis theorem and Perpendicular Axis theorem.

UNIT - IV (9+3)

Kinematics:

Introduction to Dynamics, Rectilinear Motion of a particle – Displacement, Velocity and Acceleration, Motion with uniform Acceleration and Motion with variable Acceleration.

Curvilinear Motion- Components of motion, Rectangular Components, Components of Normal and Tangential Acceleration.

Kinetics:

Rectilinear motion-Equations of Rectilinear motion, Equations of Dynamic Equilibrium, D'Alembert's Principle.

Curvilinear Motion-Equations of Motion in Rectangular components, Tangential and Normal Components, Equations of Dynamic Equilibrium.

Applications of Work-Energy, Impulse –Momentum principles of Rectilinear Motion and Curvilinear Motion.

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Text Books:

1. Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers,* New Delhi, 40/e., 2014.
2. Timoshenko S., Young D.H., Rao J.V., and Sukumar Pati, "Engineering Mechanics in SI units", *McGraw Hill Education Pvt. Ltd.,* New Delhi, 5/e., 2013.
3. Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press*, 9/e., 2013.

Reference Books:

1. Singer F.L., "Engineering Mechanics: Statics and Dynamics", *Harper and Row Publishers,* 3/e., 1975.
2. Bhavikatti S.S., "Engineering Mechanics", *New Age International,* New Delhi, 4/e., 2013 (reprint).

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: understand the physical action of forces on the bodies through free body diagrams and analyse the forces using principles of force.

CO2: determine the axial forces in members of pin jointed structures subjected to various types of loadings.

CO3: understand the technical importance of geometrical shapes and centre of various cross sections.

CO4: understand equilibrium condition of particles in dynamic condition and can analyse the problems using various applications such as conservation of work energy principle.

U14ME206 BASIC MECHANICAL ENGINEERING

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to identify various engineering materials and applications.
LO2: to understand the basic elements of power transmission.
LO3: to know the basic manufacturing processes.
LO4: to understand fundamental principles and applications of thermodynamics.
LO5: to know working principles of SI and CI engines.

UNIT- I (9)

Engineering Materials: Classification; properties and applications.
Power Transmission: Classification; Flat belt drives - open and cross belts; Introduction to Gears.
Bearings: Types - Sliding and rolling contact; Lubricants - Objectives, types, properties and applications.

UNIT- II (9)

Manufacturing Processes: Classification and their applications.
Sand Casting: Terminology; Mould cross section; Moulding sand-types and properties; Patterns-types, materials and allowances.
Welding: Principle and applications of gas and arc welding
Machining: Classification; Lathe machine-line diagram and functions of various parts.

UNIT- III (9)

Fundamental Concepts: Introduction to SI units, System, Thermodynamic state, Property, Process and Cycle; Energy, Work and Heat; Thermodynamic Equilibrium, Zeroth law of Thermodynamics, Laws of perfect gases.
First Law Of Thermodynamics: First law- Applications to Closed system, Internal energy, Enthalpy; Processes of Closed systems- Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic.

UNIT- IV (9)

Second Law Of Thermodynamics: First law limitations, Second law Statements and their equivalence, Carnot Cycle, Carnot Theorem, Heat engine, Heat pump and Refrigerator.
IC Engines: Classification; Working principle of two and four stroke SI and CI engines.

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Text Books:

1. Basant Agrawal and C M Agrawal, "Basic Mechanical Engineering", *Wiley India Pvt. Ltd,* New Delhi
2. Mathur, Mehta and Tiwari, "Elements of Mechanical Engineering", *Jain Brothers*, New Delhi

3. Hazra Chowdary. S. K and Bose, "Basic Mechanical Engineering", *Media Promoters and Publishers Pvt. Ltd,* India.

Reference Books:

1. P. K. Nag, "Engineering Thermodynamics", *Tata McGraw Hill*, New Delhi.
2. Hazra Chowdary. S. K and Bose, "Workshop Technology, Vol. I & II", *Media Promoters and publishers Pvt Ltd,* India.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: know the properties and applications of various engineering materials
CO2: learn the basic concepts of power transmission
CO3: follow the principles and operations of manufacturing technology
CO4: understand the laws of thermodynamics and their applications
CO5: know the working principle of Heat engine, Heat pump and Refrigerator.

U14CS207 OBJECT ORIENTED PROGRAMMING LABORATORY

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to expose the students to the practical implementation of Object-Oriented concepts using C++ programming language

LO2: to improve students capability of object oriented programming for problem solving

LO3: to make students capable of using reusability and generic programming concepts in developing applications

LIST OF EXPERIMENTS

Experiment-I

1. Read 10 numbers and displays them in sorted order.
2. Write functions to swap two numbers using pointers and references.
3. Write a program that prints the sizes of the fundamental types, a few pointer types and a few enumeration of your choice. Use the size of operator.

Experiment-II

4. Write a function that counts the number of occurrences of pair of letters in a string, for example the pair "ab" appears twice in "xabaacbaxabb".
5. Find LCM of two, three and four numbers using function overloading.
6. Create a structure for storing students details (sno, sname, course, Array of five subject's marks) provide the functions for printing the total marks, calculating percentage and the result. (Note: Include the functions within the structure).

Experiment-III

7. Write a macro to find square (A+B)-square (C+D).
8. Create a class for complex number and provide methods for addition, subtraction, multiplication and division. Display the output in "a+ib" form.
9. Create a Distance class and provide methods for addition and subtraction of two distances.

Experiment-IV

10. Create a complex number class with default, parameterized, copy constructors and a destructor.
11. Create a class which provides a method to count the number of objects that are created for that class. (Use static method).
12. Create a class INT that behaves exactly like an int. (Note: overload +, -, *, /, %).

Experiment-V

13. Create a string class and overload + to concatenate two Strings, overload () to print substring and overload <, <=, >, >=, = = operators to compare two string objects.
14. Create Date class and overload ++ to print next date and overload -- to print previous date.

Experiment-VI

15. Create a user defined array class Array and overload + to add two arrays, overload * to multiply two arrays, overload [] to access given position element and also to use left side of an assignment operator.
16. Create a complex number class and overload +, -, * operators using friend functions.
17. Program to perform Matrix operations using operator overloading with friend functions.

Experiment-VII

18. Programs to demonstrate Single, Multiple, Multilevel, Hierarchical, Hybrid and Multipath inheritance.

19. Programs to demonstrate constructors in inheritance.

Experiment-VIII

20. Create a Shape class with methods perimeter, area. Derive classes Circle, Square and Triangle from Shape class. Provide implementation for perimeter, area in the derived classes. (Declare perimeter, area as pure virtual functions).
21. Implement Multipath inheritance by declaring pointers to base class and access the derived class methods using base class pointers.
22. Program to demonstrate of manipulators

Experiment-IX

23. Write a function template to overload max method, which can find maximum of any data type.
24. Create function template to sort an array, which can sort array of any type.
25. Create a Generic calculator class to perform +, -, *, / operations on any type.
26. Create a Generic class for array of variable size and provide sorting, searching on any type.

Experiment-X

27. Find the roots of a quadratic equation. Handle exception for divide by zero.
28. Handle the Array Index out of Bounds Exception when accessing the elements of Arrays.
29. Create a text file of student information and display the contents of file.

Experiment-XI

30. Write a program to read a text file and remove all white space characters and replace each alphanumeric character with next character in the alphabet (Replace z by a and 9 by 0).
31. Copy the contents of one file into another except the blank lines using command line arguments.
32. Create a file with floating point numbers. Read pair of floating numbers from the file and write into another file.

Experiment-XII

33. Read the contents of three files, concatenate them and display it.
34. Write complex numbers into a file in binary format and in character format.
35. Create a class with integers and overload << to place integer into a file and overload >> to read an integer.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: gain knowledge of implementing Object-Oriented Programming concepts using C++

CO2: know the application of Object-Oriented Programming concepts for developing applications

CO3: debug and document programs in C++

CO4: develop applications using modularization technique

CO5: apply reusability and generic programming concepts in application development

U14CH208 ENGINEERING CHEMISTRY LABORATORY

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To gain hands-on experience of conventional and instrumental methods of chemical analysis
LO2: To introduce water analysis techniques
LO3: To understand the principles involved in the polymerization reactions
LO4: To gain the knowledge of estimation of metals from their ores
LO5: To expose the experiments such as estimation of metal ion by using ion-exchange resin, instrumental methods of chemical analysis, adsorption
LO6: To introduce a photo chemical reduction

LIST OF EXPERIMENTS

1. Determination of Alkalinity of test sample of water.
2. Estimation of Available Chlorine in test sample of Bleaching powder.
3. Determination of Hardness of water using complexometric method.
4. Determination of Calcium in Lime Stone / Dolomite.
5. Estimation of Cupric ions in the test solution.
6. Adsorption of an acid on a charcoal -Applicability of adsorption Isotherm.
7. Photochemical reduction of Ferric salt.
8. Synthesis of a polymer.
9. Conductometric Titrations.
10. Potentiometric Titrations.
11. Colorimetric analysis – Verification of Lambert-Beer's Law.
12. Estimation of Metal ion using ion-exchange resin.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,
CO1: handle analytical instruments for chemical analysis.
CO2: determine alkaline species, temporary and permanent hardness of a water sample.
CO3: estimate some metals from their ores.
CO4: understand the advantages of instrumental methods of chemical analysis over conventional methods.
CO5: understand the principles involved in photo chemical and polymerization reaction.

U14PH208 ENGINEERING PHYSICS LABORATORY

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to understand the oscillatory phenomena in determining the various properties like rigidity modulus, moment of inertia, acceleration due to gravity and other elastic properties.

LO2: to determine the wavelengths, slit widths, diameters of thin wires etc., with high degree of accuracy using interference and diffraction techniques.

LO3: to study the optical activity of some substances.

LO4: to determine the optical fiber characteristics.

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LIST OF EXPERMENTS

1. Newton's Rings: Determination of wavelength of a monochromatic light.
2. Determination of slit width using He-Ne Laser.
3. To find dispersive power of a prism using Spectrometer
4. Torsional pendulum: Determination of rigidity modulus of given wire and moment of inertia of ring.
5. Diffraction Grating: Determination of wave lengths of white light using normal incidence method.
6. To determine resolving Power of a Telescope.
7. To find the acceleration due to gravity (g) by Compound pendulum.
8. Polarimeter (Saccharimeter): Determination of specific rotation of sugar solution.
9. Photo Cell: To study the characteristics of a photo cell.
10. Determination of wavelength of He-Ne Laser.
11. Spiral spring: Determination of force constant of spiral spring.
12. Determination of Numerical Aperture of an Optical fiber.
13. Determination of diameter of a thin wire using Interference method.

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: handle and apply the powerful radiations like lasers and radioactive rays.

CO2: know the interference and diffraction patterns and apply them in precise measurements.

CO3: make preferential selection of Optical fibers.

CO4: determine the various optical, mechanical and magnetic properties

U14CH209 ENVIRONMENTAL STUDIES

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	-	-	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: to incorporate the basic knowledge of the environmental studies
LO2: to understand the need to use resources more equitably
LO3: to understand the knowledge of conversation of biodiversity
LO4: to introduce the causes, effects and control measures of environmental pollution
LO5: to know the issues involved in enforcement of environmental legislation

UNIT-I (6)

Introduction:

The Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance.

Natural Resources:

Forest Resources: Use and over – exploitation of forests, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.

Water Resources: Use and over- utilization of surface and ground water, floods; drought; conflicts over water.

Mineral Resources: Environmental effects of extracting and using mineral resources.

Agricultural Land: Land as a resource, land degradation, soil erosion and desertification.

Food Resources :World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II (6)

Ecosystem and Biodiversity:

Ecosystem: Concepts of an ecosystem: Food chain, food webs and ecological pyramids: Energy flow in the ecosystem: ecological succession.

Biodiversity and its conservation: Introduction: Definition. genetic, species and ecosystem diversity; value of biodiversity. Biodiversity in India, Hot spots of biodiversity, Man- wildlife conflicts, Endangered and endemic species of India, In-situ and Ex-situ conservation

UNIT-III (6)

Environmental Pollution:

Global climatic change, Green house gases, Acid rain.

Causes and effects of Air, Water, Soil, Marine and Noise pollution with case studies.

Solid and Hazardous waste management, effects of urban, industrial and nuclear waste. Natural disaster management: flood, earthquake, cyclone and landslides.

UNIT-IV (6)

Environment Protection and Society:

Role of Individual and Society: Role of individual in prevention of pollution, Water conservation, Rain water harvesting, Watershed management, wasteland reclamation.

Environmental Protection / Control Acts: Environmental legislation with respect to Air, Water, Forest and Wildlife, Enforcement of environmental legislations, Population growth, Role of Information Technology in Environment and Human Health.

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Text Books:

1. Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses – 2/e., *Universities Press (India) Private Limited*
2. Anjaneyulu Y., "Environmental Studies", *B.S. Publications*.

Reference Books:

1. Bharucha Erach, "The Biodiversity of India" *Mapin Publishing Pvt. Ltd.*
2. Odum, E.P. 1971, "Fundamental of Ecology", *W.B. Saunders Co.,* USA, 574p.
3. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", *Technoscience Publications.*
4. Gilbert M. Masters, "Introduction to Environmental Engineering & Science", 1991, *PHI*
5. A.S. Chauhan, "Environmental Studies", *Jain Brothers* (New Delhi) 3rd revised and enlarged edition
6. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford University Press*

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,

CO1: understand human interaction with the environment
CO2: understand utmost importance of the sustainable use of natural resources
CO3: get acquainted with ecosystem and conservation of biodiversity
CO4: gain the knowledge of control measures of environmental pollution and natural disaster management
CO5: understand the conflict between the existing development strategies and need for environmental conservation
CO6: understand various environmental protection / control acts
CO7: understand the role of individual in the environment protection

U14ME209 ENGINEERING WORKSHOP PRACTICE

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
LO1: to understand the importance of workshop practice in Engineering
LO2: to acquire proper understanding of various manufacturing processes
LO3: to identify the significance and application of various tools and equipment used in workshop

LIST OF EXPERIMENTS

Foundry:

1. Prepare a Sand Mould using bracket pattern
2. Prepare a Sand Mould using dumbbell pattern

Fitting:

3. Prepare a Square fit using Mild Steel Plates
4. Prepare a Half round fit using Mild Steel Plates

Welding:

5. Prepare a Lap joint on Mild Steel Plates using Arc Welding
6. Prepare a Single V – Butt Joint on Mild Steel Plates using Arc Welding

Carpentry:

7. Prepare a Half lap joint of a given Wooden pieces
8. Prepare a Bridle joint of a given Wooden pieces

Plumbing:

9. Prepare a Pipe joint with elbows & tee using PVC pipes
10. Prepare a Pipe joint with union & coupling using PVC pipes

Machine Shop:

11. Perform a Step turning operation on mild steel bar
12. Perform a Taper turning operation on mild steel bar

Text Books:

1. Hazra Chowdary. S.K and Bose, "Elements of Workshop Technology, Vol-I &II", *Media Promoters and publishers Pvt. Ltd,* India.
2. W.A.J.Chapman, "Workshop Technology, Vol-I", *Edward Arnold*

Course Learning Outcomes (COs):
After completion of the course, the student will be able to,
CO1: know and understand the types of trades in engineering
CO2: improve their practical skills to develop new products

U14EA210 EAA: PHYSICAL EDUCATION & NSS

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation :	100 marks
End Semester Exam :	-

I. PHYSICAL EDUCATION

Course Learning Objectives & Outcomes:

- *To perform and engage in a variety of physical activities*
- *To develop and maintain physical health and fitness through regular participation in physical activities*
- *To demonstrate positive self esteem, mental health and physiological balance through body awareness and control*
- *To exhibit the spirit of fair play, team work and sportsmanship*

Activities related to:

1. Physical Fitness
2. Games & Sports

II. NATIONAL SERVICE SCHEME (NSS)

Course Learning Objectives (LOs):

The objectives of the NSS is to
LO1: arouse the social consciousness of the students
LO2: provide them with opportunity to work with people in villages and slums
LO3: expose them to the reality of life
LO4: bring about a change in their social perceptions
LO5: develop competence required for responsibility sharing and team work

List of Activities:

1. Shramadanam
2. Tree Plantation
3. General Medical Camps in Villages
4. Awareness on Eye Donation
5. Awareness on "Child Labour and Child Marriages"
6. Awareness programs on "Literacy, Good Health Practices, etc."
7. Safe Riding Program
8. Awareness program on "RTI Act"
9. Awareness on Blood Donation

Course Learning Outcomes (COs):

After completion of the course, the student will be able to,
CO1: develop his / her personality through community service rendered
CO2: apply their education to find solutions to individual and community problems
CO3: acquire capacity to meet emergencies and natural disasters
CO4: acquire a democratic attitude, leadership qualities and practice national integration

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE :: WARANGAL-15
(*An Autonomous Institute under Kakatiya University*)
III SEMESTER OF 4 –YEAR B.TECH DEGREE PROGRAMME
ELECTRICAL & ELECTRONICS ENGINEERING

(6T+2L)

Sl. No.	Course Category Code	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	BS	U14MH 301	Engineering Mathematics-III	3	1	0	4	15	25	40	60	100
2.	PC	U14EE 302	Circuit Theory-I	3	1	0	4	15	25	40	60	100
3.	PC	U14IT 310	Data Structures	3	1	0	4	15	25	40	60	100
4.	PC	U14EC 304	Electronic Circuits	3	1	0	4	15	25	40	60	100
5.	PC	U14EE 305	Electrical and Electronic Measurements	3	1	0	4	15	25	40	60	100
6.	PC	U14EE 306	Electric and Magnetic Fields	3	1	0	4	15	25	40	60	100
7.	PC	U14IT 311	Data Structures Laboratory	0	0	3	2	40	-	40	60	100
8.	PC	U14EC 308	Electronic Devices and Circuits Laboratory	0	0	3	2	40	-	40	60	100
			Total	**18**	**6**	**6**	**28**	**-**	**-**	**-**	**-**	**800**
9.	MC	U14MH 309	Compliance with Current English	2	0	0	1	100	-	100	-	100

Students Contact Hours/ Weeks **: 32**
Total Credits **: 28**

U14MH301 ENGINEERING MATHEMATICS- III

Class: B.Tech. III semester **Branch:** Common to all

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: Laplace transform and its use to find the solutions of certain initial and boundary value Problems occur in engineering

LO2: Fourier series and its importance

LO3: application of Fourier series to a few partial differential equations of specific importance like wave equation, heat conduction equation, etc. which arise in engineering

LO4: integration of a function of complex variable, and evaluation of certain real integrals using complex analysis

UNIT-I (9+3)

Laplace Transforms: Integral transforms, Kernel of a transform, Laplace transform of a function; Inverse Transform, Existence and uniqueness of Laplace Transforms, S- plane and region of convergence (ROC); Laplace Transform of some commonly used signals-Dirac-delta (impulse) function $\delta(t)$, Step $u(t)$, Ramp $tu(t)$, Parabolic $t^2u(t)$, Real exponential $e^{at}u(t)$ Complex exponential $e^{j\Omega t}u(t)$ Sine & cosine functions, Damped sine & cosine functions, Hyperbolic sine & cosine functions, Damped hyperbolic sine & cosine functions, Rectangular pulse & triangle; Properties of Laplace Transforms- Linearity, First shifting theorem (Frequency shift property),Multiplication by 't' and division by 't', Laplace transforms of derivatives and integrals, Time scaling property, Time reversal property, Laplace transform of Heaviside unit step function, Second shifting theorem (time shift property); Initial value and final value theorems; Laplace transform of periodic functions, Convolution theorem.

Operational Calculus: Transfer functions, Solution of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace transforms, Application of Laplace transforms to the first order and second order systems subjected to impulse, Step, Periodic, Rectangular, Square, Ramp, Triangular and Sinusoidal functions.

UNIT-II (9+3)

Fourier Series: Periodic functions, Orthogonal and orthonormal functions and systems of orthogonal functions, Representation of a function as trigonometric Fourier series (FS) in a range of length 2π, Euler formulae, Conditions for the existence of Fourier series (Dirichlet's conditions), FS for typical wave forms - Square wave, Pulse train, Impulse train(comb function), Periodic rectangular wave, Triangle, Saw-tooth, Half-wave rectified signal, Full-wave rectified signal; Plotting FS coefficients - Line spectrum (magnitude and phase spectra); Effects of symmetry of function on FS coefficients, Exponential FS ,Fourier series of $Sin\omega t$, $Cos\omega t$ and combination of Sinusoids, Fourier series on an arbitrary period; Half range series – Half range cosine and sine series expansions.

UNIT-III (9+3)

Applications of Partial Differential Equations: Basic concepts of partial differential equations, Classification of second order partial differential equations, Solution of a partial differential equation, Solution through the method of separation of variables.

Vibrating string: Wave equation and its solution by the method of separation of variables, D'Alembert's solution of wave equation, solutions of various boundary value problems based on vibrating string.

One dimensional heat flow: Transient heat flow equation, Heat flow through a bar of finite length with homogeneous and non homogeneous boundary conditions, Heat flow through a bar with insulated ends.

Two dimensional heat flow: Equation of two dimensional heat flow (Laplace's equation) under steady state/the electrostatic potential of electrical charges in any region that is free of these charges (problems based on Trigonometric FS only),Solution of Laplace's equation in cartesian and polar form, Heat flow through infinite rectangular plates, Finite square plate and semi circular and circular plates.

UNIT-IV (9+3)

Complex Integration: Line integration in complex plane, Integral of a non analytic function, Dependence on path of integration, Bounds for integrals, *ML*-Inequality, Cauchy's integral theorem, Cauchy's integral formula; Series expansion of complex functions- Taylor's series and Laurent's series; Zeros and **s**ingularities, Residues; Residue Theorem - Applications of Residue theorem to the properly chosen integrals around a unit circle and semi circle.

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Text Books:

1. Grewal. B.S., "Higher Engineering Mathematics", *Khanna Publishers,* New Delhi, 43/e., 2014.

Reference Books:

1. Kreyszig E., "Advanced Engineering Mathematics", *John Wiley & Sons, Inc.,* U.K 9/e., 2013.
2. R.V.Churchill, "Complex Variables and its Applications", *McGraw-Hill*, New York, 9/e., 2013.
3. S.S.Sastry, "Engineering Mathematics", Vol. II ,*Prentice Hall of India*, 3/e., 2014.

Course Learning Outcomes (COs):

After completion of this course, the students will be able to

CO1: find Laplace transform of a given function and apply Laplace transforms to solve certain differential equations

CO2: express given function as a Fourier series in an interval

CO3: find solutions of partial differential equations by the method of separation of variables and apply the same to wave equations, equation of heat flow and Laplace's equation (cartesian & polar forms)

CO4: represent a given function in Taylor's & Laurent's series along a given path and evaluate certain real integrals using integral theorems

U14EE302 CIRCUIT THEORY -I

Class: B.Tech., III-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:
Examination Scheme:

L	T	P	C
3	1	-	4

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : circuit elements and relations
LO2 : steady state analysis of circuits for sinusoidal excitations
LO3 : time domain analysis
LO4 : applications of laplace transforms in circuit theory

UNIT – I (9 + 3)

Circuit Elements and Relations: Types of Sources and Source Transformations, Dot convention, Formation of loop and node equations, Graph of a network – Incidence matrix, Cut set and Tie set matrices & Formation of equilibrium equations, Dual networks.

UNIT – II (9+3)

Steady State Analysis of Circuits for Sinusoidal Excitations: Single Phase Series, Parallel, Series –Parallel circuits, Solution of AC networks using mesh and nodal analysis 3-Phase balanced and unbalanced network analysis.

UNIT – III (9+3)

Time response analysis of networks: Solution of network equations in time domain, Classical differential equations approach, Initial conditions & evaluation, applications to simple RLC circuits only.

UNIT – IV (9+3)

Applications of Laplace Transforms in Circuit Theory : Laplace transforms of various signals of excitation, Laplace transformed networks, determination and representation of initial conditions, Waveform synthesis, Response for impulse function and its relation to network admittance, Convolution integral and applications.

Resonance: Series and Parallel resonance, Bandwidth, Q factors

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Text Books:

1. M.E. Van Valken Burg: "Network Analysis", *Pearson Education* 3/e, 2006.
2. W.H.Hayt and Jr.Kemmerly, "Engineering Circuit Analysis" *Tata McGraw Hill*, 2/e, 2014.

References Books:

1. David A Bell "Electric Circuits", *Oxford University Press*, 1/e, 2010 ,
2. D. Roy Choudhary, "Network analysis and Synthesis" *New age Publishers*, 1/e, 2006.
3. K. A. Gangadhar, "Circuit Theory" *Khanna Publishers*, 2/e, 2006.
4. Parker Smith "Problems in Electrical Engineering", *CBS Publishers*, 2010.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1 : analyze electric circuits using network topology & solve problems
CO2 : evaluate steady state and transient behavior of networks for dc and ac citations
CO3 : evaluate solution of network equations in time domain
CO4 : know applications of laplace transforms in circuit theory

U14IT310 DATA STRUCTURES

Class: B.Tech. **III**–Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : basics of data structure, its role in application development and operations of linear data Structures.
LO2 : understanding concepts and operations of linked lists and trees
LO3 : graphs representations, traversal techniques, spanning trees and importance of balanced Trees.
LO4 : sorting, searching mechanisms and the importance of hashing techniques.

UNIT - I (9+3)

Basic Concepts: Algorithm specification- Introduction, Performance analysis and measurement- Performance analysis, Performance measurement.

Arrays: The arrays as an abstract data type, The polynomial abstract data type, Sparse matrices- Introduction, Sparse matrix representation, Transposing a matrix.

Stacks and Queues: The stack abstract data Type, The queue abstract data type,
Evaluation of expressions - Expressions, Postfix notations, Infix to postfix, Infix to prefix.

UNIT - II (9+3)

Linked Lists: Singly linked lists and chains, Representing chains, Circular lists, Linked stacks and Queues, Polynomials, Doubly linked lists.

Trees: Introduction, Binary trees- The abstract data type, Properties of binary trees, Binary tree representations, Binary tree traversals and Tree iterator-Introduction, Inorder traversal, Preorder traversal, Postorder traversal, Iterative traversals. Threaded binary trees, Heaps, Binary search trees - Definition, Searching a binary search tree, Insertion into a binary search tree, Deletion from a binary search tree, Joining and Splitting binary search trees, Height of a binary search tree.

UNIT - III (9+3)

Graphs: The graph abstract data type - Introduction, Definition, Graph representation, Elementary graph operations- Depth first search, Breadth first search, Connected components, Spanning trees, Minimum cost spanning trees - Kruskal's algorithm, Prim's algorithms, Shortest paths- All pairs shortest paths.

UNIT - IV (9+3)

Sorting and Searching: Searching, Search techniques- Binary search, Fibonacci search, Sorting- Types of sorting, General sort concepts, Bubble sort, Insertion sort, Selection sort, Quick sort, Heap sort, Merge sort, Comparison of all sorting methods.

Hashing: Introduction, Key terms and issues, Hash functions, Collision resolution strategies, Hash table overflow, Extendible hashing.

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Text Books:

1. Ellis Horowitz, Sartaj Sahani, Dinesh Metha, "Fundamentals of Data Structures in C++", *Universities Press*, 2/e, ISBN-978 81 7371 606 5, 2008.
2. Varsha H.Patil, "Data Structures Using C++", *Oxford University Press*, 1/e, ISBN-10: 0-19-806623-6, ISBN-13: 978-0-19-806623-1, 2012.

Reference Books:

1. D. Samanta, "Classic Data Structures", *Prentice Hall India*, 2/e, ISBN- 978-203-3731-2, 2009.
2. Mark Allen Weiss, "Data Structure & Algorithm Analysis in C++", *Pearson Education*, 3/e, ISBN-10: 81-3171-474-8, ISBN-13:97-8813-1714-744, 2007.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : identify the importance of data structures and implement operations of linear data Structures.

CO2 : differentiate linear and non linear data structures and implement different operations on linked lists and trees.

CO3 : implement graph traversal techniques and describe various search trees.

CO4 : measure the performance of various sorting, searching and hashing techniques.

U14EC304 ELECTRONIC CIRCUITS

Class: B.Tech., **III**-Semester **Branch:** Common to EEE & ECE

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: biasing and Operating Point, analysis of transistor at low and high frequency.
LO2: multi stage amplifiers, analysis of FET at low and high frequencies, MOSFET.
LO3: negative feedback amplifiers, Oscillators and their stability considerations.
LO4: large signal amplifiers and tuned amplifiers.

UNIT – I (9+3)

Small Signal Low Frequency Transistor Amplifier Circuits: Review of BJT Biasing and operating point, BJT small signal low frequency h-parameter model, Analysis of single stage transistor amplifier circuits using h-parameters in CE, CB and CC configurations, Simplified analysis of these configurations.

High Frequency Transistor Amplifier Circuits: High frequency model of a transistor and cut-off frequencies, Frequency response analysis of single stage amplifier at mid band gain, Gains at low and high frequency, Calculation of bandwidth of single stage amplifier.

UNIT – II (9+3)

Multistage Amplifiers: Cascade (RC Coupled) and cascade configurations, Darlington pair, bootstrap circuit, Differential amplifier, Effect of cascading on gain and bandwidth.

FET Amplifiers: Review of FET; Biasing of FET, FET low frequency and high frequency models, Low and High frequency response of amplifier circuits, Analysis of single stage amplifier, MOSFET- Operation and Characteristics.

UNIT – III (9+3)

Feed Back Amplifiers: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of negative feedback on amplifier characteristics.

Oscillators: Condition for oscillations, RC and LC oscillators, Crystal oscillator, Frequency and Amplitude stability of oscillations.

UNIT – IV (9+3)

Large Signal Amplifiers: Classification of large signal amplifiers, Class A, B and AB power amplifiers, Push-Pull amplifiers and Complementary symmetry, Design of heat sinks, Power efficiency, Cross over and Harmonic distortion.

Tuned Amplifiers: Single tuned and Double tuned voltage amplifiers, Inter stage design, Stability considerations, Class B and Class C tuned power amplifiers.

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Text Books:

1. Jacob .Millman and C.C.Halkias, "Integrated Electronics", *TMH, New Delhi,* 2/e Edition, 1991.
2. S.Salivahanan and N.Suresh Kumar, "Electronic Devices and Circuits", *Tata McGraw Hill Education (INDIA) Private Ltd,* 2/e, 2009.

Reference Books:

1. S. Sedra and Kenneth C. Smith, "Microelectronic Circuits'', *Oxford University publisher, 2014.*
2. J.B Gupta, "Electronic Devices and Circuits", *S.K Katarina and Sons, 2002.*

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1: analyze biasing circuits and design single stage transistor amplifier at low and high frequencies.
CO2: design and analyze multistage transistor amplifiers and FET amplifiers at low & high frequencies.
CO3: design and implement negative feedback amplifiers, Oscillators.
CO4: explain large signal amplifiers and tuned amplifiers.

U14EE305 ELECTRICAL AND ELECTRONIC MEASUREMENTS

Class: B.Tech, III Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop student's knowledge in/on
LO1 : performance of various instruments to measure voltage, current, power and energy
LO2 : errors in CTs, PTs and its use for measuring high range current and voltage and applications of Potentiometers
LO3 : measure circuit elements using bridges
LO4 : applications of electronic instruments & various transducers

UNIT –I (9+3)

Electrical Measuring Instruments: Significance of Measurement, Static characteristics of measuring system- Linearity, Sensitivity, Precision, Accuracy, Permanent magnet moving coil, Moving Iron ,Dynamometer, Induction for measuring current, voltage ,power and energy, Power factor meter, Peak demand meter, Errors and methods of reducing errors , Measurement of three phase reactive power using single wattmeter method, Extension of Ranges of Voltmeters and ammeter, Loading effect on measuring instruments, Phantom loading.

UNIT – II (9+3)

Instrument Transformers: Introduction, Advantages, Burden of instrument transformer, Current transformer-errors in current transformer, Effect of secondary open circuit, Potential transformer-errors in potential transformers, Testing of current Transformers with Silsbee's method.

Potentio Meters: D.C. Potentiometer and A.C. Potentiometers of Polar and Co-ordinate type, Relative merits, Applications, Measurements of resistance, Calibration of Voltmeter, Ammeter and Wattmeter.

UNIT -III (9+3)

Bridges: Principle of working - Types: Wheatstone, Kelvin, Maxwell, Anderson, Hay, Owen, Schering, De Sauty's, Wien, Kelvin's double bridge, Megger.

UNIT-IV (9+3)

Electronic Instruments- Digital Voltmeters, CRO, Cathode Ray Tube (CRT), Screens, Probes, Applications of CRO, Measurement of frequency and phase using CRO, Block diagram representation of DSO.

Transducers: Transducers for measurement of non-electrical quantities-Types and their principle of working, Resistance-Strain gauge, Inductance-LVDT and Capacitive pick up, Measurement of temperature using Thermo Couple.

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Text Books:

1. Sahwany A.K,"Electrical and Electronics Measurement and Instrumentation", Dhanpat *Rai Publications*; 12/e, 2001.

Reference Books:

1. Golding and Widdis, "Electrical Measurement in Measuring Instruments" *Reem Publications*, 5/e, 1968.
2. Alfred D. Helthic & Willem D.Cooperr "Modern Electronics Instrumentation Techniques", *Pearson/PHI*, 1/e, 2007.
3. J. B. Gupta: "A course in Electrical and Electronic Measurements and Instrumentation", *Kataria and Sons*, 13/e, 2009.
4. U. A. Bakshi, A. V. Bakshi, "Electrical Measurements and Instrumentation", *Technical Publications*, 2009.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : *compare the performance and select MC, MI, Dynamometer and Induction types of measuring instruments based on their applications*

CO2 : *compute the errors in CTs and PTs and its use for measurement of high range current and voltage & Solve Problems*

CO3 : *determine the circuit parameters using AC and DC bridges & Solve Problems*

CO4 : *demonstrate the applications of CRO & various transducers*

U14EE306 **ELECTRIC AND MAGNETIC FIELDS**

Class: B.Tech, III Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on-
LO1 : concepts of electric forces and fields for different configurations.
LO2 : fields in different materials and capacitance calculations.
LO3 : effects of magnetic fields in electrical systems, magnetic potentials and inductance.
LO4 : Maxwell's equations, wave equation and Pointing vector

UNIT –I (9+3)

Introduction: Review of Vector algebra, Cartesian, Cylindrical and Spherical Co-ordinate Systems. Introduction to Electromagnetic Fields, Field theory Vs Circuit theory.

Static Electric Fields: Coulomb's law, Electric field intensity, Field due to different charge configurations, Electric flux, Electric flux density, Gauss' law and its applications, Divergence theorem, Relation between D and E, Work done in moving a unit positive charge, Electric potential, Absolute potential, Potential difference between two points and its independence in path of integration, Potentials caused by different types of charge configurations, Relation between E and V, Potential and electric field at a point due to electric dipole, Torque on electric dipole when placed in Electric field, Electro static energy, Energy density.

UNIT –II (9+3)

Electric field in materials: Conductors in electrostatic fields, Polarization in dielectrics, Dielectric strength& constant, Boundary conditions between dielectrics.

Boundary value problems: Laplace's and Poisson's equations, Uniqueness theorem and simple examples, Method of images.

Capacitance: Definition of Capacitance, Capacitance of Parallel plate, Cylindrical and Spherical capacitors and multi conductor systems, Concepts of GMD and GMR for capacitance calculations, Conduction and Convection currents, Current density & Ohm's Law, Electromotive force & KVL, Equation of Continuity & KCL, Boundary conditions for current density.

UNIT –III (9+3)

Static Magnetic fields : Concept of Magnetic field, Biot-Savart's law, Ampere's law and its applications, Magnetic flux and flux density, Magnetic field caused by different types of current configurations, Scalar and Vector magnetic potentials, Calculation of Vector Magnetic Potentials for simple cases, Vector Poisson's equation.

Magnetic Forces: Force on a moving charge, Force on a differential current element, Force between differential current elements.

Field in dielectrics: Magnetic boundary conditions, Magnetic Dipole, Magnetization in material

Inductance: Concept of self-inductance, mutual-inductance, Calculation of Inductance of Solenoid and over headlines.

UNIT –IV (9+3)

Maxwell's equations & Electromagnetic Waves: Maxwell's equations for Static Fields, Faraday's law, Displacement current, Maxwell's equations for time varying fields, Wave equation for free space, Conducting medium field, Relation between E&H in plane waves, Wave Propagation in good conductors and dielectrics, Poynting Vector and flow of power, Power loss in a plane conductor.

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Text Books:

1. W. H Hayt (Jr.), "Engineering Electromagnetics", *TMH*, 8/e, 2012.
2. Mathew. N. O. Sadiku, "Principles of Electromagnetics", *Oxford University press,* 4/e, 1990.

References Books:

1. David J. Griffiths, "Introduction to Electrodynamics", *Pearson,* 4/e, 2013.
2. Edward. C. Jordan & Keith. G. Balmain, "Electromagnetic waves and radiating systems", *PHI,* 2/e, 1990.
3. David. K. Cheng, "Field and Electromagnetics", *Adison Wesely Longman,* 1996.
4. K. A. Gangadhar, "Field Theory", *Khanna Publishers, 5/e,* 2012.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1: realize electric field concepts and solve problems.
CO2: examine the fields in different materials and capacitance concepts.
CO3: use the magnetic field concepts and calculate the magnetic potentials and inductance for various cases.
CO4: contrast Maxwell's equations, assess wave equation, Poynting vector and apply the concept of wave propagation.

U14IT311 **DATA STRUCTURES LABORATORY**

Class: B.Tech. III-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : basic concepts of data structures and implementing different operations on linear data Structures.
LO2 : implementing linked list operations.
LO3 : trees, graphs and its traversal techniques.
LO4 : different types of sorting and searching techniques.

LIST OF EXPERIMENTS

Experiment-I

1. Program to implement array operations.
2. Program to display sparse representation for a given m*n matrix.
3. Write a program to read a sparse matrix and display its transpose.

Experiment-II

4. Write a program to perform addition of two sparse matrices.
5. Write a program to implement stack operations using arrays.

Experiment-III

6. Program to implement multiple stack operations.
7. Program to convert infix expression into postfix.
8. Program to convert given postfix expression into prefix notation.

Experiment-IV

9. Program to evaluate given postfix expression.
10. Write a program to implement queue operations using arrays.

Experiment-V

11. Program to implement circular queues operations using arrays.
12. Program to create single linked list and insert an element t desired position.

Experiment-VI

13. Implement the following operations on linked list.
    a) Delete b) Concatenation c) Reverse.
14. Program to implement double linked list operations. (Insertions and Deletions).

Experiment-VII

15. Program to implement circular single linked list and its operations.
16. Program to implement circular double linked list and its operations.
17. Program to create and display single linked list using header node.
18. Program to create and display double linked list using header node.

Experiment-VIII

19. Program to implement stack operations using linked list.
20. Program to implement queues operations using linked list.

Experiment-IX

21. Implementation of binary tree and its traversal techniques.
    a) Inorder b) Preorder c) Postorder .
22. Program to create a binary search tree and perform the tree operations.
    a) Insertion of a node b) Deleting a node.

Experiment-X

23. Implement the following graph traversal techniques.
    a) Depth first search b) Breadth first search.

Experiment-XI

24. Program to implement insertion sort technique.
25. Program to implement selection sort technique.
26. Program to implement quick sort technique.

Experiment-XII

27. Program to implement merge sort technique.
28. Program to implement heap sort technique.

Laboratory Manual:

1. "Data Structures Laboratory Manual", *prepared by the faculty of Department of IT.*

Text Books:

1. Ellis Horowitz, Sartaj Sahani, Dinesh Metha, "Fundamentals of Data Structures in C++", *Universities Press*, 2/e, ISBN-978 81 7371 606 5, 2008.
2. Varsha H.Patil, "Data Structures Using C++", *Oxford University Press*, 1/e, ISBN-10: 0-19-806623-6, ISBN-13: 978-0-19-806623-1, 2012.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : apply the practical knowledge in implementing operations on various linear data Structures.
CO2 : analyze the operations of linked lists.
CO3 : implement programs on trees and graphs.
CO4 : implement sorting and searching techniques to solve real time problems.

U14EC308 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Class: B.Tech., **III-**Semester **Branch:** Common to EEE & ECE

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LO):
This laboratory course will develop students' knowledge in/on
LO1: electronic devices and their applications
LO2: frequency response of BJT and FET Amplifiers
LO3: feedback amplifiers
LO4: RC, LC Oscillators and Tuned amplifiers

LIST OF EXPERIMENTS

1. Characteristics of a Semiconductor diode & Zener Diode.
2. Half-wave / full – wave Rectifier with and without filters
3. BJT Characteristics – CE configuration
4. Biasing of transistor using fixed bias, self-bias
5. FET Characteristics CS (Common Source)
6. Design of Single Stage BJT amplifiers and its frequency response
7. Design of FET CS Amp and its frequency response
8. Design of voltage series feedback amp
9. Design of RC Phase Shift Oscillator
10. Design of LC Oscillator
11. Design of class B Power amplifier
12. Design of Single tuned amplifier.

Laboratory Manual

1. Manual for **Electronic Devices and Circuits Laboratory** *prepared by the department of ECE*

Text books:

1. Jacob .Millman and C.C.Halkias, "Integrated Electronics", *TMH, New Delhi,* 2/e, 1991.
2. S.Salivahanan and N.Suresh Kumar, "Electronic Devices and Circuits", *Tata McGraw Hill Education (INDIA) Private Ltd,* 2/e, 2009.

Course Learning Outcomes (CO):
After completion of this course, students' will be able to…
CO1: apply the electronic device applications
CO2: differentiate the RC and LC Oscillators
CO3: design the different types of amplifiers
CO4: calculate the Bandwidth and gain of amplifiers

U14MH309 COMPLIANCE WITH CURRENT ENGLISH

Class: B.Tech. III Semester **Branch:** EIE, EEE, IT and ECE

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: rudiments of grammar and accuracy in spoken English

LO2: introducing themselves, making new introductions, preparing scripts of simple dialogues, playing the assigned roles and speaking extempore and making public discourses

LO3: vocabulary to attribute quality to language

LO4: correct use of language and techniques to write an essay, a report, an official letter, to precise the given text and to prepare CV/resume

LIST OF ACTIVITIES

Activity-1: Identifying sub- tenses, structures and examples
Activity-2: Using tenses in different situations and detecting the errors
Activity-3: Matching the sentences with subject and verb
Activity-4: Making statements and questions using correct verb form that would go with the subject
Activity-5: Introducing oneself and introducing others
Activity-6: Developing dialogues on the given situations and playing the assigned roles
Activity-7: Predicting the meanings of different words, making sentences substituting a group of words, identifying the ambiguity in sentences and using foreign phrases in sentences
Activity-8: Speaking extempore on the given topic, making speeches and giving seminars
Activity-9: Preparing CV/resume and writing an official letter
Activity-10: Writing a report and an essay
Activity-11: Précising the given text
Activity-12: Correcting the errors in a sentence

Reference Book:

1. John Sinclair, "Collins Cobuld English Grammar," *Collins Cobuild*,1990

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to

CO1: use appropriate tense in proper situations and produce grammatically acceptable sentences in speech and writing

CO2: develop dialogues and conversations in English and make oral presentations effectively

CO3: use sound vocabulary in communication

CO4: write a report, an official letter, an essay, prepare CV / Resume and precise the given passage.

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE :: WARANGAL-15
(*An Autonomous Institute under Kakatiya University*)
IV SEMESTER OF 4 –YEAR B.TECH DEGREE PROGRAMME
ELECTRICAL & ELECTRONICS ENGINEERING

(5T+3L)

Sl.No.	Course Category Code	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	BS	U14MH 401	Engineering Mathematics-IV	3	1	0	4	15	25	40	60	100
2.	PC	U14EE 402	Electrical Machines-I	3	1	0	4	15	25	40	60	100
3.	PC	U14EE 403	Circuit Theory-II	3	1	0	4	15	25	40	60	100
4.	PC	U14EI 405	Linear Integrated Circuits	3	1	0	4	15	25	40	60	100
5.	PC	U14EI 410	Digital Electronics	3	1	0	4	15	25	40	60	100
6.	PC	U14EE 407	Electrical and Electronic Measurements Laboratory	0	0	3	2	40	-	40	60	100
7.	PC	U14EE 411	Circuits and Simulation Laboratory	0	0	3	2	40	-	40	60	100
8.	PC	U14EI 412	Integrated Circuits Laboratory	0	0	3	2	40	-	40	60	100
Total				**15**	**5**	**9**	**26**	**-**	**-**	**-**	**-**	**800**
9.	MC	U14MH 409	Soft and Interpersonal Skills	2	0	0	1	100	-	100	-	100
10.	MC #	U14CH 209	Environmental Studies	2	0	0	2	15	25	40	60	100

Students Contact Hours/ Weeks **: 31+2#**
Total Credits **: 26**
 # For Lateral Entry Students only

U14MH401 ENGINEERING MATHEMATICS- IV

Class: B.Tech. IV semester **Branch:** Common to all

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop student's knowledge in/on….
LO1: various methods of solving system of linear equations and eigen value problem
LO2: methods of fitting curves by the method of least squares
LO3: probability distributions and applications to engineering disciplines
LO4: numerical methods to solve various problems

UNIT-I (9+3)

Matrices: Elementary transformations on a matrix to find inverse of a matrix, Rank of matrix, Normal form of a matrix, Solution of system of homogenous and non homogeneous linear equations, Linear dependence and independence of vectors.
Eigen values and eigen vectors of a matrix - Cayley Hamilton theorem, Reduction of a matrix to diagonal form, Reduction of a quadratic form to canonical form.

UNIT-II (9+3)

Probability & Statistics: Statistical data: Review of measures of central tendency and measures of dispersion, Correlation coefficient, Rank correlation, Regression – Linear regression equations.
Curve fitting: Method of least squares –Fitting of (i) Straight line (ii) Second degree parabola (iii) Exponential curves, Most plausible solution of a system of linear algebraic equations.
Review of the concepts of probability, Random variables, Discrete and continuous probability distributions, Mean and variance of a distribution, Binomial distribution, Poisson distribution and normal distribution, Fitting of these probability distributions to the given data.

UNIT-III (9+3)

Numerical Analysis: Finite differences and difference operators.
Interpolation: Lagrange interpolation, Newton's forward and backward interpolation formulae.
Numerical differentiation: First and second derivatives using forward and backward interpolation polynomials at the tabulated points.
Numerical integration: Gaussian quadrature formula, Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule.

UNIT-IV (9+3)

Solution to system of linear equations: Gaussian elimination method, Jacobi and Guass-Siedel iteration methods.
Numerical Solution of algebraic and transcendental equations: Bisection method, Regula-Falsi method and Newton Raphson's method.
Numerical solution of ordinary differential equations: Taylor's method, Picard's method, Euler's method and Runge - Kutta methods of second and fourth order**.**

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Text Books:

1. Grewal. B.S., "Higher Engineering Mathematics", *Khanna Publishers,* New Delhi, 43/e. 2014.

Reference Books:

1. Gupta and Kapoor, "Fundamentals of Mathematical Statistics", *Sulthan Chand and & sons,* New Delhi, 11/e. , 2010.
2. Kreyszig E., "Advanced Engineering Mathematics", *John Wiley & Sons, Inc.,*U.K., 9/e., 2013.

Course Learning Outcomes (COs):

Upon completion of this course, the students will be able to

CO1: compute rank of a matrix to solve a system of linear algebraic equations, eigen values, eigen vectors of a given square matrix and reduce a given quadratic form to canonical form

CO2: fitting various types of curves arising in the analysis of engineering problems, find correlation regression coefficients of given data and apply theoretical probability distributions in decision making

CO3: find the polynomial for the given set of data & its derivative and evaluate definite integrals using numerical methods

CO4: compute the solution of system of linear equations, algebraic, transcendental and ordinary differential equations

U14EE402 **ELECTRIC MACHINES – I**

Class: B.Tech., **IV-**Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : the Principle of Converting Electrical energy to Mechanical energy and Vice-versa through Electromagnetic field.

LO2 : understanding the effect of Armature reaction. Commutation and methods of improving commutation in D.C. Machines.

LO3 : understanding the Characteristics and Applications of DC motors.

LO4 : the working principles and applications of 1- Φphase and 3-Φ Transformers.

UNIT – I (9+3)

Basic Principles of Rotating Electrical machines: Principles of Electromechanical Energy Conversion, Singly and Doubly excited systems. Basic constructional features of rotating electrical machines.

DC Generators: Principle of operation, Armature windings, Simplex and Multiplex lap and wave windings. Types of dc generators, Emf equation.

UNIT – II (9+3)

Armature reaction: Demagnetizing and cross magnetizing Ampere Turns, Interpoles, Compensating windings. Commutation, Reactance voltage, Methods of improving commutation. Methods of excitation, Separately and Self excited generators. Voltage buildup process in shunt generators, Critical field resistance and Critical speed, Parallel operation of dc generators, Load sharing, Use of equalizer bars. Characteristics & Applications of Shunt, Series & compound generators.

UNIT – III (9+3)

D.C. Motors: Principle of operation, Back emf, Torque Equation, Classification of dc motors. Starters and Speed Control of dc motors. Losses and Efficiency, Testing of dc machines, Brake Test, Swinburne's Test, Hopkinson's Test, Retardation Test, Field's Test, Operating Characteristics & Applications of dc motors.

UNIT – IV (9+3)

Transformers, Single Phase Transformers: Constructional features, principle of operation, Emf equation, operation on no load and on load, development of equivalent circuit. Determination of equivalent circuit parameters, Phasor diagrams. Losses, ordinary efficiency and All day efficiency, Separation of Core losses. Regulation, approximation and rigorous expressions. Determination of performance by Open Circuit (OC), Short Circuit (SC) tests and Sumpner's test. Parallel operation, Load sharing.

Auto Transformer: Principle of working, Saving of copper as compared to two winding Transformer and applications.

Three Phase Transformers: Types of connections, Relation between line and phase voltages and currents, Three winding Transformer, Use of Tertiary winding, Scott connection of transformers, Tap changing of transformers Off load and On load, Induction Regulator.

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Text Books:

1. Bimbhra P.S., Electric Machinery, *Khanna Publisher,* 7/e, 2014
2. Bimbhra P.S., Generalized Machine Theory, *Khanna Publisher*, 5/e , 2014

Reference Books:

1. Chakrabarthy, Electric Machines, *McGraw Hill, Publications*, 2015
2. A.E. Fitzgerald, Kingsly, Stephen., Electric Machinery, *Tata McGraw Hill*, 2015
3. Stephen J.Chapman Electric Machinery Fundamentals, *Tata McGraw Hill*, 4/e , 2015
4. Nagrath and Kotari "Electrical Machines" *Tata McGraw Hill,* 4/e, 2004.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : *describe the Principles of Electro Mechanical Energy Conversion.*

CO2 : explain the effect of Armature reaction , Commutation and methods of improving commutation in D.C. Machines. & Solve Problems

CO3 : enumerate the Characteristics, speed control and Applications of D.C.Motors & Solve problems

CO4 : identify the Applications of 1-Φ and 3-Φ Transformers.

U14EE403 **CIRCUIT THEORY -II**

Class: B.Tech., **IV-**Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : network theorems
LO2 : two port networks
LO3 : fourier transforms and fourier series
LO4 : network functions and network synthesis

UNIT – I (9 + 3)

Network Theorems: Super position theorem, Reciprocity theorem, Thevenin's theorem, Norton's Theorem, Maximum power transform theorem, Millman's Theorem, and Tellegens's theorem, Compensation and Substitution Theorems.

.

UNIT – II (9+3)

Two Port Networks : Characterization of linear time invariant two port networks - Open circuit impedance Parameters - Short circuit admittance parameters - transmission parameters – Inverse transmission parameters - Hybrid parameters -Inverse Hybrid parameters - Inter relationship between parameters - Inter connections of two port networks –Ladder network-Bridged-T, Parallel-T and Lattice-T network-Network representation of element devices - Network transmission criteria.

UNIT – III (9+3)

Fourier Transforms and Fourier Series: Review of Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for repetitive waveforms, Amplitude and phase spectrums -Fourier transforms, and application to network analysis with non-sinusoidal repetitive waveform excitations

UNIT – IV (9+3)

Network Functions: Network functions for 1-port and 2-port networks and their relationships Ladder Networks - General Networks - Poles and Zeros of Network functions - Restrictions on poles and zeros of driving point impedances.

Network Synthesis : Positive real function properties - Hurwitz Polynomials - Even and odd functions - Test for positive Real functions - Elementary synthesis operation - Properties and Foster and Cauer forms of RL, RC and LC networks.

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Text Books:

1. M.E. Van Valken Burg" Network Analysis" 3rd Edition, *Pearson Education*, 2006.
2. N.C. Jagan, C. Lakshminarayana" Network Theory" *BS publications*, 2003.

References Books:

1. David A Bell "Electric Circuits", *Oxford University Press*, 1/e,2010 ,
2. D.Roy Choudhary, "Network analysis and Synthesis" *New age Publishers*, 1/e,2006
3. K.A.Gangadhar, "Circuit Theory" *Khanna Publishers* , 2/e ,2006
4. Parker Smith "Problems in Electrical Engineering ", *CBS Publishers*, 2010

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1 : *analyze electric circuits using network theorems.*
CO2 : evaluate network transfer function for any electrical network
CO3 : analyze given waveform through fourier series and fourier transformation.
CO4 : solve network functions and network synthesis

U14EI405 LINEAR INTEGRATED CIRCUITS

Class: B.Tech**. IV-**Semester **Branch:** E&I and EEE

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge on/in…
LO1: ideal and practical characteristics of Op-Amp
LO2: applications of Op-Amp
LO3: frequency response of various filters using Op-Amp and waveform generators using 555 timer
LO4: 723 voltage regulator and phase locked loop

UNIT – I (9+3)

Integrated circuits (ICs): Introduction, Classification of ICs.

Operational Amplifier (Op-Amp): Differential amplifier, Dual input balanced output differential amplifier, Dual input unbalanced output differential amplifier; Building blocks of Operational Amplifier (Op-Amp); Analysis of basic inverting & Non-Inverting amplifier configurations and Voltage follower.

DC characteristics of Op-Amp: Input offset voltage, Input bias current, Input offset current, Total output offset voltage, Thermal drift, Supply voltage rejection ratio (SVRR), Common mode rejection ratio (CMRR).

AC characteristics of Op-Amp: Open loop and closed loop frequency response, Stability of Op-Amp, Slew rate, Ideal and Practical characteristics of IC μA741.

UNIT – II (9+3)

Applications of Operational Amplifiers: Summing and difference amplifiers, Integrator and Differentiator, Current to voltage and Voltage to current converters, Instrumentation amplifier, Sample and Hold circuit.

Non-Linear Applications: Precision rectifiers–Half wave and Full wave rectifiers; log and Antilog amplifiers.

Comparators and wave form generators: Op-Amp comparators, Regenerative comparators (Schmitt Trigger); R.C. phase shift and Wien's bridge oscillators.

UNIT – III (9+3)

Active filters: Introduction of filters, Ideal and Realistic frequency responses of various filters, First order, Second order filters-Analysis and Design of V.C.V.S configured low pass, High pass, Band pass and Band stop filters, I.G.M.F. configured narrow band pass and narrow band reject filter, Twin T-notch filter.

Monolithic timers and their applications: Introduction to IC 555 timer, Functional diagram, Design of Astable and Monostable multivibrators using 555timer, Applications of astable multivibrator - FSK generator, Pulse-Position modulation, Schmitt trigger, Applications of

monostable multivibrator: Missing pulse detector, Linear ramp generator, Pulse-Width modulation.

UNIT – IV (9+3)

Phase locked loops: Voltage controlled oscillator, Basic PLL operation, Transient response of PLL, Definitions related to PLL, Monolithic PLL and design considerations, typical PLL applications (FSK, AM detectors). **(*Qualitative treatment only)***

Voltage regulators: Basic voltage regulator using Op-Amps, General purpose IC regulator, uA723-Functional diagram, specifications, Design consideration of 723 as Low and High voltage regulators; Three terminal voltage (fixed) regulators- Introduction and General features of three terminal regulators, IC series of three terminal Regulators.

Data converters: DAC types (weighted resistor, R-2R ladder); ADC types (Flash, Successive approximation and Dual-Slope).

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Text Book:

1. D. Roy Choudhury, Shail B. Jain," Linear Integrated Circuits", *New Age International Pvt. Ltd*. New Delhi, 4/e., 2010. (Chapters 1 to 10)

Reference Books:

1. Ramakant Gayakwad, "Op-Amps and Linear Integrated Circuits", *Pearson Education* 3/e, 1993.
2. G.B. Clayton, "Integrated Circuits and Applications", *ELBS*, London.
3. Rodert F.Coughlin, Frederick F.Driscoll, "Operational Amplifiers and Linear Integrated Circuits", *Pearson Education*, New Delhi.
4. R.Botkar, "Integrated Circuits", *Khanna Publishers*, New Delhi.

Course Learning Outcomes (COs):
After completion of this course, students will be able to…
CO1: list ideal/practical parameters of Op-Amp
CO2: design Op-Amp circuits for linear/nonlinear applications
CO3: design filter and timer circuits for various applications
CO4: explain the operation of IC voltage regulator, phase locked loops and data convertors

U14EI410 DIGITAL ELECTRONICS

Class: B.Tech., **IV-**Semester **Branch**: Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : switching algebra and various minimization techniques of switching functions.
LO2 : various combinational circuits and their applications.
LO3 : types of flip flops and their use in the design of sequential circuits.
LO4 : different logic family circuits and their performance.

UNIT – I (9+3)

Number systems and Codes: Review of number systems, Binary arithmetic, Binary weighted and Non weighted codes, Error detecting and Error correcting codes.
Boolean Algebra: Postulates and Theorems, Logic gates and Truth tables, Representation, Minimization and Realization of switching functions, SOP & POS forms, Minimization using Karnaugh map and Quine - McClusky Techniques.

UNIT – II (9+3)

Combinational circuits: Design of combinational circuits using logic gates – Half adder, Full adder, Half subtractor, Full subtractor, Parallel adder, Serial adder, Carry look ahead adder, BCD adder, 1's and 2's Complement Adder/Subtractors, Decoders - BCD to 7 segment, BCD to Decimal decoders; Encoders- Priority encoders; Multiplexers, Demultiplexers, Realization of switching functions using multiplexers and decoders; Parity generators, Comparators.

UNIT – III (9+3)

Sequential circuits: Flip flops – SR, JK, D and T Flip flops, Truth tables, Excitation tables, Race around condition, Master slave flip flop; Binary counters – Design of synchronous and Asynchronous counters; Shift registers – Modes of operation, Bidirectional shift registers, Ring counter and Johnson counter.
Synchronous sequential circuits: State table, State diagram, State assignment, Sequence detectors, Binary counters.

UNIT – IV (9+3)

Logic families: Introduction to logic families, Characteristics– Fan in, Fan out, Noise margin, Propagation delay, Current sourcing, Current sinking, Study of RTL, DCTL, DTL, HTL, TTL, ECL and MOS families, their characteristics and comparison.

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Text Books:

1. Zvi. Kohavi, "Switching and Finite Automata Theory", *Tata McGraw-Hill,* New Delhi 2/e, *2008*.
2. R.P. Jain, "Modern Digital Electronics", *Tata McGraw-Hill* New Delhi, 3/e, 2003.

Reference Books:

1. Moris Mano," Digital Design", *PHI,* New Delhi , 3/e 2003.
2. A.Anand Kumar, "Switching Theory And Logic Design", *PHI,* New Delhi, 1/e , 2013 (Reprint).
3. Herbert Taub and Donald Schilling, "Digital Integrated Circuits", *Tata McGraw-Hill,* New Delhi 2008.

Course Learning Outcomes (COs):

After completion of this course, the students' will be able to

CO1: apply various minimization techniques to obtain minimal SOP/POS forms of switching functions.

CO2: design different combinational circuits and implement logic functions.

CO3: explain the operation of flip flops and their application in the design of sequential circuits like counters, shift registers, sequence detectors etc.

CO4: analyze the operation of various logic family circuits and compare their performance characteristics.

U14EE407 ELECTRICAL AND ELECTRONIC MEASUREMENTS LABORATORY

Class: B.Tech., **IV**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LOs):

This Laboratory Course will develop student's knowledge in/on

LO1 : calibration of single phase energy meter and LPF wattmeter.

LO2 : measurement of Resistance, Inductance and capacitance using AC and DC bridges and measurement of three phase active power and reactive power

LO3 : performance of CTs & PTs and to measure ratio error.

LO4 : measurement of frequency and phase angle using CRO & displacement measurement using LVDT

LIST OF EXPERIMENTS

1. Calibration of Single phase Energy meter.
2. Calibration of LPF Wattmeter by Phantom Loading.
3. Measurement of Unknown Resistance using Wheatstone bridge.
4. Measurements of three phase Reactive Power using Single Wattmeter.
5. Calibration of PMMC Voltmeter using DC Potentiometer.
6. Extension of Range of PMMC Ammeter.
7. Measurement of Phase Angle and frequency using Lissajous patterns.
8. Measurement of capacitance using Schering Bridge.
9. Measurement of Inductance using Maxwell's Inductance-Capacitance Bridge.
10. Determination of Ratio error by Current Transformer and Potential Transformer
11. Displacement Measurement using Linear Variable Differential Transformer(LVDT).
12. Measurement of three phase power by Two wattmeter method

Laboratory Manual:

1. Manual for "Electrical & Electronics Measurements Laboratory" *prepared by the Department of EEE.*

Text Books:

1. Sahwany A.K, "Electrical and Electronics Measurement and Instrumentation", *Dhanpat Rai Publications*; 12/e, 2001.
2. Golding and Widdis,"Electrical Measurement in Measuring Instruments" *Reem Publications* , 5/e, 1968.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : calibrate single phase energy meter and LPF wattmeter.

CO2 : calculate Resistance, Inductance and capacitance using AC and DC bridges and Calculate three phase active power and reactive power

CO3 : determine ratio error in CTs and PTs.

CO4 : demonstrate the applications of CRO and draw the performance characteristics of LVDT.

U14EE411 CIRCUITS AND SIMULATION LABORATORY

Class: B.Tech, III Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge in/on

LO1 : network theorems
LO2 : PSPICE /MATLAB
LO3 : transient analysis
LO4 : two port network parameters

LIST OF EXPERIMENTS

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Verification of Maximum Power Transfer Theorem
4. Verification of Reciprocity Theorem using PSPICE
5. Simulation of Time response of second order RLC series circuit using PSPICE.
6. Determination of Z - Y parameters of Two-port network
7. Determination of ABCD Parameters & Inverse ABCD Parameters of Two-port network.
8. Determination of Hybrid Parameters & Inverse Hybrid Parameters of Two-port network.
9. Use the mesh analysis to find the current flowing through the element using MATLAB coding for the given circuit.
10. Find the nodal voltages of the given circuit using MATLAB coding
11. Determination of Parameters of a Choke Coil
12. Frequency Response of R-L-C Series Circuit.

Laboratory Manual:

1. Manual for "Circuits & Simulation Laboratory" *prepared by the Department of EEE*

Text Books:

1. Muhammed H.Rasheed., "SPICE for Circuits and Electronics Using P-Spice" *Pearson Education* , 2/e ,2014
2. Basic Simulation Lab with MATLAB By Bhanu Bhasakara , Siddhartha Bhasakara *Mc- Graw-Hill* , 1/e,2011
3. Introduction to MATLAB by William J Palam III , *Mc-Graw-Hill* , 2/e,2010

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : validate network theorems.
CO2 : determine Z, Y and ABCD parameters for a given two port network
CO3 : simulate electrical circuits using PSPICE / MATLAB
CO4 : evaluate the time response of RLC series circuit

U14EI412 INTEGRATED CIRCUITS LABORATORY

Class: B.Tech., **IV-**Semester **Branch**: Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : Implementation of Combinational Circuits using Digital ICs
LO2 : Implementation of Sequential Circuits using Digital ICs
LO3 : Applications of Operational Amplifier IC 741
LO4 : Applications of IC 555 Timer

LIST OF EXPERMENTS

1. Design and Implementation of Logic Functions/Adder/Subtractor using Logic Gates.
2. Design and Implementation of Binary to Gray and Gray to Binary code converters using XOR gates
3. Design and Realization of Adder/Subtractor using Multiplexer and Decoder.
4. Truth Table Verification of Flip Flops: SR, JK, D & T Flip-Flops.
5. Design and Implementation of Decade Counter using IC 7490.
6. Design and Implementation of 4-bit Shift Register/Ring Counter/Johnson Counter.
7. Measurement of Static and Dynamic Parameters of Operational Amplifier
8. Design and Testing of Integrator and Differentiator for a specified frequency
9. Design and Testing of Log/Antilog Amplifier using 741 Op-amp
10. Design of Square Wave Generator for a specified frequency and duty cycle, using Op-Amp IC 741
11. Design an Astable /Monostable Multivibrator using IC 555 timer for a given frequency.
12. Design of Voltage regulator using IC 723 for a given O/P voltage and Load current.

Laboratory Manual

1. Integrated Circuits Laboratory Manual, *prepared by Dept of E& I Engg.*

Text Books:

1. R.P.Jain and M.M.S.Anand, "Digital Electronics Practice Using ICS", *Tata McGraw Hill,*Paper Back Edition 2001..
2. Roy Choudary, Shail Jain, "Linear Integrated Circuits", *New Age international*.

Course Learning Outcomes (CO):
After completion of this course, the students' will be able to
CO1: design and test the functionality of combinational and sequential circuits
CO2: use 741 op-amp for different applications
CO3: design mono stable & astable multi vibrator using 555 IC timer.

U14MH409 SOFT AND INTERPERSONAL SKILLS

Class: B.Tech. IV semester **Branch:** EIE, EEE, IT and ECE

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: language skills and speaking with logical sequence & confidence

LO2: knowing their skills in public speaking and practice to reveal true qualities of personality & leadership

LO3: knowing their suitable and apt career objectives in-line with the industry expectations

LO4: developing career goals, and strategies for gaining employability skills

LIST OF ACTIVITIES

Activity 1: Team interaction
Activity 2: JAM round
Activity 3: Extempore
Activity 4: Debate
Activity 5: GD
Activity 6: Elocution
Activity 7: Presentations through PPTs
Activity 8: Oral presentations on career planning and "my dream-career"
Activity 9: SWOT analysis presentation
Activity 10: Mock Interview
Activity 11: Hosting and anchoring an event
Activity 12: Story narration

Suggested readings:

1. Robert.T.Kiyosaki and Sharon L.Lechter, "Rich Dad Poor Dad", *Warmer Books,* 1997.
2. Shiv Khera, "You can Win" *New Dawn Press, 2004.*
3. APJ Abdul Kalam, "Wings of Fire: An Autobiography of APJ Abdul Kalam**",** *University Press, 1999.*
4. David Joseph Schwartz, "The magic of thinking big", *Simon & Schuster Inc.,* 1/e, 1987.
5. Stephen Covey, "The 7 Habits of Highly Effective People", *Free Press,* 1989.

Course Learning Outcomes (COs):

Upon completion of this course, the students will be able to

CO1: exhibit their verbal skills and non verbal skills

CO2: identify clearly defined career objective and apply skills to achieve excellence in their career

CO3: analyze and relate their competencies as per the industry requirements

CO4: excel in interviews to attain better opportunities.

U14CH209 ENVIRONMENTAL STUDIES

Class: B.Tech. II Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	-	-	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (Los):

LO1: to incorporate the basic knowledge of the environmental studies
LO2 : to understand the need to use resources more equitably
LO3 : to understand the knowledge of conversation of biodiversity
LO4 : to introduce the causes, effects and control measures of environmental pollution
LO5 :to know the issues involved in enforcement of environmental legislation

UNIT-I (6)

Introduction: The Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance.

Natural Resources:

Forest Resources: Use and over – exploitation of forests, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.

Water Resources: Use and over- utilization of surface and ground water, floods; drought; conflicts over water.

Mineral Resources: Environmental effects of extracting and using mineral resources.

Agricultural Land: Land as a resource, land degradation, soil erosion and desertification.

Food Resources :World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II (6)

Ecosystem and Biodiversity:

Ecosystem: Concepts of an ecosystem: Food chain, food webs and ecological pyramids: Energy flow in the ecosystem: ecological succession.

Biodiversity and its conservation: Introduction: Definition. genetic, species and ecosystem diversity; value of biodiversity. Biodiversity in India, Hot spots of biodiversity, Man- wildlife conflicts, Endangered and endemic species of India, In-situ and Ex-situ conservation

UNIT-III (6)

Environmental Pollution: Global climatic change, Green house gases, Acid rain.

Causes and effects of Air, Water, Soil, Marine and Noise pollution with case studies.

Solid and Hazardous waste management, effects of urban, industrial and nuclear waste. Natural disaster management: flood, earthquake, cyclone and landslides.

UNIT-IV (6)

Environment Protection and Society:

Role of Individual and Society: Role of individual in prevention of pollution, Water conservation, Rain water harvesting, Watershed management, wasteland reclamation.

Environmental Protection / Control Acts: Environmental legislation with respect to Air, Water, Forest and Wildlife, Enforcement of environmental legislations, Population growth, Role of Information Technology in Environment and Human Health.

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Text Books:

1. Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses – 2/e., *Universities Press (India) Private Limited*
2. Anjaneyulu Y., "Environmental Studies", *B.S. Publications*.

Reference Books:

1. Bharucha Erach, "The Biodiversity of India" *Mapin Publishing Pvt. Ltd.*
2. Odum, E.P. 1971, "Fundamental of Ecology", *W.B. Saunders Co.,* USA, 574p.
3. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", *Technoscience Publications.*
4. Gilbert M. Masters, **"Introduction to Environmental Engineering & Science",** 1991, *PHI*
5. A.S. Chauhan, "Environmental Studies", *Jain Brothers* (New Delhi) 3rd revised and enlarged edition
6. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford University Press*

Course Learning Outcomes (Cos):

After completion of the course, the student will be able to,

CO1: understand human interaction with the environment
CO2 : understand utmost importance of the sustainable use of natural resources
CO3 : get acquainted with ecosystem and conservation of biodiversity
CO4 : gain the knowledge of control measures of environmental pollution and natural disaster management
CO5 : understand the conflict between the existing development strategies and need for environmental conservation
CO6 : understand various environmental protection / control acts
CO7 : understand the role of individual in the environment protection

****** Note: To be offered to the Lateral Entry students in the IV semester***

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE :: WARANGAL-15

(*An Autonomous Institute under Kakatiya University*)

V SEMESTER OF 4 –YEAR B.TECH DEGREE PROGRAMME

ELECTRICAL & ELECTRONICS ENGINEERING

(5T+3L)

Sl. No.	Course Category Code	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	PC	U14EE 501	Electrical Machines-II	3	1	0	4	15	25	40	60	100
2.	PC	U14EE 502	Power Systems-I	3	1	0	4	15	25	40	60	100
3.	PC	U14EE 503	Power Electronics	3	1	0	4	15	25	40	60	100
4.	PC	U14EE 506	Control Systems Engineering	3	1	0	4	15	25	40	60	100
5.	PC	U14EC 510	Microprocessors and Microcontroller Systems	3	1	0	4	15	25	40	60	100
6.	PC	U14EE 507	Electrical Machines-I Laboratory	0	0	3	2	40	-	40	60	100
7.	PC	U14EE 508	Control Systems Laboratory	0	0	3	2	40	-	40	60	100
8.	PC	U14EC 511	Microprocessors and Microcontroller Laboratory	0	0	3	2	40	-	40	60	100
9.	PR	U14EE 509	Seminar	0	0	0	1	-	-	100	-	100
			Total	**15**	**5**	**9**	**27**			**420**	**480**	**900**

Students Contact Hours/ Weeks **: 29**

Total Credits **: 27**

U14EE501 ELECTRIC MACHINES – II

Class: B.Tech., **V**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : understanding the Construction, Working Principles and Performance characteristics of 3-Φ Induction Motors.
LO2 : knowing the Construction, Working Principles and Performance characteristics 3-Φ Synchronous Generators.
LO3 : understanding the Construction, Working Principles, Performance behavior and Applications of 3-Φ Synchronous Motors.
LO4 : knowing the Construction, Working principles and Various Applications of 1-Φ Induction Motors and Special Purpose Machines.

UNIT – I (9+3)

3-Φ Induction Motors: Construction details, Types, Production of rotating magnetic field. Principle of operation, Equivalent circuit, Phasor diagram, torque equation, Slip torque characteristics, Effects & Change in supply Voltage and Frequency on torque and speed. Losses and efficiency, Determination of equivalent circuit parameters and Circle diagram by No load and Blocked Rotor tests.

Methods of Starting: Direct on line (DOL), Star- Delta (γ-Δ), Autotransformer, Rotor resistance starters.

Methods of speed control: Pole changing, Variable frequency Variable voltage, Rotor resistance, Rotor injected Emf technique.

Double Cage Induction motor: Construction. Principle & operation, equivalent circuit Characteristics and Applications.

UNIT – II (9+3)

3- Φ Synchronous Generators: Construction, Types, Winding factors, Production of Emf, Harmonics. Armature reaction, Synchronous reactance, Phasor diagrams. Load characteristics OC & SC tests. Methods of predetermination of Voltage Regulation by Synchronous Impedance (EMF), MMF method, Portier (ZPF). Two reaction theory and phasor diagrams for a Salient-pole synchronous machine. Slip test. Power angle Characteristics. Synchronization & Synchronizing Power. Parallel operation and Load sharing, Operation on infinite bus bar, Applications. Short circuit transients in Synchronous machines.

UNIT – III (9+3)

3-ΦSynchronous Motors: Principle of operation, Phasor diagrams. Methods of starting of 3-Φ Synchronous Motors. Variation of Current and Power factor with excitation and mechanical load. Hunting and its applications. Determination V& Inverted V Curves. Excitation Circles and Power Circles. Power factor correction of 3-Φ Synchronous Motors. Synchronous Condenser, Applications.

UNIT – IV (9+3)

1-ΦInduction Motors: Principle & Operation, Methods of Starting. Double field revolving theory. Equivalent circuit. Determination of Equivalent circuit parameters by conducting No-load & Blocked rotor tests.

Special Purpose Machines: Constructional features. Working principle. Characteristics and Applications of Universal Motor, Stepper Motor, Brushless (BLDC) Motor.

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Text Books:

1. Bimbhra P.S., Electric Machinery, *Khanna Publisher*, 7/e, 2014
2. Bimbhra P.S., Generalized Machine Theory, *Khanna Publisher*, 5/e, 2014

Reference Books:

1. *Chakrabarthy, Electric Machines, McGraw Hill, Publications, 2015*
2. *A.E. Fitzgerald, Kingsly, Stephen., Electric Machinery, Tata McGraw Hill, 2015*
3. *Stephen J.Chapman Electric Machinery Fundamentals, Tata McGraw Hill, 4/e , 2015*
4. *J.B. Gupta ,Theory & Performance of Electrical Machines, S. K. Kataria & Sons, 2009*

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : describe the Performance Characteristics, starting methods and speed control of 3-Φ Induction motors.

CO2 : evaluate the Performance of 3-Φ Synchronous Generators. & Solve Problems

CO3 : identify Applications of 3-Φ Synchronous Motors & Solve Problems.

CO4 : explain the Various Applications of 1-Φ induction Motors and Special Purpose Machines.

U14EE502 **POWER SYSTEMS-I**

Class: B.Tech., **V**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : conventional Energy Sources
LO2 : economics of Power Generation
LO3 : different Types of Insulators , Corona
LO4 : under Ground Cables & parameters of transmission lines

UNIT – I(9+3)

Conventional Energy Sources: Hydroelectric Stations: Introduction, Arrangement and location of hydroelectric station – Types of hydroelectric plant – Principle of working power developed – layout of hydro power station: Steam power plant, Introduction – Selection of site – coal handling plant – Ash handling Plant – Steam generating Plant – Steam turbine & Generator – Cooling water systems: Nuclear Power Plant: Introduction to Nuclear reactors Types of reactors – Location of Nuclear power plant; Gas turbine power plant: Introduction lay out of Gas turbine plant – Advantages, Combined cycle plants.

UNIT – II(9+3)

Non Conventional Energy Sources: Tidal Power, Wind Power, Geo Thermal Power Solar Power.

Economics of Power Generation: Definitions, Connected load, Maximum demand, Demand factor, Load factor, Diversity factor, Load duration curve, Number and size of generating units, Base load and peak load plants, cost of Electrical energy, Fixed cost, Running cost, Tariffs.

UNIT – III(9+3)

Insulators: Types, Potential distribution over a string of suspension insulators, Factors affecting the distribution of voltage along the string insulators, Methods of equalizing potential string efficiency, stringing charts, testing of insulators.

Corona: Critical disruptive voltage, Corona loss, Line design based on corona, Disadvantage of corona, Radio interference and Inductive interference between power and communication lines.

UNIT – IV(9+3)

Distribution Lines: Distribution Systems, D.C. two wire and three wire systems. Single phase and three phase 3 wire and 4 wire AC systems – Comparison of efficiency, Kelvin's Law – Economic size of conductor.

Transmission Lines: Electrical Power system components – Elementary ideas of layout – Resistance and capacitance of transmission lines, Single Phase and 3-Phase lines with

symmetrical and asymmetrical spacing, composite conductors – Transposition, bundled conductors, Effect of earth on capacitance, Mechanical design of transmission lines.

Under Ground cables: Electric stress in a cable-core cable-Grading of cables-cable capacitance-cable inductance-Dielectric loss and Heating

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Text Books:

1. C.L.Wadhwa, "Generation, Distribution & Utilization of Electrical Energy", *New age International,* 6/e, 2014.
2. S.N.Singh "Electric Power Generation, Transmission & Distribution", *Printice Hall of India,* 2/e , 2009.
3. MV.Deshpande, "Electrical Power System Design", *Printice Hall of India* ,1/e, 2011.

Reference Books:

1. Soni, Gupta, Bhatnagar, "Electrical Power", *Dhanpat rai & sons*, 2/e, 2006.
2. Ned Mohan, "Electric Power Systems", *Wiley*, 1/e, 2014.
3. Syed A Nasar, "Electric Power Systems" ,*Mcgraw-Hill*, 1/e, 2006.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : describe the operation of conventional generating stations
CO2 : determine Different Types of Tariff's in power system
CO3 : design Distribution of voltage along the string insulators & Solve Problems
CO4 : discuss underground cables & circuit parameters of transmission lines & Solve Problems

U14EE503 POWER ELECTRONICS

Class: B.Tech., **V**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : characteristics and applications of basic power semiconductor switches

LO2 : performance of controlled rectifiers.

LO3 : performance of chopper, inverter operation

LO4 : A.C voltage controllers & Cyclo converter operation and power electronic applications in industry

UNIT – I (9+3)

Characteristics of Power Devices: Introduction of power semi conductor devices like SCR, DIAC, TRAIC, GTO, MOSFET, UJT, IGBT and their characteristics, Two transistor modes of SCR, Protection of SCR against over voltages, Over current and voltage and current transients. Evaluation of switching losses with hard switching.

Gate Triggering circuits, Resistance, Resistance – Capacitance Trigger circuits, UJT as relaxation oscillator, Series and Parallel operation of SCRs, String efficiency, Different methods of forced communication Techniques.

UNIT – II (9+3)

Phase controlled Rectifiers: Phase Angle control Single phase & three phases, Half wave, Full wave, Half controlled and Fully controlled with and without freewheeling diodes for resistive and inductive loads, Effect of source inductance, Dual converters, Power factor improvements.

UNIT – III (9+3)

Choppers: Basic circuit, Step-up& Step-down, Classification of choppers on the basis of various quadrants, DC-DC converters without electrical isolation: Buck, Boost, Buck-Boost (Continuous Conduction Mode only)

Inverters: Voltage source inverters and Current source inverters, 1-phase and 3-Phase bridge inverters, Brief introduction to sinusoidal modulation of single phase & three phase VSI.

UNIT – IV (9+3)

AC Voltage Controllers: Single Phase AC Controllers with R and RL loads.

Cyclo converters: Principle and operation of Single phase to single phase.

Applications of power electronics converters. Battery charger, Uninterruptible power supply, Switched mode power supply.

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Text Books:

1. P.S. Bhimbra, "Power Electronics", *Khanna Publishers*, 5/e, 2013.

Reference Books:

1. M.D. Singh & K.B. Kanchandani, Power Electronics, *Tata McGraw Hill*, 2/e 2014.
2. M.H. Rashid, ''Power Electronics, circuits, devices &applications'', *Prentice Hall of India,* 3/e
3. P.C. Sen, ''Power Electronics'', *Tata McGraw Hill*, 2013.
4. Ned Mohan Tore M. Undeland: ''Power Electronics: Converters, Applications, and design'', *John Wiley & Sons,* 3/e , 2007

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : *determine the power semiconductor switches characteristics and their applications & design of snubber circuit*

CO2 : *evaluate the performance of rectifiers. & Solve Problems*

CO3 : *analyze & describe the operation of inverters and choppers & Solve Problems*

CO4 : *evaluate the performance of AC voltage controllers and Cycloconverters*

U14EE506 CONTROL SYSTEMS ENGINEERING

Class: B.Tech., **V**-Semester **Branch:** Common to EEE & EIE

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : transfer function representation &determination using block diagram Reduction & signal flow graphs of LTI Systems

LO2 : time domain analysis of LTI Systems and stability studies

LO3 : develop the concepts on stability analysis using frequency response.

LO4 : concepts of state space analysis & compensation techniques

UNIT – I (9+3)

Introduction: Types of systems, Properties of systems, Linearity, Time-invariance, Stability, Open loop control system, Closed loop control system, Effect of Feedback on overall gain, Sensitivity.

Mathematical Models of Physical Systems: Electrical, Mechanical and Electromechanical systems, Transfer function of physical systems by Block diagram reduction and signal flow graph techniques, Drawing a signal flow graph from a block diagram.

UNIT – II (9+3)

Control System Components: AC and DC servomotors, Synchros and Tacho generator.

Time Domain Analysis: Design specifications Typical test signals, Time response of first order and of 2nd order systems, Time domain specifications, Basic control actions like P, PI, PD, PID and derivative feedback, Steady State error and error constants, Routh Hurwitz Criterion, Concept of root locus and construction of root loci, Effects of adding poles and zeros.

UNIT – III (9+3)

Frequency Domain Analysis: Frequency response of closed loop systems, Specifications, Correlation between frequency and time domain specifications, Polar plots, Gain Margin and Phase Margin, Bode plots, Nyquist stability criterion.

UNIT – IV (9+3)

State Variable Analysis of Continuous Systems: Concepts of state, State variables and state model, Derivation of state model from transfer function, Diagonolization, Derivation of transfer function from state model, Solution of state equations, State transition matrix, Concept of Controllability and Observability.

Compensation: Elementary treatment of Compensation.

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Text Books:

1. A.Anand Kumar,"Control Systems", *Prentice Hall of India*. New Delhi, 2008.

2. S.Palani," Control Systems Engineering",*McGraw Hill Education(India)Private Limited* New Delhi "2/e, 2015.

References Books:

1. J. Nagrath & M. Gopal, "Control System Engineering", *New Age International Publishers*, New Delhi. "3/e, 2003.
2. K.Ogata, "Modern Control Engineering" *Prentice Hall of India*, New Delhi, 3/e .
3. B.C. Kuo, "Automatic Control Systems" *Prentice Hall of India*, New Delhi. 8/e, 2002.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : determine the TF of a system using block diagram reduction technique & signal flow graphs of LTI system & Solve Problems.

CO2 : determine Transient and Steady State behavior of systems using standard test signals and stability in time domain & Solve Problems

CO3 : determine the stability of the LTI systems using frequency domain.

CO4 : analyze performance of state space analysis of a continuous system.

U14EC510 MICROPROCESSORS AND MICRCONTROLLER SYSTEMS

Class: B.Tech., **V**-Semester **Branch**: Electronics & Electrical Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: architecture of 8085 microprocessor.
LO2: assembly language programming.
LO3: memory segmentation concept.
LO4: architecture of 8051 microcontroller and its interfacing

UNIT – I (9+3)

Introduction to 8-bit Microprocessor : History of Microprocessor, 8085 Microprocessor architecture, register, flags. 8085 pin configuration & function of each pin. Fetch, Decode and execute operations. Op-code Fetch, execute cycle, T state, Machine cycle. Memory and I/O read and write cycles WAIT state, interrupt timing diagram.

UNIT – II (9+3)

Intel 8085 Microprocessor Instruction Set and Programming: Addressing modes of 8085. Data transfer, Arithmetic, Logical, Rotate, Branch and machine control instructions. Development of 8085 assembly language programs, time delays. Concept of stack and Instruction related to stack. 8085 interrupts, RST, RIM, SIM instructions. Subroutines and conditional call instructions.

UNIT – III (9+3)

8086 Family Architecture: Organization of 8086 CPU, Concept of Memory Segmentation, Segment registers, physical and logical addressing, Instruction set, Addressing Modes.

UNIT – IV (9+3)

8051 Microcontroller: Architecture, Instruction set, addressing modes, Assembly language Programming, timers, I/o Ports, interrupts, serial ports, interfacing with LEDS Switches & Stepper Motor. Real Time Clock.

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Text Books:

1. Krishnakaant "Microprocessors and Microcontrollers" 2/e, PHI learning, 2014 *(Chapter 2, 3, 4,5,6,9, 10).*

Reference Books:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085" *Penram International*.
2. D.V.Hall, "Microprocessors & Interfacing", *Tata McGraw Hill*, New Delhi.
3. Kennet Ayala, "8086 Microprocessor: Programming & Interfacing with PC", *Penram Publications*, Bombay.
4. Brey, "Advanced Microprocessors", *Prentice Hall of India*, New Delhi.

5. Kennet Ayala, "The Microcontroller Architecture, Programming and Applications", *Penram Publications*, Bombay.

Course Learning Outcomes (COs):

After completion of this course, the students' will be able to

CO1: Explain the architecture of 8085.
CO2: Write assembly language programs by using 8085 microprocessor.
CO3: Discuss the various addressing modes of 8086 microprocessor.
CO4: Explain the architecture of 8051 microcontroller and its interfacing

U14 EE507 ELECTRICAL MACHINES -I LABORATORY

Class: B.Tech., V-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : performance characteristics of d. c. machines by conducting various tests.
LO2 : gaining performance characteristics of d. c. motors by conducting load tests.
LO3 : voltage regulation and performance of 1-Φ transformers by conducting various tests.
LO4 : various connections of 3-Φ transformers and about Scott connection.

LIST OF EXPERMENTS

1. Open circuit and Load Characteristics of dc shunt generator.
2. Load characteristics of dc Compound generator
3. Load test on dc shunt and Compound motor.
4. Load test on dc series motor.
5. Swinburne's test and speed control of dc shunt motor.
6. Hopkinson's test on dc Motor - Generator set.
7. Load test on 1-Φ transformer.
8. Open Circuit (O.C) and Short Circuit(S.C) tests on 1-Φ transformer.
9. Polarity Test and Sumpner's test on 1-Φ transformer.
10. Separation of no-load losses in1-Φ transformer.
11. Study of Starters and 3-Φtransformers connections.
12. Scott connection of 3-Φ transformer.

Laboratory Manual

1. Manual for Electrical Machines -I Laboratory *prepared by the department of EEE*

Reference Books:

1. S.G. Tarnekar, P.K. Kharbanda "Laboratory Courses in Electrical Engineering" *S. Chand & Company Limited*, 4/e, 2003.

Course Learning Outcomes (COs):
After completion of this course, students will be able to
CO1 : select range of apparatus based on the ratings of dc machines and transformers
CO2 : determine the voltage regulation and equivalent circuit parameters of transformers by conducting various tests.
CO3 : evaluate the efficiency of the dc machine and transformers by analyzing test results.
CO4 : analyze starting ,speed control methods and characteristics for dc machines.

U14EE508 CONTROL SYSTEMS LABORATORY

Class: B.Tech., **V**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge in/on

LO1 : characteristics of AC and DC servo motor.
LO2 : performance of second order systems in time domain.
LO3 : LTI systems using frequency domain analysis.
LO4 : characteristics of Synchros & controllers.

LIST OF EXPERIMENTS

1. Time response of Second order system
2. Study of characteristics of Synchros
3. Study of characteristics of DC servo motor
4. Determination of transfer function of DC motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Analysis of Lag and lead compensation – Magnitude and phase plot
7. Performance of Temperature controller using PID.
8. Characteristics of AC servo motor.
9. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
10. Stability analysis (Bode& Root Locus) of Linear Time Invariant system using MATLAB
11. Stability analysis (Nyquist) of Linear Time Invariant system using MATLAB
12. Verification of controllability & observability using MATLAB.

Laboratory Manual

1. Manual for Control Systems Laboratory *prepared by the department of EEE*

Reference Books:

1. A.Anand Kumar, "Control Systems", *Prentice Hall of India*. New Delhi, 2008.
2. M. Gopal, " Control System Principles & Design", *Tata McGraw Hill*, New Delhi Publishers, 2/e., 2012

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : analyze the characteristics of a given AC and DC servo motor
CO2 : determine the performance of second order systems in time domain
CO3 : simulate & Determine stability of LTI systems using frequency domain Analysis
CO4 : determine the performance characteristics of Synchros & controllers

U14EC511 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

Class: B.Tech., **V**-Semester **Branch:** Electronics & Engineering Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Examination:	60 marks

Course Learning Objectives (LOs):
This laboratory course will develop students' knowledge in/on
LO1: Assembly language programming on 8085 Microprocessor.
LO2: Assembly language programs on basic arithmetic, sorting, and strings.
LO3: Programming concepts on 8086 microprocessor.
LO4: Assembly language programming on 8051 Microcontroller

LIST OF EXPERIMENTS

Assembly Language Programming on 8085 Microprocessor

1. Study of 8085 kits
2. Finding Sum, Average, Multiplication.
3. Sorting (a) Ascending (b) Descending.
4. Multi byte addition & Subtraction
5. String Comparison

Assembly Language Programming on 8086 Microprocessor

6. Study of 8086 kits
7. Finding Sum, Average, Multiplication.
8. Sorting (a) Ascending (b) Descending.
9. Multi byte addition & Subtraction
10. String Comparison

Assembly Language Programming on 8051 Microcontroller

11. Study of 8051 kits
12. Finding Sum, Average.
13. Multiplication and Division.
14. Sorting (a) Ascending (b) Descending.

Laboratory Manual

1. Manual for "Microprocessors & Microcontrollers Laboratory" *prepared by the department of ECE*

Text Books:

1. D.V.Hall, Microprocessors & Interfacing, Tata McGraw Hill, New Delhi.

Course Learning Outcomes (COs):
After completion of this course, the students' will be able to
CO1: write assembly language programs on basic arithmetic, sorting, and strings
CO2: execute assembly language programs on 8086 microprocessor.
CO3: explain the Multi-byte addition and subtraction using 8086 microprocessor.
CO4: design various assembly language programs on 8051 microcontroller.

U14EE509 SEMINAR

Class: B.Tech. V-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme :

L	T	P	C
-	-	-	1

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…..
LO1: literature review and report writing
LO2: presentation skills and speaking with logical sequence & confidence
LO3: latest and current trends in technologies
LO4: critical thinking

Student has to give independent seminar on the state-of-the-art technical topics relevant to their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a *Department Seminar Evaluation Committee (DSEC)*
2. *DSEC* shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective seminar presentation
3. There shall be only continuous Internal Evaluation (CIE) for seminar
4. The CIE for seminar is as follows:

Assessment	Weightage
Seminar Supervisor Assessment	20%
Seminar Report	30%
DSEC Assessment: *Oral presentation (PPT) and viva-voce*	50%
Total Weightage:	**100%**

(a) **Report:** Students are required to submit a well-documented report on the chosen seminar topic as per the prescribed format as per the dates specified by *DSEC*
(b) **Presentation:** The students are required to deliver the seminar before the *DSEC* as per the schedule notified by the department
(c) *DSEC* shall decide the course of action on the students, who fail to submit the seminar report and give oral presentation

Course Learning Outcomes (COs):
After completion of this course, the students will be able to
CO1: analyze the technical content and prepare a well-documented report
CO2: make effective seminar presentation by exhibiting the presentation skills with confidence in a logical sequence
CO3: explain the current and upcoming technologies
CO4: propose and defend opinions and technical ideas with conviction (not as mere recipient of ideas)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE :: WARANGAL-15
(*An Autonomous Institute under Kakatiya University*)
VI SEMESTER OF 4 –YEAR B.TECH DEGREE PROGRAMME
ELECTRICAL & ELECTRONICS ENGINEERING

(6T+2L)

Sl. No.	Course Category Code	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	OE	U14 OE 601	Open Elective-I	4	0	0	4	15	25	40	60	100
2.	PC	U14EE 602	Power Systems-II	3	1	0	4	15	25	40	60	100
3.	PC	U14EI 603	Digital Signal Processing	3	1	0	4	15	25	40	60	100
4.	PC	U14EE 604	Power Semiconductor Drives	3	1	0	4	15	25	40	60	100
5.	PC	U14EE 605	Utilization of Electrical Energy	3	1	0	4	15	25	40	60	100
6.	PE	U14EE 606	Professional Elective-I	4	0	0	4	15	25	40	60	100
7.	PC	U14EE 607	Power Electronics and Simulation Laboratory	0	0	3	2	40	-	40	60	100
8.	PC	U14EE 608	Electrical Machines-II Laboratory	0	0	3	2	40	-	40	60	100
9.	PR	U14EE 609	Mini Project Work	0	0	0	2	-	-	100	-	100
			Total	**20**	**4**	**6**	**30**	-	-	**420**	**480**	**900**

Students Contact Hours/ Weeks **: 30**
Total Credits **: 30**

Open Elective-I
OE 601A: Disaster Management
OE 601B: Project Management
OE 601C: Professional Ethics in Engineering
OE 601D: Rural Technology and Community Developments

Professional Elective-I
EE 606A: Advanced Control Systems
EE 606B: High Voltage Engineering
EE 606C: Switched Mode Power Conversion

U14OE601A DISASTER MANAGEMENT

Class: B.Tech.VI-Semester **Branch:** Common to All

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: nature of disaster and types of disasters
LO2: prevention, preparedness and mitigation measures for Earth Quake, floods, fire, landslides, cyclones, tsunamis, nuclear & chemical disasters
LO3: financial management of disaster and related losses
LO4: information and communication technology in disaster management and training

UNIT – I (12)

Introduction & principles of disaster management: Nature - Development, Hazards and disasters; Natural disasters - Earth quakes, Floods, Fire, Landslides, Cyclones, Tsunamis, Nuclear; Chemical dimensions and Typology of disasters - Public health disasters, National policy on disaster management.

UNIT –II (12)

Prevention and mitigation measures: Prevention, Preparedness and mitigation measures for various disasters, Post disaster reliefs and Logistics management, Emergency support functions and their coordination mechanism, Resources and material management, Management of relief camp.

UNIT– III (12)

Risk and vulnerability: Building codes and Land use planning, social vulnerability Environmental vulnerability, Macroeconomic management and sustainable development, Climate change, risk rendition, Financial management of disaster and related losses.

UNIT - IV (12)

Role of technology in disaster management: Disaster Management for Infrastructures, Taxonomy of infrastructure, Treatment plants and process facilities, electrical sub stations, roads and bridges, geo spatial information in agriculture, drought assessment, multimedia technology in disaster risk management and training.

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Text Books:

1. Rajib shah and R.R Krishnamurthy, "*Disaster management – Global Challenges and local solutions*" University Press,1st edn,2009.
2. Satish Modh, "*Introduction to Disaster management*", Macmillan Publishers, India, 1st edn., 2010.

References Books:

1. Jagbir Singh, "*Disaster Management-Future Challenges and Opportunities*", I.K Publishers, 1st edn., 2007.
2. H.K Gupta, "*Disaster management*", Universities Press, India,1st, edn.,2003.
3. G.K. Ghosh, "*Disaster management*", A.P.H. Publishing Corporation, 1st, edn., 2012.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1: describe & differentiate types of disasters

CO2: identify prevention & mitigation measures in case of earthquakes, floods, fire, landslides, Cyclones and tsunamis, nuclear & chemical disasters and plan preparedness & execute

CO3: assess financial management of disaster and related losses

CO4: apply information & communication technology for disaster risk management and training the affected

U14OE601B PROJECT MANAGEMENT

Class: B.Tech. VI Semester **Branch**: Common to all

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop student's knowledge in/on…
LO1: role of project manager, organization and management functions
LO2: effective time and conflict management
LO3: project planning, scheduling and budgeting
LO4: cost control, risk management and quality control techniques

UNIT – I (12)

Project Management: Understanding project management, Role of project manager, Classification of projects; Project management growth - Definitions and Concepts; Organizational structures - Organizing and staffing the project management office and team; Management functions.

UNIT – II (12)

Time and Conflict management: Understanding time management, Time management forms, Effective time management, Stress and burnout; The conflict environment, Conflict resolution, The management of conflicts, Conflict resolution modes; Performance measurement, Financial compensation and rewards, Morality, ethics, and corporate culture, Professional responsibilities, Success variables, Working with executives.

UNIT – III (12)

Project planning: General planning, Life-cycle phases, Proposal preparation, Project planning, The statement of work, Project specifications, Milestone schedules, Work breakdown structure, Executive role in planning, The planning cycle, Handling project phase outs and transfers, Stopping projects, Scheduling techniques - CPM and PERT, Pricing and estimating.

UNIT – IV (12)

Cost and quality control: Understanding cost control, Earned value measurement system, Cost control problems, Methodology for trade-off analysis; Risk management process, Risk analysis, Risk responses, Monitoring and control of risks, Contract management; Quality management concepts, Cost of quality, Quality control techniques.

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Text Books:

1. Harold Kerzner, "Project Management: A Systems Approach to Planning, Scheduling and Controlling", *John Wiley & Sons Inc.*, 10/e., 2009.

Reference Books:

1. Jack R Meredith & Samuel J mantel Jr, "Project Management : A Managerial Approach" , *John Wiley & Sons Inc.*, 8/e., 2012.
2. John M Nicholas & Herman Steyn, "Project Management for Business, Engineering and Technology", *Taylor & Francis*, 4/e., 2012.

3. Adedeji B. Badiru, "Project Management: Systems, Principles and Applications", *CRC Press*, 2012.

Course Learning Outcomes(COs):

After completion of the course, the student will be able to…

CO1: identify desirable characteristics of effective project managers

CO2: manage executives, use success factors and resolve conflicting environments

CO3: apply appropriate approaches to plan a new project in-line with project schedule and suitable budget

CO4: identify & explain important risks expected to be encountered in a new project and apply appropriate techniques to assess & improve ongoing project performance

U14OE601C PROFESSIONAL ETHICS IN ENGINEERING

Class: B.Tech. VI-Semester **Branch:** Common to all

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on
*LO1 : **human values and engineering ethics***
LO2 : professionalism and theory of virtues
LO3 : safety & risk benefit analysis, professional and intellectual property rights
LO4 : environmental & computer ethics and various roles of engineers in a company

UNIT – I (12)

Human Values: Morals, values & ethics , Integrity, Work ethic, Service learning, Civic virtue, Respect for others , Living peacefully ,caring , Sharing , Honesty , Courage ,Valuing time , Co-operation , Commitment , Empathy , Self-confidence , Character , Spirituality.
Engineering Ethics: Senses of "Engineering Ethics", Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory , Gilligan's theory - Consensus and Controversy.

UNIT – II (12)

Profession and professionalism: Profession and its attributes, models of Professional roles
Theory of Virtues: Definition of virtue and theories of virtues, self-respect, responsibility and senses, modern theories of Virtues, uses of ethical theories
Engineering as social experimentation: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study

UNIT –III (12)

Safety, Responsibilities and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - Three Mile Island and Chernobyl case studies, collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT – IV (12)

Global Issues: Multinational corporations - environmental ethics, computer ethics, weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample Code of Ethics (specific to a particular Engineering Discipline).

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Text Books:

1. D R Kiran, "Professional Ethics and Human Values", *McGraw-Hill Education (India) Pvt. Ltd.*, 1/e, 2013.

Reference Books:

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Professional Ethics and Human Values", *Prentice Hall of India*, 1/e, 2013.

2. Mike Martin and Roland Schinzinger, "Ethics in Engineering", *McGraw-Hill*, 4/e, 2014.
3. Charles D. Fleddermann, "Engineering Ethics", *Prentice Hall,* 4/e, 2004

Course Learning Outcomes(COs):

After completion of this course, students will be able to….

CO1 : summarize the need of human values and professional ethics
CO2 : explain the concept of professionalism and theory of virtues
CO3 : perform risk benefit analysis and describe professional rights & IPR
CO4 : describe the various roles of engineer in a company and analyze code of ethics specific to a particular engineering discipline

U14OE601D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENTS

Class: B.Tech.VI-Semester **Branch:** Common to all

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1**:** *wide spectrum of technologies and processes for implementation in rural and tribal areas*
LO2: *medicinal and aromatic plants to fulfill the needs of pharmaceuticals industries and rural energy for eradication of drudgery*
LO3: *purification of drinking water, rain water harvesting and employment generating technologies*
LO4: c*oncepts of community organization and development and other related issues in a*n accessible manner

UNIT – I (12)

Technologies and Process: Building materials and components – Micro concrete roofing tiles, water & fire proof mud walls and thatch, red mud/rice husk cement, types of bricks, ferro-cement water tanks and other products, Cement blocks, Preservation of mud walls; Agricultural implements - Naveen sickle, Animal drawn digger, Grubber weeder, Self propelled reaper, Seed drill, Improved bakhar.

Food Processing: Introduction; Fruit and vegetable preservation – Process flow sheet, Scale of operation, Economic feasibility, Source of technology; Soya milk – Process, Economics; Dehydration of fruits and vegetables; Cultivation of oyster mushroom – Preparation of beds, Spawning, Removal of bags for production of mushrooms, Harvesting and marketing, Economics, Process flow sheet, Source of technology.

UNIT – II (12)

Medicinal and Aromatic plants: Introduction, Plants and its use, Aromatic plants, Cymbopogons, Geranium, Manufacturing of juice, Gel and powder; Rural energy – Cultivation of jatropha curcus and production of biodiesel, Low cost briquetted fuel, Solar cookers and oven, Solar drier, Biomass gasifier.

Bio-fertilizers: Introduction, Vermicompost, Improvement over tradional technology/process, Techno economics, Cost of production, Utilization of fly ash for wasteland development and agriculture.

UNIT – III (12)

Purification of Drinking water: Slow sand filtration unit, Iron removal, Iron removal plant connected to hand pump, Chlorine tablets, Pot chlorination of wells, Solar still, Fluoride removal; Rain water harvesting – Availability of rain water through roof top rain water harvesting, Through percolation tank, Check dams recharging of dug wells.

Employment Generating Technologies: Detergent powder and cake – Process, Process for liquid detergent; Carcass utilization – Improvement over traditional technology, Flow chart, Process, Capital investment; Indigo blue - Dye, Organic plant production, Dye extraction techniques, Aspects of indigo market, Economics; Modernization of bamboo based industries - Introduction, Process for bamboo mat making, Machinery, Products; Agarbatti manufacturing; Vegetable tanning of leathers - Raw material, Soaking, Liming, Reliming, Deliming, Pretanning, Malani, Setting, Yield.

UNIT – IV (12)

Community development: Community organization – Concept, Definition, Need, Functions, Principles, Stages; Community development – Introduction, Concept, Definition, Need, Objectives, Characteristics, Elements, Indicators; Distinguish between community organization and community development;

Community Mobilization: Need, Benefits, Preparing, Initial contact with community, Coordinating, Functions of the community, Challenges, Techniques for mobilizing community, Community contributions, Leadership and capacity building, Community participation, Role of community worker in community mobilization; Models of community organization practice – Local development model, Social planning model, Social action model, Approaches to community organization.

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Text Books:

1. M.S. Virdi, "Sustainable Rural Technology", *Daya Publishing House*, ISBN: 8170355656, 2009.
2. Asha Ramagonda Patil, "Community Organization and Development: An Indian Perspective ", *PHI Learning private ltd*, 2013.

Reference Books:

1. Punia Rd Roy, "Rural Technology", *Satya Prakashan Publishers*,2009
2. S B Verma, S K Jiloka, Kannaki Das, "Rural Education and Technology", *Deep & Deep Publications Pvt. Ltd*. 2006.
3. Edwards, Allen David and Dorothy G. Jones. "Community and Community Development". *The Hague, Netherlands: Mouton*, 1976.
4. Lean, Mary. "Bread, Bricks, and Belief: Communities in Charge of Their Future". *West Hartford, Kumarian Press,* 1995.
5. Heskin, Allen David, "The Struggle for Community", *West View Press*. 1991
6. Clinard, Marshall Barron. "Slums and Community Development: Experiments in Self-Help", *Free Press*, 1970.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1: *describe various technologies and process which can be implemented in rural and tribal areas*

CO2: *identify the major medicinal plants are required for commercial supply to Pharma companies and alternative fuel that could meet substantial oil need in the country*

CO3: *analyze several cost effective technologies for purification of water which can adopted in rural areas, various rain water harvesting techniques of collection and storage of rain water*

CO4: *describes in detail the process of community development, different aspects of community organization and community mobilization covering needs, benefits and challenges related to it*

CO5: *explains different models of community organization for bringing social change*

U14EE602 POWER SYSTEMS-II

Class: B.Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : representation of transmission lines
LO2 : methods of voltage control
LO3 : symmetrical components and fault calculations
LO4 : system neutral grounding and insulation co-ordination

UNIT – I (9+3)

Performance of transmission line: Representation of transmission lines, Short transmission lines, Medium length lines, Nominal "T" and "∏" representation, Long transmission lines, Equivalent circuit representation of a long line; A,B,C,D constants, long lines, series (Tandam) and parallel networks, skin effect, proximity effect and Ferranti effect, Suge impedance loading, Power flow through transmission lines.

UNIT – II (9+3)

Voltage control: Introduction, Methods of voltage control, Shunt, series compensation, tap changing transformers, Booster transformers, Synchronous phase modifiers, Determination of their capacities, analytical methods.

Representation of Power systems: Single line diagram, Impedance and reactance diagrams, per unit quantities, advantages of per unit systems.

UNIT – III (9+3)

Symmetrical Components and fault calculations: Significance of positive, negative, zero sequence components, Average 3-phase power in terms of symmetrical components. Sequence impedances and sequence networks for fault calculations, single line to ground (LG) fault, LL fault, LLG fault, LLLG fault, reactors and their location, short circuit capacity of a bus.

UNIT – IV(9+3)

Traveling waves on transmission line: Production of travelling waves, open circuited line, short circuited line, Line terminated through a resistance, line connected to a cable, reflection and refraction coefficients at a T-junction, Line terminated through a capacitance, attenuators of travelling waves.

System Neutral grounding and insulation Co-ordination: Introduction, ungrounded neutral system, arcing grounds. Advantages of neutral grounding .Methods of neutral grounding solid grounding, reactance grounding, Peterson coil grounding. Grounding transformer, choice of grounding, insulation co-ordination and volt-time curves.

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Text Books:

1. Wadhwa, C.L. "Electrical Power Systems" *New age International*, 6/e, 2014.
2. Stevenson W.D. "Elements of Power System Analysis" *McGraw Hill International Publishers,* 4/e, 2014.

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Reference Books:

1. Olle I Elgerd " Electric Energy Systems Theory", *Tata McGraw Hill* ,2/e ,2011
2. Miller "Reactive power control in Electric systems "*Wiley* , 2/e ,2011
3. I.J.Nagarath & D.P.Kothari "Modern power system Analysis" *Tata McGraw Hill, 4/e,2012*
4. J. Grainger & W.D. Stevenson "Power System Analysis" - *McGraw Hill*, 1/e, 2003

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : analyze transmission line performance & Solve Problems
CO2 : explain the significance of per unit quantities.
CO3 : determine the fault currents for symmetrical and unbalanced faults
CO4 : realize the concept of Traveling waves on transmission line

U14EI603 DIGITAL SIGNAL PROCESSING

Class: B.Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : continuous-time (CT) and discrete-time (DT) signals

LO2 : discrete fourier transform (DFT), computational complexity of DFT and efficient implementation of DFT using fast fourier transform (FFT)

LO3 : specifying characteristics of frequency selective filters, design of linear-phase FIR filters

LO4 : classical analog butterworth & chebyshev filters, converting analog filter into equivalent digital filter to design digital IIR filters

UNIT – I (12)

Signals and Systems: Continuous-time (CT) and discrete-time (DT) signals, CT-LTI systems, DT-LTI systems, Sampling theorem, Convolution sum, CT-LTI systems, Convolution integral, Properties of LTI systems, LTI systems described by differential and difference equations.

***z*-Transform:** Representing signals by using DT complex exponentials, *z*-transform, Region of convergence (ROC), Inverse *z*-transform, Properties of *z*-transform, *z*-transform of some common signals, Analysis and characterization of LTI system using *z*-transform, FIR and IIR systems.

UNIT – II (12)

Discrete Fourier Transform (DFT): Frequency domain sampling and reconstruction of discrete-time signals, DFT, properties of DFT, Circular convolution, Inverse DFT (IDFT), Linear filtering methods based on DFT, Frequency analysis of signals using DFT, Relation between DFT and other transforms, Discrete cosine transform (DCT).

Fast Fourier Transform (FFT): Computational complexity of DFT, Introduction to FFT, Radix-2 FFT algorithms, Decimation-in-time FFT algorithm, Decimation-in-frequency FFT algorithm, Inverse DFT using FFT.

UNIT – III (12)

Filter concepts: Causality and its implications, Paley-Wiener theorem, Magnitude characteristics of physically realizable filters, Phase delay, Group delay, Zero phase filter, Linear phase filters, Desirability of linear phase, Filter specifications.

Finite Impulse Response (FIR) filters: Introduction to FIR filters, Inherent stability of FIR filters, Symmetric and anti-symmetric FIR filters , Design of linear phase FIR filters - Windowing method (rectangular window, triangular window, hamming window & hanning window) and frequency sampling method; Design of FIR differentiators, Design of Hilbert transformers.

UNIT – IV (12)

Infinite Impulse Response (IIR) Filters: Reliability of ideal filter, Introduction to IIR filters, Design of IIR digital filters from analog filter specifications, Mapping techniques - Impulse invariance and bilinear transformation; IIR digital filter design using Butterworth and Chebyshev approximations, Frequency transformations, Comparison of Butterworth and Chebyshev filters, Comparison of IIR and FIR filters.

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Text Books:

1. John G.Proakis & D.G.Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", *Pearson education*, 4/e, 2007.
2. Ifeachor, Digital Signal Processing-A practical Approach, *Pearson Education India*, 2/e, 2002.

Reference Books:

1. A. V. Oppenheim & R. W. Schafer, "Discrete-Time Signal Processing", *PHI,* 2/e, 1999.
2. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", *TMH,* 2/e, 2002
3. Johnny R. Johnson, "Introduction to Digital Signal Processing" , *PHI*, 1/e, 2001.
4. Adreas Antanio, "Digital filter Analysis and Design", *TMH,* 4/e, 1988.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : explain Continuous-time (CT) and discrete-time (DT) signals

CO2 : find the DFT of a DT sequence, perform circular convolution using DFT & IDFT and compute 2, 4 & 8point DFT of a sequence using radix-2 DIT & DIF algorithms

CO3: design a linear-phase FIR filter with a prescribed magnitude response using windowing & frequency-sampling methods

CO4: design an IIR Butterworth/Chebyshev digital filter meeting the required specifications by performing impulse invariance/bilinear transformation

UI4EE604 POWER SEMICONDUCTOR DRIVES

Class: B.Tech VI Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : the fundamentals and dynamics of electric drives

LO2 : the various types of the rectifier control and chopper control DC drives

LO3 : the AC voltage control, frequency control and slip power recovery control of Induction motor drives

LO4 : various types of synchronous motor drives and its speed torque characteristics

UNIT-I (9+3)

Fundamentals of Electric Drives: Electric Drives, advantages of electric drives, parts of electric drives, choice of electric drives, status of D.C. drives and A.C. drives. starting, Braking, speed control of AC and DC motors Dynamics of Electric drives: Fundamental torque equations, types of load, Quadrant diagram of speed-Torque characteristics, Dynamics of load torque combinality, steady state stability and Transient stability of an Electric drives. Load equalization. Calculation of time and energy loss in Transient operation, Drive specifications.

UNIT-II (9+3)

Rectifier control of dc drives: Controlled rectifier circuits, braking operation of rectifier controlled separately excited dc motor, single phase and three phase half and fully controlled rectifier fed separately excited dc motor ,multi quadrant operation of fully controlled rectifier fed separately excited dc motor.

Chopper control of dc drives : chopper control of separately excited and series dc motors , multi quadrant control of chopper fed motors

UNIT-III (9+3)

Control of Induction Motor DrivesAC Voltage Controllers: control of induction motor by AC voltage controllers. Frequency controlled Induction motor drives: control of Induction motor by Voltage Source Inverter (VSI), Current Source Inverter (CSI), Current controlled PWM inverters and cyclo converters.

Slip power controlled wound-rotor induction motor drives: static rotor resistance control, static scherbius drives, krammer drives

UNIT-IV (9+3)

Control of Synchronous Motor Drives Operation of cylindrical rotor synchronous motor from VSI and CSI, self controlled Synchronous Motor Drives using cyclo converters, Permanent magnet AC motor drives

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Text Books:

1. G.K. Dubey, "Fundamentals of Electrical Drives", *Narosa Publishers*, New Delhi, 1988.

2. N.K. De and P.K. Sen, "Electrical Drives", *Prentice Hall of India*, New Delhi, 1999.

Reference Books:

1. Vedam Subrahmanyam, "Thyristor Control of Electrical Drives", *Tata McGraw Hill*, New Delhi. 1988.
2. B.K. Bose "Modern Power Electronics & A.C Drives", *Pearson edu*., 2002.
3. P.S.Bimbhra " Power Electronics", *Khanna publishers*, 2012.
4. G.K. Dubey, "Power Semiconductor Drives", *Narosa Publishers*, New Delhi. 1988.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : know the fundamentals and dynamics of electric drives
CO2 : develop the rectifier control and chopper control DC drives
CO3 : realize the Concept of AC voltage control, frequency control and slip power recovery control of induction motor drives & Solve Problems
CO4 : know the concept of Synchronous motor drives & Solve Problems

U14EE605 UTILIZATION OF ELECTRICAL ENERGY

Class: B.Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : various electric traction systems with their performance.
LO2 : selection of motor for different industrial drives.
LO3 : electric heating and welding techniques.
LO4 : designing and selection of lamps for proper illumination

UNIT – I (9+3)

Electric Traction: Systems of electric traction, Transmission of drive, Mechanics of train movement, Speed-time curves, Effect of speed, Acceleration and distance and schedule, Power and energy output from driving axles, Specific energy output, Series-parallel method of speed control, Shunt-bridge transition, Collection of current, Third rail over head wires, Part two graph collections, Different types of electric braking, reverse current, rheostat and regenerative braking, counter current braking of AC and DC motors.

UNIT – II (9+3)

Industrial Utilization: Introduction, Factors governing selection of Electric Motors, Nature of electric supply, Types of drives, Nature of loads, Standard Ratings of Motors, Choice of ratings of Motors, Types of Motors used in industrial Drives, Motors for particular service.

UNIT – III (9+3)

Electric Heating: Elementary principle of heat transfer, Stefan's law, electric furnaces, Resistance furnace, design of heating, losses and efficiency – construction and working of different types of induction furnaces – Dielectric heating Arc furnaces, Control equipment.

Welding: Types of welding, Resistance, Gas and Arc welding, Characteristics of Carson and metallic Are welding, Comparison (Excluding electronics controls)

UNIT – IV (9+3)

Illumination: Introduction, Laws of Illumination, Light production by excitation, Gas discharge lamps, Fluorescent lamps, ultra violet lamps, Arc lamps, Filament lamps, Polar curves, Effect of voltage variation, Basic principles of Light control, Types and design of Lighting schemes, lighting calculations, flood lighting and street lighting, Factory lighting.

Power factor correction: Introduction, Disadvantages of a low Power factor, Causes of low power factor, Power factor improvement, Power factor correction by Static Capacitors, Economics of PF improvement, Most economical Power factor when K W demand is constant, Most economical Power factor when KVA demand is constant.

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Text Books:

1. E.Openshaw Taylor, "Utilization of Electric Energy" *Orient Longman*, 2001.
2. G. C. Garg," Utilization of Electric Power and Electric Traction" *Khanna Publishers*, 1990.
3. C.L.Wadhwa, "Generation Utilization and Distribution of Electrical Energy" *New age International Publishers*, 2010.

Reference Books:

1. J.B.Gupta "A Course in Electric Power" *S.K.Kataria & Sons,* 2010
2. Soni Gupta Bhatnagar, "A Course in Electrical Power" *Dhanpat Rai & Sons,* 2005.
3. H.Partab, "Utilization of Electrical Energy" *Dhanpat Rai & Sons*, 2001.
4. B.L.Theraja & A.K.Theraja "Transmission, Distribution & Utilization" *S.Chand.*

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : choose the motor for different types of Electric traction systems.
CO2 : evaluate the selection of a motor for different types of loads.
CO3 : use various heating and welding techniques for different applications.
CO4 : select and design the lamps for proper illumination. & Solve Problems

U14EE606A **ADVANCED CONTROL SYSTEMS**

Class: B. Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : state variable analysis and stability aspects of control systems

LO2 : analyzing the effect of feedback on controllability, observability and study of Full order observer and reduced order observers

LO3 : concepts of optimal control and calculus of variations

LO4 : concepts of dynamic programming and Software tools to simulate, design linear control systems

UNIT – I (12)

Controllability and observability: Tests for continuous time systems for controllability and observability-time varying case, minimum energy control, time invariant case, principle of duality, controllability and observability from Jordan canonical form and other canonical forms.

Stability: Stability in the sense of Lyapunov.Lyapunov's stability and Lyapunov's instability theorems. Direct method of Lyapunov for the linear continuous time autonomous systems.

UNIT – II (12)

Model control: Effect of state feedback on controllability and observability. Pole placement by feedback. Full order observer and reduced order observer. Deadbeat control by state feedback. Deadbeat observers.

UNIT – III (12)

Optimum control: Formulation of optimal control problem, Minimum time, Minimum energy, and Minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem.

Calculus of variations approach: Minimization of functionals of single function. Constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints.

UNIT – IV (12)

Dynamic programming: Multistage decision process in discrete time principle of causality. Principle of invariant imbedding. Principle of optimality. Multistage decision process in continuous time. Computation of optimal control policy in discrete time control systems with state and control quantization.

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Text Books:

1. Modern Control System Theory-by M. Gopal, New, *New age International Publishers,* 2/e, 1996.

Reference Books:

1. Modern control engineering by K. Ogata, *PHI*, 3/e, 1998.
2. Digital Control and State Variable Methods by M. Gopal, *TMH,* 2/e, 2003.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : apply the concepts of state variable analysis for analyzing stability of real- time control systems.

CO2 : develop the concepts and applications of modern control and state feedback for real time problems & Solve Problems.

CO3 : illustrate the applications of optimal control and calculus of variations in modern control schemes & Solve Problems.

CO4 : develop the programming aspects and other soft computing techniques applied to modern control.

U14EE606B **HIGH VOLTAGE ENGINEERING**

Class: B.Tech., **VI**-Semester **Branch:** Electrical and Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LO):

This course will develop students' knowledge in/on-

LO1 : breakdown mechanisms in solid, liquid and gaseous dielectrics.
LO2 : high voltage and current generation circuits and the operation of each circuit.
LO3 : different techniques employed in high voltage and current measurements.
LO4 : impulse and power frequency tests on the power system components.

UNIT – I (12)

Breakdown Mechanism of Gases, Townsend's First Ionization coefficient, Cathode processor, Secondary effects, Townsend's Second Ionization coefficient, Townsend's Breakdown Mechanism, Experimental Determination of coefficients and Breakdown in Electronegative Gases, Steamer or Kanal Mechanism of Breakdown, Paschen's Law, Penning Effect, Breakdown in Non uniform fields and Corona Discharges, Time – Lag, Practical considerations in using Gases for Insulation purposes, Vacuum Insulation.

Breakdown Mechanism of Solids and Liquids: Introduction, Intrinsic Breakdown, Electro Mechanical Breakdown, Thermal Breakdown, Breakdown of Solid dielectrics in practice, Chemical and Electro Chemical Deterioration and Breakdown, Breakdown due to Treeing and Tracking, Breakdown due to Internal discharges, Breakdown in composite dielectrics, Break down of liquids as Insulators, Pure Liquids and commercial liquids, Conduction and Breakdown in commercial liquids – Suspended particle theory, cavitation and the Bubble theory, Thermal mechanism of the Breakdown, Stressed volume theory.

UNIT – II (12)

Generation of High D.C.&A.C, Voltages and Currents: Half wave rectifier circuit, Voltage doubler circuits, Cockcroft-Walton Voltage multiplier circuit, Electrostatic Generator, Vande Graff Generator, Generation of High AC voltages, Cascaded Transformers, Resonant Transformer, Generation of High frequency AC High voltages, Generation of Rectangular current pulses, Tripping control of Impulse Generator.

Definition of Impulse currents & voltages: Impulse voltage Generator circuits any two type, Marx's multi stage voltage generator, tripping control of impulse voltage generator, Generation of switching surges, definition of impulse current wave forms, impulse current generator.

UNIT – III (12)

Measurement of High Voltage DC, AC and Impulse Currents & Voltages: Measurement of High D.C. voltages – High ohm series Resistance, Resistance potential Divider, R-C capacitive voltage divider, Generating Voltmeter Series capacitance voltmeter, CVT, Electrostatic voltmeters, Peak reading a.c. voltmeters (Chubb– Fortescue method) Spharical Measurements (Spherical gaps) for High D.C. and AC voltages, Impulse voltage, Measurement of High AC, D.C. and Impulse currents, Hall Generators for D.C. current Measurements, Resistive shunts,

Bipolar Strip shunt, Coaxial Tubular shunt, Squirrelcage shunts, C.R.O. for Impulsive voltage and current Measurements.

UNIT – IV (12)

High Voltage Testing Techniques: Principle of Insulation co-ordination on H.V. and EHV Power System, Power frequency and Impulse Testing of Isolators, Bushings, Cables and Transformer, Testing of Insulators and circuit breakers, Testing of Surge Divertor.

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Text Books:

1. M.S.Naidu, V.Kamaraju, "High Voltage Engineering," *Tata McGraw Hill*, 4/e, 2009.
2. Rakosh Das Begamudre, "Extra High Voltage AC Transmission Engineering", 3/e, *New Age International*, 2006.

Reference books:

1. E. Kuffel, W. S. Zaengl, and J. Kuffel, Newnes. "High Voltage Engineering Fundamentals," *Oxford,* 2/e, 2000.
2. D. Kind and K. Feser, Newnes, "High Voltage Test Techniques," *Oxford,* 2/e, 2001.
3. C.L. Wadhwa, "High Voltage Engineering," New Age International, 5/e, 2010.
4. Subir Ray, "An Introduction to High Voltage Engineering," *Prentice Hall India,* 2/e, 2013.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : illustrate the different breakdown mechanisms in solid, liquid and gaseous dielectrics.
CO2 : design and describe the various circuits for generation of high voltages and currents.
CO3 : design and describe the various circuits for measurement of high voltages and currents.
CO4 : illustrate the power frequency and impulse tests on the power system components.

U14EE606C SWITCHED MODE POWER CONVERSION

Class: B.Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : the operation of non-isolated and isolated DC-DC converters in both continuous conduction mode and discontinuous conduction mode

LO2 : various resonant dc-dc converters which can eliminate stresses and switching losses in the semiconductor devices.

LO3 : current control and Voltage control methods to regulate the output power.

LO4 : design of DC-DC converters and evaluation of stability of the system

UNIT – I (12)

DC-DC Converters: Basic topologies of buck, Boost converters, Buck-boost converters, and Cuk converter, Isolated DC-DC converter topologies—forward, and Fly-back converters, Half and full bridge topologies, Modeling of switching converters

UNIT – II (12)

Resonant Converters: Introduction to resonant converters - classification of resonant converters - basic resonant circuit concepts - load resonant converter - resonant switch converter - zero voltage switching clamped voltage topologies - resonant DC link inverters with zero voltage switching - high frequency link integral half cycle converter

UNIT – III (12)

Current Mode and Current Fed Topologies: Voltage mode and current mode control of converters, Peak and average current mode control, Its advantages and limitations, Voltage and current fed converters.

Converter Transfer Functions: Application of state-space averaging to switching converters, Derivation of converter transfer functions for buck, Boost, and Buck-boost topologies.

UNIT – IV (12)

Power Converter Design: Design of filter inductor & Capacitor, and Power transformer, Ratings for switching devices, Current transformer for current sensing, Design of drive circuits for switching devices.

Controller Design: Introduction, mechanisms of loop stabilization, Shaping E/A gain vs. frequency characteristic, Conditional stability in feedback loops, Stabilizing a continuous mode forward converter and discontinuous mode fly-back converter, Feed-back loop stabilization with current mode control, The right-half plane zero.

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Text Books:

1. Ned Mohan, Tore, M. Undeland," Power Electronics: Converters, Applications, and Design", *John Wiley & Sons,* 3/e, 2007.
2. Abraham I. Pressman, "Switching Power Supply Design", *Mc Graw Hill International*, 2/e, 1999.

Reference Books:

1. P.C. Sen,"Modern Power Electronics", *S. Chand Publications*, 2004.
2. Andrzej M. Trzynadlowski," Introduction to Modern Power Electronics", *illustrated Publisher John Wiley & Sons*, 2/e, 2010.
3. Muhammad H. Rashid, Power Electronics hand book, ISBN: 81 8147 367 1.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : differentiate non-isolated and isolated DC-DC converters and their operation in continuous and discontinuous conduction modes.

CO2 : identify different resonant converters for switch mode operation.

CO3 : apply current control and voltage control methods to regulate the output power & Solve Problems

CO4 : design and develop DC-DC converters and compute the stability of the system.

U14EE607 POWER ELECTRONICS AND SIMULATION LABORATORY

Class: B.Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge in/on

LO1 : *characteristics of power electronics devices*

LO2 : *gate firing circuits & commutation circuits for thyristor.*

LO3 : *control methods of rectifiers, choppers, AC voltage controllers & Inverters.*

LO4 : *simulation of power electronics circuits.*

LIST OF EXPERMENTS

1. Characteristics of SCR,IGBT & MOSFET
2. Gate firing circuits for SCR's
3. Single phase semi controlled bridge converter with R &R-L Loads.
4. Single phase fully controlled bridge converter with R &R-L Loads
5. Forced commutation circuits (Class A, Class B, Class C, & Class D)
6. DC Morgan chopper.
7. Single Phase dual converter with R load.
8. Single phase AC voltage controller.
9. Single phase cyclo converter.
10. Three phase bridge inverter.
11. PSPICE/MATLAB simulation of single-phase full converter using RLE load
12. PSPICE/MATLAB simulation of single-phase AC voltage controller using RLE load.
13. PSPICE/ATLAB simulation of single phase Inverter with PWM control.

Laboratory Manual

1. Manual for "Power electronics & Simulation Laboratory" *prepared by the Department of EEE*

Reference Books:

1. Muhammed H.Rasheed., "SPICE for Circuits and Electronics Using P-Spice" *Pearson Education* , 2/e ,2014
2. Introduction to MATLAB by William J Palam III , *Mc-Graw-Hill* , 2/e,2010.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : determine the power semiconductor switches characteristics and their applications

CO2 : design gate firing & commutation circuits for SCRs

CO3 : analyze the operation of converters, inverters and choppers

CO4 : design and simulate power electronic circuits and plot their characteristics

U14 EE608 ELECTRICAL MACHINES –II LABORATORY

Class: B.Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : the performance characteristics of 3-Φ induction motor by conducting various tests.

LO2 : knowing the voltage regulation of 3-Φ synchronous generator by conducting various methods.

LO3 : acquiring the performance behavior of 3-Φ synchronous motor by conducting various tests.

LO4 : knowing the equivalent circuit of 1-Φ induction motors by conducting tests.

LIST OF EXPERMENTS

1. Determination of Equivalent circuit parameters of 3-Φ induction motor
2. Brake test on Slip ring induction motor.
3. Circle diagram of 3-Φ induction motor.
4. Speed control of 3-Φ induction motor by Pole changing.
5. Regulation of 3-Φ alternator by E.M.F and M.M.F method.
6. Regulation of 3-Φ alternator by Z.P.F. method .
7. Parallel operation of 3-Φ Alternators.
8. Determination of V and inverted V curves of 3-Φ Synchronous Motors.
9. Load test on Capacitor Start and Run 1-Φ induction motor.
10. Determination of equivalent circuit parameters of 1-Φ induction motor.
11. Determination of Xd and Xq of a Salient Pole 3-Φ Synchronous machine from slip test.
12. Rotor resistance starter for Slip ring induction motor.

Laboratory Manual

1. Manual for "Electrical Machines –II Laboratory" *prepared by the Department of EEE*

Reference Books:

1. S.G. Tarnekar, P.K. Kharbanda "Laboratory Courses in Electrical Engineering" *S. Chand & Company Limited*, 4/e, 2003.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : determine the performance parameters of 3-Φ induction motor from circle diagram by conducting various Tests.

CO2 : predetermine the voltage regulation of 3-Φ synchronous generator by Conducting various methods.

CO3 : determine the direct and quadrature axis reactance's by conducting slip test.

CO4 : determine the performance of 3-Φ Synchronous Motor by conducting V and inverted V curves.

U14EE609 MINI PROJECT

Class: B.Tech. VI-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme :

L	T	P	C
-	-	-	2

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…..
LO1: mini project design in one of the selected areas of specialization with substantial multi-Disciplinary component
LO2: using current technologies
LO3: problem solving, motivational and time-management skills for career and life
LO4: problem based learning

Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a *Department Mini Project Evaluation Committee (DMPEC)*
2. *DMPEC* shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective mini project oral presentation
3. There shall be only continuous Internal Evaluation (CIE) for mini project
4. The CIE for mini project is as follows:

Assessment	Weightage
Mini project Supervisor Assessment	20%
Working model developed under mini project	40%
Final Report on mini project	20%
DMPEC Assessment: *Oral presentation (PPT) and viva-voce*	20%
Total Weightage:	**100%**

Note:

a) **Working Model:** Students are required to develop a working model on the chosen work and demonstrate before the *DMPEC* as per the dates specified by *DMPEC*
b) **Report:** Students are required to submit a well-documented report on the on the work carried out in the prescribed format as per the dates specified by *DMPEC*
c) **Presentation:** The students are required to deliver the seminar before the *DMPEC* as per the schedule notified by the department
d) *DMPEC* shall decide the course of action on the students, who fail to complete mini project, submit report and give oral presentation

Course Learning Outcomes (COs):
After completion of this course, the students will be able to
CO1: identify, formulate and solve problems related to their program of study
CO2: work independently with minimal supervision
CO3: demonstrate mastery of knowledge, techniques, practical skills and use modern tools of their discipline
CO4: write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE :: WARANGAL-15
(*An Autonomous Institute under Kakatiya University*)
VII SEMESTER OF 4 –YEAR B.TECH DEGREE PROGRAMME
ELECTRICAL & ELECTRONICS ENGINEERING

(5T+2L)

Sl. No.	Course Category Code	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	HS	U14MH 701	Management , Economics and Accountancy	3	1	0	4	15	25	40	60	100
2.	PC	U14EE 702	Power System Operation and Control	3	1	0	4	15	25	40	60	100
3.	PC	U14EE 703	Power System Protection	3	1	0	4	15	25	40	60	100
4.	PE	U14EE 704	Professional Elective-II	4	0	0	4	15	25	40	60	100
5.	PE	U14EE 705	Professional Elective-III	4	0	0	4	15	25	40	60	100
6.	PC	U14EE 706	Electric Drives Laboratory	0	0	3	2	40	-	40	60	100
7.	PC	U14EE 707	Electrical Simulation Laboratory	0	0	3	2	40	-	40	60	100
8.	PR	U14EE708	Major Project Work *Phase-I*	0	0	8	4	-	-	100	-	100
			Total	**17**	**3**	**14**	**28**	-	-	**380**	**420**	**800**

Students Contact Hours/ Weeks **: 34**
Total Credits **: 28**

Professional Elective-II
EE704A: AI Techniques in Electrical Engineering
EE704B: Embedded Systems
EE704C: Special Purpose Machines

Professional Elective-III
EE 705A: HVDC and FACTS
EE 705B: Power System Deregulation
EE 705C: Distribution System Planning and Automation

U14MH701 MANAGEMENT, ECONOMICS AND ACCOUNTANCY

Class: B.Tech. VII semester **Branch:** E&I, EEE, ECE and IT

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop student's knowledge in/on…
LO1: the concepts of management
LO2: the concepts of economics and forms of business organizations
LO3: fundamentals of accountancy
LO4: preparation of final accounts

UNIT-I (9+3)

Management: Meaning and definition, Scope of management, Principles of management; Scientific management- Definition, Characteristics.

Functions of Management: Planning-Definition, Process, Characteristics. Organizing; Definition of organization, Characteristics, Types, Principles of organization. Centralization and Decentralization; Definitions, Features, Merits and Demerits. Communication; process of communication- channels- media and barriers.

Staffing: Meaning and functions of personnel management.

Coordination : Definition, steps to achieve effective coordination.

Controlling: Definition and process.

UNIT-II (9+3)

Economics: Meaning and definition, scope; Micro and macro-Assumptions-Methods and usefulness of economics. Laws of economics-Differences with laws of physical sciences.

Factors of Production: Meaning, definition and characteristics of Land-Labor-capital and entrepreneur. Division of Labor: Types, advantages and disadvantages.

Forms of Business Organization: Sole Proprietor ship, Partnership firm, Types of Partners Cooperative society & Joint stock company-features-Types of Joint stock companies-Merits and demerits.

UNIT-III (9+3)

Double Entry System and Book Keeping: Accounting concepts and conventions, Overview of accounting-cycle. Journal-meaning and journalisation; Ledger- meaning, Ledger posting, Balancing; Two- column-cash book (cash and bank), Preparation of trial balance.

UNIT – IV (9+3)

Preparation of Final Accounts: Trading Account, profit and loss account and Balance Sheet with simple adjustments.

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Text Books:

1. Y.K Bhushan, Business Organization and Mamgt., *Sultan Chand*,2012, (Unit I)
2. K.K. Dewett, Modern Economic Theory., *Pearson Ed.,* 2010 (Unit II).
3. T S Grewal. Introduction to Accountancy., *Sultan Chand*.,(Unit III & IV).

Reference Books:

1. Koontz and O'Donnell, Management. ,*Oxford* Publications.,2011
2. L.M.Prasad, Principles and Practice of Management *Sultan Chand*.,2010
3. R.L.Gupta Principles of Accountancy., *Sultan and Chand* Co.,2010

Course Learning Outcomes (COs):

After completion of this course, the students will be able to

CO1: judge the differences between practical and theoretical management.
CO2: associate an idea of Micro, Macro Economics and Forms of Business Organisations
CO3 distinguish between Journal and Ledger.
CO4: assess the profits and losses & financial position through the Balance Sheet.

UI4EE702 POWER SYSTEM OPERATION AND CONTROL

Class: B.Tech **VII-** Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : computation of load flows in a power system by employing various iterative methods
LO2 : the various methods of reactive power control in power systems and economic load scheduling
LO3 : load frequency control and its analysis in an isolated power system
LO4 : stability, stability limits and the dynamics of synchronous machines

UNIT – I (9+3)

Load flow studies: Introduction, Bus classification, Nodal admittance matrix, Load flow equations, Iterative methods – Gauss, Gauss Seidel and Newton Raphson methods. Newton decoupled and fast decoupled. Merits and Demerits of these methods, system data for load flow study.

UNIT – II (9+3)

P - Q Control: Effect of Synchronous machine excitation, Power angle of synchronous machines, Specifications of Voltages, capacitor banks, control by transformers, Introduction to static VAR compensators.

Economic Operation of Power Systems: Distribution of load between units within a plant, transmission loss as a function of plant generation, calculation of loss coefficients, distribution of load between plants. Unit commitment: Introduction, constraints in unit commitment problems.

UNIT – III (9+3)

Load Frequency control: Introduction, Load frequency problem, Megawatt frequency (or P-F) control channel, Megavar voltage (or Q – V) control channel. Dynamic interaction between P-F and Q-V loops, Mathematical model of speed governing system, turbine models division of power system into control areas, P-F control of single control area (the uncontrolled and controlled cases) P-F control of two area systems (the uncontrolled and controlled cases).

UNIT – IV (9+3)

Power System Stability: The stability problem, steady state stability limit, Expression using ABCD parameters, steady state stability of synchronous machine. transient stability, swing equation, equal area criterion of stability and its further applications, step by step solution swing equation, some factors affecting transient stability & Methods of improving stability . Concept of Dynamic stability – effect of excitation on generator power limits.

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Text Books:

1. John Grainger & William Stevenson Jr., "Power Systems Analysis", *McGraw Hill,* 1/e, 2003.
2. C.L.Wadhwa, "Electrical Power Systems", *New age International*, 6/e, 2014.

3. Olle I Elgerd " Electric Energy Systems Theory", *Tata McGraw Hill* ,2/e ,2011

Reference Books:

1. I.J. Nagrath & D.P.Kothari, "Modern Power System Analysis", *McGraw Hill*, 4/e, 2011.
2. Chakrabarthi, Abhijit halder, "Power system analysis: Operation and Control", *Prentice hall of India*, 3/e, 2010.
3. E.W.Kimbark "Power system stability, Vol-I,II &III", *Wiley & Sons*.
4. A.J. Wood and B.F. Wollenberg, *"Power Generation Operation and Control"*, *John Wiley & Sons*, 2/e, 1996.

Course Learning Outcomes (COs):

After completion of this course, students will be able to….

CO1 : compute the bus variables and the power flows in the system using various iterative methods
CO2 : analyze the various reactive power control techniques in a power system determine the optimal economic load scheduling.
CO3 : determine the static and dynamic frequency response of a power system for a single area and two area system
CO4 : predict the stability of power systems and determine the transient stability limits

UI4EE703 POWER SYSTEM PROTECTION

Class: B.Tech., VII-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : circuit Breakers
LO2 : electromagnetic Relays
LO3 : static Relays
LO4 : protection of Transmission Lines

UNIT – I (9+3)

Switch Gear and Circuit Breakers: Introduction, principle of circuit Interruption, short circuit studies in power systems, circuit breakers, types and characteristics, circuit breaker rating, Restriking voltage, transient, characteristics of restriking voltage, circuit breaker operating mechanism, Air-break, circuit breakers, oil circuit breakers, Air-blast circuit breaker, Vacuum circuit breakers, SF_6 circuit breakers Modification of circuit breaker duty by shunt resistors, HVDC circuit breaking, Design of circuit breakers, Testing of circuit breakers, Selection of circuit breaker, Types of switch gear, AC indoor switch gear, Medium voltage a.c. switch gear, medium voltage AC H.R.C. fuses applications.

UNIT – II (9+3)

Protection Relays: Basic ideas of relay protection, Need for protection relaying in power systems, Basic requirements of protective relaying. Principles and characteristics of protective relaying, Classification of relays, Theory of application of relays, principal types of Electromagnetic relays, Theory of Induction relay torque, General equations of Comparators, over current relays, Instantaneous over current relay, Directional relays, Distance relays, differential relay.

UNIT – III (9+3)

Static Relays: Basis for Static relay development, classification of static relays, basic components of static relay, comparators, Amplitude comparators, Phase comparators. Co-incidence type phase comparator, Over current relay, differential protection, and static distance protection.

UNIT-IV (9+3)

Protection: Protection of transmission line with distance relays, over current and differential relays, Unit protection of transmission, Bus protection, Generator protection with differential relays, Earth fault relays, Miscellaneous faults and protection. Transformer protection with differential relays, earth fault relays, Buchloz relay. Horngaps, surge diverters, Rod gaps, Ground rods, Ground wires.

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Text Books:

1. Badhri Ram, "Switchgear & Protection" *Tata Mc-Graw-Hill*, 2/e, 2014

2. Ravindranath & Chander, "Switch Gear & Protection" *New Age International* , 2/e, 2014

Reference Books:

1. Sunil S.Rao "Switch Gear & Protection" *Khanna Publishers*, 9/e ,2014
2. U.A.Bakshi, M.V.Bakshi: "Switchgear and Protection", *Technical Publications*, 1/e , 2014
3. Y.G.Paithankar & Bhinde "Fundamentals of Power System Protection "*Printice Hall of India*, 2/e,2014
4. T.S Madhava Rao ,"Power Systems Protection & Static Relays" *Mc Graw-Hill*, 2/e , 2014

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : analyze Fundamental principles of circuit breakers & fuses
CO2 : compare electromagnetic with static relays
CO3 : realize the concept of Static Relays.
CO4 : evaluate the of performance of Various Relays

U14EE705A **A.I. TECHNIQUES IN ELECTRICAL ENGINEERING**

Class: B. Tech., **VII**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : artificial neural networks
LO2 : ANN paradigms and Fuzzy Logic
LO3 : genetic algorithms
LO4 : applications of AI techniques

UNIT – I (12)

Artificial Neural Networks: Introduction, Models of Neuron Network-Architectures – Knowledge representation, Artificial Intelligence and Neural networks–Learning process-Error correction learning, Hebbian learning–Competitive learning-Boltzman learning, supervised learning-Unsupervised learning–Reinforcement learning-Learning tasks.

UNIT – II (12)

ANN Paradigms: Multi-layer perceptron using Back propagation Algorithm (BPA), Self – Organizing Map (SOM), Radial Basis Function Network-Functional Link Network (FLN), Hopfield Network.

Fuzzy Logic: Introduction –Fuzzy versus crisp, Fuzzy sets-Membership function –Basic Fuzzy set operations, Properties of Fuzzy sets –Fuzzy cartesion Product, Operations on Fuzzy relations –Fuzzy logic –Fuzzy Quantifiers, Fuzzy Inference-Fuzzy Rule based system, Defuzzification methods

UNIT – III (12)

Genetic Algorithms: Introduction-Encoding –Fitness Function-Reproduction operators, Genetic Modeling –Genetic operators-Cross over-Single site cross over, Two point cross over –Multi point cross over-Uniform cross over, Matrix cross over-Cross over Rate-Inversion & Deletion, Mutation operator –Mutation –Mutation Rate-Bit-wise operators, Generational cycle-convergence of Genetic Algorithm.

UNIT – IV (12)

Applications of AI Techniques: Load forecasting, Load flow studies, Economic load dispatch, Load frequency control, Single area system and two area system, Small Signal Stability (Dynamic stability), Reactive power control , Speed control of DC and AC Motors.

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Text Books:

1. S.Rajasekaran and G.A.V.Pai "Neural Networks, Fuzzy Logic & Genetic Algorithms", *PHI*, New Delhi, 2003.
2. Rober J. Schalkoff, "Artificial Neural Networks", *Tata McGraw Hill Edition*, 2011

Reference Books:

1. Hassoun, "Fundamentals of Artificial Neural Networks, *Prentice Hall of India*, New Delhi.
2. Anderson, "Introduction to Neural Networks", *Prentice Hall of India*, New Delhi.
3. Kosko, "Neural Networks and Fuzzy Systems", *Prentice Hall of India*, New Delhi
4. D.E.Goldberg, "Genetic Algorithms", *Addison-Wesley* 1999

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : realize the concepts of ANNs, Fuzzy Logic and Genetic Algorithm.
CO2 : know the difference between knowledge based systems and Algorithmic based systems.
CO3 : explain the operation of Fuzzy Controller and Genetic Algorithm.
CO4 : apply soft computing techniques for real-world problems.

U14EE704B EMBEDDED SYSTEMS

Class: B.Tech., **VI**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: concepts of embedded systems.
LO2: general Purpose and Domain Specific Processors.
LO3: embedded Firmware Design Approaches.
LO4: R*TOS& Task Communication/Synchronization Issues*.

UNIT I (12)

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT –II (12)

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT –III (12)

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages, Programming in Embedded C.

UNIT –IV (12)

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.
Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

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Text Books:

1. Shibu K.V, "Introduction to Embedded Systems", *Mc Graw Hill* ,2014

Reference Books:

1. Raj Kamal ,"Embedded Systems", *TMH* 2/e, *,2008*.
2. Lyla,"Embedded Systems-An Integrated Approach ", *Pearson Education*, 2013.
3. David E. Simon ,"An Embedded Software Primer", *Pearson Education,2004*.

Course Learning Outcomes (COs):

After completion of this course the student will be able to…

CO1: explain Embedded systems.
CO2: describe General Purpose and Domain Specific Processors.
CO3: discuss Embedded firmware Design Approaches.
CO4: explain RTOS & Task Communication/Synchronization Issues.

UI4EE704C **SPECIAL PURPOSE MACHINES**

Class: B.Tech VII Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : operation control and application of Switched Reluctance Motor (SRM) and Synchronous Reluctance Motor (SyRM).

LO2 : performance and applications of BLDC and PMDC motors.

LO3 : operation and applications of PMSM and 1-Φ special machines.

LO4 : operations and applications of linear machines.

UNIT – I (12)

Switched Reluctance Motor(SRM): Construction, Principle Of Working, Srm Analysis, Torque Equation And Characteristics, Power Converter Circuits, Control Of Srm, Rotor Position Sensors, Sensorless Control , Related Problems.

Synchronous Reluctance Motor (SyRM): construction of SyRM, working of SyRM, phasor diagram & torque equation and control of SyRM, advantages, applications, related problems.

UNIT – II (12)

PMDC Motor: Construction, Principle of Working, Torque Equation & Equivalent circuit, performance characteristics, types of PMDC motors.

Brushless PMDC Motor (BLDC): classification, construction, electronic commutation, principle of operation, types and control of BLDC motor, comparison of conventional DC motor and BLDC motor, applications of BLDC motor, related problems.

UNIT – III (12)

Permanent Magnet Synchronous Motor: construction, principle of operation, EMF equation and torque equation, phasor diagram and circle diagram of PMSM, Comparison of conventional and PM synchronous motors, self control of PMSM and sensorless control of PMSM, applications of PMSM, related problems.

Single Phase Special Machines: AC series motor: construction, principle of working, EMF and torque equation, phasor diagram and torque speed characteristics.

Repulsion motor: construction and working, types of repulsion motor, torque equation, characteristics and phasor diagram , related problems.

UNIT – IV (12)

Linear Electrical Machines: Linear Induction Motor: construction and thrust equations, performance equations, equivalent circuits, characteristics and control.

Linear Synchronous Motor: types of construction, thrust equation and control of LSR, applications.

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Text Books:

1. E.G.Janardhan, "Special Electrical Machines", *PHI Delhi,* 2014

Reference Books:

1. P.S.Bhimbra, "Electrical Machinery", *Khanna publications,* New Delhi.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1 : select the SRM and SyRM for industrial applications.
CO2 : analyze the performance of BLDC and PMDC motors. & Solve Problems
CO3 : indentify the applications of PMSM and 1-Φ special machines.
CO4 : compare the conventional machines with linear machines. & Solve Problems

U14EE705A **HVDC AND FACTS**

Class: B.Tech., **VII**-Semester **Branch:** Electrical and Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : difference between HVDC and HVAC and to understand the different modes of operation of Graetz circuit with voltage wave forms.

LO2 : different converter control techniques and acquire knowledge on filtering out the different types of harmonics.

LO3 : importance of controllable parameters and the objectives of shunt compensators.

LO4 : different types of FACTS controllers.

UNIT – I (12)

DC Power Transmission: Need for power system interconnections, Evolution of AC and DC transmission systems, Comparison of HVDC and HVAC Transmission systems, Types of DC links and components.

Analysis of converters: Pulse number, choice of converter configurations, Analysis of Graetz circuit with and without overlap, voltage waveforms, Analysis of two and three valve conduction mode, Converter Bridge characteristics, Inverter mode of operation, voltage waveforms.

UNIT – II (12)

Principles of DC link control: Converter Control characteristics, Control hierarchy Constant current Control, CEA Control, firing angle control of valves, starting and stopping of a dc link, Power control. Effects of Harmonics, sources of harmonic generation, Types of filters –Design examples, Basic power flow.

UNIT – III (12)

Power flow in AC systems: Relative importance of controllable parameters, Basic types of FACTS controllers. Current source and Voltage source converters, VSC configurations based on pulse number.

Shunt compensation: Objectives of shunt compensation, Methods of controllable VAR generation, TCR, TSC, FC-TCR configurations, STATCOM, basic operating principle, control approaches and characteristics.

UNIT – IV (12)

Series Compensation: Objectives of series compensator, Sub synchronous resonance variable impedance type of series compensators, TCSC, TSSC-operating principles and control schemes, SSSC, Power Angle characteristics, Control range and VAR rating, Capability to provide reactive power compensation.

Series Shunt Compensation: Introduction, Basic operating principles and characteristics, control and dynamic performance.

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Text Books:

1. K.R.Padiyar "HVDC Power Transmission Systems –Technology and System Interactions", *New Age International Publishers*, 2007.
2. Narain. G.Honorani, Laszlo Gyugyi "Understanding FACTS –Concepts and Technology of Flexible AC Transmission Systems", *Electrical & Electronics Engineering Press*.

Reference Books:

1. R. Mohan Mathur, Rajiv K. Varma "Thyristor Based Facts Controller for Transmission Systems" *Electrical & Electronics Engineering Print,* 2002.
2. J. Arrillaga, Y.H. Liu, N.R. Watson "Flexible Power Transmission", *John Wiley Press*, 2007.
3. K.R.Padiyar "Power Electronics Control in Power Systems" *Tata McGraw Hill*, 2006.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : differentiate between HVDC and EHVAC transmission and analyze the operation of Graetz circuit in different modes with voltage waveforms.

CO2: analyze the different converter control techniques and design the filters for harmonic mitigation & Solve Problems.

CO3 : apply different control techniques for real and reactive power flow in ac transmission systems & Solve Problems.

CO4 : analyze and select a suitable FACTS controller for a given power flow control.

U14EE705B POWER SYSTEM DEREGULATION

Class: B.Tech., **VII** -Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : developments in power system restructuring
LO2 : OASIS: open access same-time information system
LO3 : roles and responsibilities of service entities in the power market.
LO4 : power system operation in a competitive environment

UNIT – I (12)

Overview of Key Issues in Electric Utilities: Introduction –Restructuring models –Independent system operator (ISO) –Power Exchange -Market operations –Market Power models.

UNIT – II (12)

OASIS: Open Access Same-Time Information System: Structure of OASIS -Publishing of Information – Open Transmission System Operation –Definitions of Transfer Capability Issues.

UNIT – III (12)

Electricity Pricing: Introduction –electricity Price Volatility Electricity Price Indexes –challenges to Electricity Pricing –Construction of Forward Price Curves –Short-time Price Forecasting.

Power System Economic Operation: Unit commitment: Basic model, Additional Issues, Formation of Power Pools, Energy Brokerage

UNIT – IV (12)

Power System Operation in a Competitive Environment: Introduction –Operational Planning Activities of ISO-The ISO in Pool Markets –The ISO in Bilateral Markets –Operational Planning Activities of a Genco

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Text Books:

1. Kankar Bhattacharya, Math H.J. Boller, JaapE.Daalder, "Operation of Restructured Power System" *Klum, er Academic Publisher*, 1/e, 2001.
2. Venkatesh, "Electrical Power system Analysis ,Security and Deregulation", *Printice Hall of India*, 1/e, 2012.

Reference Books:

1. Mohammad Shahidehpour, and Muwaffaqalomoush, "Restructured Electrical Power systems", *Marcel Dekker Inc.,* 2001.
2. AshikurBhuiya, "Power System Deregulation: Loss Sharing in Bilateral Contracts and Generator Profit Maximization", *VDM Verlag*, 1/e, 2008.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : know the developments in power system restructuring.
CO2 : describe the Open Access Same-Time Information System
CO3 : identify the roles and responsibilities of service entities in the power market.
CO4 : analyze congestion management, transmission pricing, and ancillary services management

U14EE705C DISTRIBUTION SYSTEM PLANNING AND AUTOMATON

Class: B.Tech., **VII** -Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : characteristics and components of electric power distribution systems
LO2 : impact of geographical, demographical and economic factors on distribution systems
LO3 : components of distribution automation systems
LO4 : distribution system design based on forecasted data

UNIT – I (12)

Power sector in India: An overview of distribution systems, Distribution system planning-issues and aspects, Introduction to Distribution system forecasting techniques, Stochastic and time series techniques for forecasting, intelligent techniques based load forecasting techniques, Definitions and importance of various terms that characterize loads, Load management and types of tariffs

UNIT – II (12)

Distribution transformers (DTRs): Basic design considerations, 3-ph and 1-ph DTRs-types of connections and its relevance in operation, Need for special types of distribution transformers, Cast resin, CSP, Amorphous core DTRs, Regulation and efficiency of transformers-use of predetermined curves

UNIT – III (12)

Sub-transmission system: Sub-stations site selection procedure, Sub-station capacity expansion, Location of new sub-stations and their rating, Sub-station bus schemes, VD and PL calculations for a service area with four and six feeders, VD and PL calculations for a service area with n-feeders, Characteristics of primary systems, Voltage drop (VD) and power loss (PL) calculations, Importance of power factor in distribution systems, Capacitors and their role in improving power factor

UNIT – IV (12)

Distribution system protection: Distribution system protection devices, Problems in distribution systems and the need for automation,

Distribution system automation (DSA): General schematic, DSA-Hardware modules and their functions, DSA-Software modules and their functions, DSA-Alternatives in Communication media, Communication protocols for DSA schemes and need for OSA, Examples of DSA schemes, Distribution system grounding

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Text Books:

1. Turan Gonen, "Electric power Distribution System Engineering", *CRC Press*, 2/e, 2007.
2. A S Pabla, "Electric Power Distribution", *Tata Mc Graw Hill Publisher*, 5/e, 2004.

Reference Books:

1. James A Momoh, "Electric Power Distribution, Automation, Protection and Control", *CRC Press*, 1/e, 2007.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : characteristics and components of electric power distribution systems.

CO2 : analyze and evaluate the impact of geographical, demographical and economic factors on distribution systems& solve problems

CO3 : components of distribution automation systems.

CO4 : design, analyze and evaluate distribution system design based on forecasted data

UI4EE706 ELECTRIC DRIVES LABORATORY

Class: B.Tech VII Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This laboratory course will develop students' knowledge in/on
LO1 : usage of various types of converter control drives
LO2 : PWM control voltage source inverter drives
LO3 : closed loop operation of induction motor drive
LO4 : usage of various types of AC and DC drives

LIST OF EXPERIMENTS

1. Single phase fully converter controlled drive.
2. Single phase semi- converter controlled drive.
3. Three phase fully converter controlled drive.
4. Three phase semi- converter controlled drive.
5. Single phase VSI-PWM control drive.
6. Single phase AC voltage converter controlled drive.
7. Single phase cyclo-converter controlled drive.
8. Buck converter controlled drive.
9. Rotor resistance control of wound rotor induction drive.
10. Closed loop control of three phase induction drive.

Laboratory Manual:

1. Manual for "Electric Drives Laboratory" *prepared by the Department of EEE*

Text Books:

1. G.K. Dubey, "Fundamentals of Electrical Drives", *Narosa Publishers*, New Delhi, 1988.

Course Learning Outcomes (COs):
After completion of this course, students will be able to
CO1 : know the usage of various types of converter control drives
CO2 : apply PWM control voltage source inverter drives
CO3 : operate closed loop operation of induction motor drives
CO4 : use various types of AC and DC drives

UI4EE707 ELECTRICAL SIMULATION LABORATORY

Class: B.Tech **VII** Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This laboratory course will develop students' knowledge in/on
LO1 : simulation of electrical and electronic circuits
LO2 : power flow problem in power systems
LO3 : performance of transmission lines
LO4 : performance of DC Machines

LIST OF EXPERIMENTS

1. Simulation of three phase bridge rectifier using PSIM.
2. Performance evaluation of medium and long transmission lines using Matlab.
3. Symmetrical component analysis using Matlab
4. Load frequency control of single area and two area power system with Matlab / Simulink
5. Performance of FC-TCR compensator using PSCAD.
6. Permanent Magnet DC motor simulation using Matlab/Simulink
7. Simulation of Half wave & Full wave bridge rectifier using PSIM.
8. Simulation of 1-Φ inverter circuits using PSIM.
9. DC Motor Speed control using Matlab/Simulink.
10. Simcoupler Module for Co-Simulation with MAT LAB/Simulink

Laboratory Manual:

1. Manual for "Electrical Simulation Laboratory" *prepared by the Department of EEE*

Text Books:

1. C.L. Wadhwa " Electrical Power Systems " *New Age International*, 6/e,2014
2. Hadi Sadat "Power System Analysis "*Tata Mc Graw Hill Pub. Co.* 2002.
3. I.J. Nagrath & M.Gopal "Control Systems Engineering" *New Age International Pub. Co, 2/e, 2014*
4. A.E. Clayton & C.I. Hancock "Performance and Design of DC Machines" *Narosa Publishing House*, 1/e, 2010

Course Learning Outcomes (COs):
After completion of this course, students will be able to
CO1 : simulate and analyze Power Electronics Converters.
CO2 : analyze and solve power flow problem in power systems
CO3 : model, simulate and analyze the performance of DC Machines
CO4 : evaluate the performance of transmission lines

U14EE708 MAJOR PROJECT WORK *PHASE-I*

Class: B.Tech. VII-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme :

L	T	P	C
-	-	7	4

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…..
LO1: problem based & project based learning
LO2: major project design in one of the selected areas of specialization with substantial multi-disciplinary component
LO3: analytical and research skills
LO4: team work, leadership and interpersonal skills

Student has to take up Major project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

- The major project work is a practical, in-depth study of a selected problem and showing an implementable solution the problem
- Major project work enables the student to synthesize and integrate knowledge, connect theory and practice as well as demonstrate holistic achievement of program learning outcomes

Guidelines:

1. The HoD shall constitute a *Department Project Evaluation Committee (DPEC)*
2. Major project work shall be normally conducted in two stages: Major project work *Phase-I* in seventh semester and Major project work *Phase-II* in eighth semester
3. There shall be only continuous Internal Evaluation (CIE) for Major project *Phase-I*
4. CIE for the Major project *Phase-I* in seventh semester is as follows:

Assessment	Weightage
Project Supervisor Assessment	50%
DPEC Assessment: *Registration Presentation, Progress presentation-I, Report submission, oral (PPT) presentation & viva-voce*	50%
Total Weightage:	**100%**

DPEC shall decide the course of action on the students, who fail to complete the Major project *Phase-I*, submission of preliminary report and oral (PPT) presentation.

Course Learning Outcomes (COs):
After completion of this course, the students will be able to
CO1: demonstrate creativity in the design of components, systems or processes of their program of study
CO2: design an innovative product by applying current knowledge and adopt to emerging applications of engineering & technology
CO3: work cooperatively with others to achieve shared goal by motivating team-mates with a clear sense of direction, values and ethics
CO4: write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE :: WARANGAL-15
(*An Autonomous Institute under Kakatiya University*)
VIII SEMESTER OF 4 –YEAR B.TECH DEGREE PROGRAMME
ELECTRICAL & ELECTRONICS ENGINEERING

(4T+2L)

Sl. No.	Course Category Code	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	OE	U14 OE801	Open Elective-II	4	0	0	4	15	25	40	60	100
2.	PC	U14EE 802	Renewable Energy Systems	3	1	0	4	15	25	40	60	100
3.	PE	U14EE 803	Professional Elective-IV	4	0	0	4	15	25	40	60	100
4.	PE	U14EE 804	Professional Elective-V	4	0	0	4	15	25	40	60	100
5.	PC	U14EE 805	Power Systems Laboratory	0	0	3	2	40	-	40	60	100
6.	PC	U14EE 806	Renewable Energy Systems Laboratory	0	0	3	2	40	-	40	60	100
7.	PR	U14EE 807	Major Project Work *Phase-II*	0	0	13	7	-	-	40	60	100
			Total	**15**	**1**	**19**	**27**	-	-	**280**	**420**	**700**

Students Contact Hours/ Weeks **: 35**
Total Credits **: 27**

Open Elective-II
OE 801A: Operations Research
OE 801B: Management Information Systems
OE 801C: Entrepreneurship Development
OE801D: Forex and Foreign Trade

Professional Elective-V:
EE 804A: Computer Methods in Power Systems
EE 804B: Smart Electric Grid
EE 804C: Design of Electrical Machines

Professional Elective-IV:
EE 803A: Digital Control Systems
EE 803B: Advance Power System Protection
EE 803C: Real Time Control of Power Systems

U14OE801A OPEARTIONS RESEARCH

Class: B.Tech. VIII semester **Branch:** E&I, EEE, IT and ECE

Teaching Scheme :

L	T	P	C
4	-	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: concepts to solve linear programming problems arise in real life situations involving several parameters using various methods and their advantages

LO2: applications of linear programming namely transportation, assignment and travelling salesman problem which arise in different situations in all engineering branches

LO3: non-linearity in optimization problems, direct search techniques and iterative methods

LO4: applications of optimization techniques in the problem of queuing systems under several situations and their practical relevance

UNIT-I (12)

Linear Programming Problems (LPP): Mathematical models and basic concepts of linear programming problem; Solution of linear programming problems - Graphical method, Analytical method, Simplex method, Artificial variable technique (Big-M and Two-phase methods), Duality principle and dual simplex method.

UNIT-II (12)

Special type of LPPs: Mathematical model of transportation problem, Methods of finding initial basic feasible solution to find the optimal solution of transportation problem, Exceptional cases in transportation problem, Degenerate solution of transportation problem, Assignment problem as a special case of transportation problem, Hungarian algorithm to solve an assignment problem, Special cases in assignment problem.

The travelling salesman problem, Formulation of travelling salesman problem as an assignment problem.

UNIT-III (12)

Non-linear Programming Problems (NLPP): Classical method of optimization using Hessian matrix, Iterative methods - Random search methods, Steepest decent method and Conjugate gradient method; Direct methods - Lagrange's method, Kuhn-Tucker conditions, Penalty function approach.

UNIT-IV (12)

Queuing Theory: Elements of operating characteristics of a queuing system, Probability distribution of arrivals and services system, Generalized model (Birth-Death process), Poisson queuing system, Study of various queuing models with single server and multiple servers having finite and infinite populations.

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Text Books:

1. Kanti swarp,P.K.Gupta, Man Mohan, "Operations Research", *S. Chand & Sons*, New Delhi. 16/e., 2013. (*Unit I,II,IV*)
2. S.S. Rao, "Optimization Techniques", *New Age International*, New Delhi, 3/e., 2013. (*Unit III*)

Reference Books:

1. Hamdy. A. Taha, Operations Research, *Prentice Hall of India Ltd,* New Delhi, 7/e., 2002.
2. J.C. Pant, "Introduction to Optimization", *Jain Brothers*, New Delhi, 7/e., 2012.

Course Learning Outcomes (COs):

After completion of this course, the students will be able to

CO1: develop the mathematical model of an optimization problem and identify particular case of activities among the several alternatives and solve a given linear programming problem using suitable method

CO2: obtain solution for a special type linear programming problem namely transportation, assignment & travelling salesman problem and infer their practical relevance

CO3: analyze the characteristics of non-linearity in optimization and solve certain NLPP using searching and iterative techniques

CO4: state the importance of queuing system and solve the problems of Poisson queuing models of different types

U14OE801B MANAGEMENT INFORMATION SYSTEM

Class: B. Tech VIII-Semester **Branch:** Common to EEE, ECE, EIE,IT

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…
LO1: essentials and strategies of managing information systems
LO2: information technology impacts on society and decision making
LO3: information system applications in manufacturing and service sectors
LO4: information systems in enterprise and supply chain management

UNIT-I (12)

Management information systems: Concepts, Role of the management information system, Impact of the management information system.
E-Business enterprise: Introduction, Organization of business in an E-enterprise, E-business, E-commerce, E-communication, E-collaboration.
Strategic management of business: The concept of corporate planning, Essentiality of strategic planning, Development of the business strategies, Types of strategies, Short-range planning, Tools of planning, Strategic analysis of business.
Information security challenges in E-enterprises: Introduction, Security threats and vulnerability, Controlling security threat and vulnerability, Management security threat in E-business, Disaster management, MIS and security challenges.

UNIT-II (12)

Information technology impact on society: Introduction, Impact of IT on privacy, Ethics, Technical solutions for privacy protection, Intellectual property, Copyright and patents, Impact of information technology on the workplace, Information system quality and impact, Impact on quality of life.
Decision making: Decision-making concepts, Decision-making process, Decision analysis by analytical modeling, Behavioral concepts in Decision-making, Organizational Decision-making, MIS and Decision-making.
Information and knowledge: Information concepts, Information - a quality product, Classification of the information, Methods of data and information collection, Value of the information, General model of a human as an information processor, Knowledge, MIS for knowledge.

UNIT-III (12)

Development of MIS: Development of long range plans of the MIS, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, MIS - Development process model.
Applications in manufacturing sector: Introduction, Personal management, Financial management, Production management, Raw materials management, Marketing management, Corporate overview.

Applications in service sector: Introduction to service sector, Service concept, Service process cycle and analysis, Customer service design, Service management system, MIS applications in service industry.

UNIT-IV (12)

Business processing Re-engineering (BPR): Introduction, Business process, Process model of the organization, Value stream model of the organization, What delays the business process, Relevance of information technology, MIS and BPR.

Decision support system and Knowledge management: Decision support systems (DSS) concepts and philosophy, DSS application in E-enterprise, Knowledge management, Knowledge management systems, Knowledge based expert system.

Enterprise management systems: Enterprise resource planning (ERP) systems, ERP model and modules, Benefits of the ERP, ERP product evaluation, ERP implementation, Supply chain management (SCM), Information management in SCM.

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Text Books:

1. Waman S Jawadekar, "Management Information Systems", *Tata McGraw Hill, Third Edition,* ISBN 0-07-061634-5, 2007.

Reference Books:

1. Ken Laudon, Jane Laudon, Rajnish Dass, "Management information system", *Pearson, Eleventh Edition,* ISBN 978-81-317-3064-5, 2010.
2. Robert Schultheis, Mary Sumner, "Management Information Systems – The Manager's View", *Fourth Edition, Tata McGraw Hill*, ISBN: 0 – 07 – 463879 – 3, 2003.
3. Robert G.Murdick, Joel E.Ross, James R.Clagget, "Information Systems for Modern Management", *Third Edition, Prentice Hall of India,* ISBN: 81 – 203 – 0397 – 0, 2002.
4. Gordon B.Davis, Margrethe H.Olson, "Management Information Systems", *Second Edition, Tata McGraw Hill,* ISBN: 0 – 07 – 040267 – 1, 2000.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1: describe concepts of managing information systems in e-business enterprises
CO2: evaluate privacy, security and quality of information management and decision making systems
CO3: analyze systems for managing information in manufacturing and service sector
CO4: asses effective of information systems which can be adopted in enterprise and supply chain management

U14OE801C **ENTREPRENEURSHIP DEVELOPMENT**

Class: B. Tech. VIII Semester **Branch:** E&I, EEE, IT and ECE

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on
LO1: various characteristics of entrepreneur and his role in development of the nation
LO2: market survey and demand survey
LO3: functions of various managements/managers in industry
LO4: legal issues in entrepreneurship and intellectual property rights

UNIT –I (12)

Entrepreneurship: Definition, Significance of entrepreneurship, Role of entrepreneurship in development of nation, Characteristics of an entrepreneur, Motivation theories, Role of women entrepreneurship, Types of business organizations, Agencies dealing with entrepreneurship and small scale Industries; Case studies of successful entrepreneurs-Identification of business opportunity.

UNIT-II (12)

Business opportunity: Definition, selection, opportunities in various branches of engineering, Sources of new ideas and screening of ideas
Planning and Launching of an entrepreneurial activity: Market survey and demand survey.
Feasibility studies: Technical feasibility, financial viability and social acceptability.
Break even analysis: Graphical and analytical methods, Preparation of preliminary and bankable project reports, Factors influencing site selection.

UNIT-III (12)

Project Planning: Product planning and development process, Definition of a project, Sequential steps in executing the project.
Plant layout: Principles, types and factors influencing layouts.
Material Management: Purchase procedures, procurement of material.
Fundamentals of Production Management: Production Planning and Control (PPC)-Concepts and Functions, Long & short run problems.
Marketing Management: Definition, Functions and market segmentation.
Financial Management: Objectives & Functions; Sources of finance-internal and external.

UNIT-IV (12)

Human Resource Management: Introduction, Importance, Selection, Recruitment, Training, Placement, Development, Performance appraisal systems.
Legal Issues in Entrepreneurship: Mechanisms for resolving conflicts; Industrial laws- Indian Factories Act, Workmen Compensation Act; Intellectual Property Rights.

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Text Books:

1. Robert D.Hisrich, Michael P. Peters, "Entrepreneurship", *Tata McGraw-Hill*, 5/e 2002.
2. David H. Holt, "Entrepreneurship New venture creation" *Prentice Hall of India*.2004.

Reference Books

1. Handbook for "New Entrepreneurs", *Entrepreneurship Development Institute of India*, Ahmadabad.
2. T.R. Banga, "Project Planning and Entrepreneurship Development", *CBS Publishers*, New Delhi, 1984.
3. Personnel efficiency in Entrepreneurship Development-"A Practical Guide to Industrial Entrepreneurs", *S. Chand & Co.*, New Delhi.

Course Learning Outcomes (COs):

After completion of this course, students will be able to….

CO1: describe characteristics of entrepreneur and his role in development of the nation
CO2: apply market survey and demand survey methods to real time situations
CO3: explain the functions of production, marketing and financial managements
CO4: identify the legal issues in entrepreneurship and explain intellectual property rights

U14OE801D FOREX & FOREIGN TRADE

Class: B.Tech. VIII semester **Branch:** EIE, EEE, IT and ECE

Teaching Scheme :

L	T	P	C
4	-	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…
LO1: business, business system and its objectives
LO2: fundamentals of foreign trade, procedure and documents required in all the clearances of foreign trade
LO3: foreign exchange market, exchange rate and its determination under various monetary systems
LO4: exchange control objectives, features and methods of exchange control

UNIT-I (12)

Business: Nature and scope, Classification of business activities, Functions of commerce & trade.
Business System: Characteristics and components of business system.
Objectives of Business: Concept, Significance and classification of objectives, Objections against profit maximization.

UNIT-II (12)

Foreign Trade: Introduction of international trade, Basic of external trade, special problems of foreign trade, stages in import procedure, stages in export procedure-bill of lading, mate's receipt, certificate of origin.

Corporations assisting foreign trade: state trading corporation of India, export credit and guarantee corporation, minerals and metals trading corporation of India.

UNIT-III (12)

Foreign Exchange: meaning and importance of exchange rate, methods of foreign payments, the demand and supply of foreign exchange, the equilibrium rate of foreign exchange, functions of foreign exchange market, determination of foreign exchange rate under different monetary systems, mint policy theory, balance of payment theory.

UNIT-IV (12)

Objectives of Exchange Control: characteristics, advantages and disadvantages of exchange control, methods of exchange controls-intervention, exchange restriction, multiple exchange rates, exchange clearing agreements, method of operation, exchange clearing agreements in practice, payments agreements, transfer moratoria; indirect methods.

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Text books:

1. C.B. Guptha, "Business Organization & Management" *Sultan & Sons Publishers, New Delhi 14/e,* 2012.
2. M.L. Seth, "Macro Economics " *Lakshmi Narayan Agarwal, Publishers, New Delhi , 22/e* 2014.

3. M.C. Vaish, Ratan Prakashan Mandir, "Monetary Theory "*Vikas Publications, New Delhi 16/e,* 2014.

Reference Books:

1. Y.K.Bhushan, "Business Organization and Modern Management" *Sultan & Sons Publishers, New Delhi. 15/e,* 2014.
2. S.A. Sherlekhar "Business Organization and Management", *Himalaya Publishing House, 2000.*
3. K.P.M. Sundaram, "Money Banking, Trade & Finance ", *Sultan & Sons Publishers, New Delhi.*
4. P.N.Chopra, "Macro Economics", *Kalyani Pubnlishers, 1/e, Ludhiana*

Course Learning Outcomes (COs):

After completion of this course, students will be able to….

CO1: describe business, business system and classify the business objectives
CO2: outline the foreign trade procedure and explain the special problems involved in foreign trade
CO3: describe the foreign exchange market, determine exchange rate and explain theories of exchange rate determination
CO4: state objectives and illustrate methods of exchange control

U14EE802 RENEWABLE ENERGY SYSTEMS

Class: B.Tech., **VIII**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : renewable Sources of Energy and Distributed Generation (DG) &DSM Options

LO2 : generation of Electricity by Photovoltaic Effect &systems and Its Application

LO3 : generation of Electricity by Wind power plants& its applications.

LO4 : construction &Working of Principles of Energy Storage Parameters, Lead Acid Batteries-Ultra Capacitors-Flywheels & issues involved in Power Injection & Interconnection Technologies with Grid.

UNIT-I (9+3)

Introduction: Renewable Sources of Energy-Grid-Supplied Electricity-Distributed Generation(DG)-Purpose, Sizing and Sitting, Optimal Location, DG Influence on Power and Energy Losses – Microgrid(MG)-Renewable Energy Economics-Calculation of Electricity Generation Costs –Demand side Management Options –Supply side Management Options-Modern Electronic Controls of Power Systems.

UNIT-II (9+3)

Photovoltaic Power Plants: Solar Energy-Generation of Electricity by Photovoltaic Effect - Dependence of a PV Cell Characteristic on Temperature-Solar cell Output Characteristics-Equivalent Models and Parameters for Photovoltaic Panels-Photovoltaic Systems-Applications of Photovoltaic Solar Energy-Economical Analysis of Solar Energy.

UNIT-III (9+3)

Wind Power Plants: Appropriate Location -Evaluation of Wind Intensity -Topography - Purpose of the Energy Generated -General Classification of Wind Turbines-Rotor Turbines-Multiple-Blade Turbines - Drag Turbines -Lifting Turbines-Generators and Speed Control used in Wind Power Energy - Analysis of Small Generating Systems.

UNIT-IV (9+3)

Energy Storage Systems: Energy Storage Parameters-Lead–Acid Batteries-Ultra Capacitors-Flywheels -Superconducting Magnetic Storage System-Pumped Hydroelectric Energy Storage Compressed Air Energy Storage -Storage Heat -Energy Storage as an Economic Resource.

Integration and Interconnection of Alternative Sources of Energy: Principles of Power Injection-Instantaneous Active and Reactive Power Control Approach-Integration of Multiple Renewable Energy Sources-Islanding and Interconnection Control-DG Control and Power Injection. Interconnection Technologies with Grid.

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Text Books:

1. Felix A. Farret, M. Godoy Simoes, "Integration of Alternative Sources of Energy", John

Wiley & Sons, 2006.
2. B.H.Khan:Non-conventional energy Resources McGraw Hill Education India private limited, 2013.

Reference Books:

1. Solanki "Renewable Energy Technologies: Practical Guide for Beginneers", *PHI Learning Pvt. Ltd.*, 2008.
2. D.Mukherjee "Fundamentals of Renewable Energy Systems", *New Age International publishers*, 2007.
3. Remus Teodorescu, Marco Liserre, Pedro Rodríguez "Grid Converters for Photovoltaic and Wind Power Systems", *John Wiley & Sons*, 2011.
4. Gilbert M. Masters "Renewable and Efficient Electric Power Systems", *John Wiley & Sons*, 2004

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1 : analyze the Renewable Sources of Energy and Distributed Generation (DG) &DSM options, Energy storage and Interconnection technologies

CO2 : explain the concepts of Generation of Electricity by Photovoltaic Effect & its applications.

CO3 : describe the Principle of Generation of Electricity by Wind power plants, Various wind turbines& controller for wind Applications.

CO4 : explain construction &working of Energy Storage Parameters-Lead–Acid Batteries & issues involved in Power Injection & Interconnection Technologies with Grid.

U14EE803A DIGITAL CONTROL SYSTEMS

Class: B. Tech., **VIII**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : basic representation and applications of Digital Control Systems

LO2 : reconstructing the original signal from sampled sequence and enhancing that signal using suitable filters

LO3 : identifying state variables to describe a system by a set of first-order differential or difference equations for sampled systems

LO4 : design concepts of digital control system using transient and frequency response methods

UNIT – I (12)

Introduction to Discrete Control Systems: Introduction, Discrete time control, Continuous time control, Comparison, Block diagram of digital control.

Z-Transforms: Z-Transforms of elementary functions, Properties, Inverse Z-transforms, Z-transform method for solving difference equations.

UNIT – II (12)

Discrete type control system in Z-plane Analysis: Introduction, Impulse sampling and data hold, Z-transform by convolution Integral method. Reconstruction of original signal from sampled signal pulse transfer function, Realization of Digital Controllers and Digital filters.

UNIT – III (12)

State Variable Analysis of Digital Control Systems: Introduction, State description of digital processors, State description of sampled continuous time plants, state description of systems with dead time, solution of state difference equation, controllability and observability, Multi variable systems.

UNIT – IV (12)

Design of Digital Control: Introduction, Mapping between S-plane and Z-plane, Stability analysis of closed loop system in Z-plane, Transient and Steady State response analysis, Design based on Root locus method, frequency response method and analytical design method.

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Text Books:

1. Ogata, Discrete-Time Control System, *Prentice Hall International*, *Inc*., 2/e, 1995.
2. Benjamin C. Kuo, *Digital Control System*, *Oxford University Press*, India, 2/e, 2014

Reference Books:

1. M. Gopal, Digital Control and State Variable Methods, *Tata McGraw Hill, New Delhi,* 2/e, 2003.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1 : differentiate between continuous-time and discrete-time control methods and Solve any function using z-transforms and inverse z-transforms

CO2 : reconstruct the original signal from any sampled sequence and reduce or enhance certain aspects of a signal using suitable filters

CO3 : realize any given sampled system using state variable approach and apply the concepts of controllability and observability & Solve Problems

CO4 : design a system using root locus and bode plots & Solve Problems

U14EE803B ADVANCE POWER SYSTEM PROTECTION

Class: B.Tech., **VIII** Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : digital relays
LO2 : protection of series compensated transmission
LO3 : busbar protection
LO4 : numerical protection

UNIT – I (12)

Introduction to Digital Relays: Comparison of digital relays with previous generation relays, Basic Components of Digital Relays with block diagram, Signal Conditioning Subsystems, Surge Protection Circuits, Anti aliasing filter, Conversion Subsystem

UNIT-II (12)

Protection of Series Compensated Transmission Line: Introduction, The Degree of compensation, basic components of series compensated transmission lines, Voltage Profile of Series Compensated Line, Faults with Unbypassed Series Capacitors, Protection problems such as Voltage Inversion, Current Inversion, Overreaching/Underreaching of distance element.

UNIT-III (12)

Busbar Protection : Introduction – Differential protection of busbars-external and internal fault - Actual behaviors of a protective CT - Circuit model of a saturated CT - External fault with one CT saturation :need for high impedance – Minimum internal fault that can be detected by the high – Stability ratio of high impedance busbar differential scheme - Supervisory relay-protection of three – Phase busbars-Numerical examples on design of high impedance busbar differential scheme.

UNIT-IV (12)

Numerical Protection : Introduction – Block diagram of numerical relay - Sampling theoremCorrelation with a reference wave – Least error squared (LES) technique - Digital filtering-numerical over - Current protection – Numerical transformer differential protection-Numerical distance protection of transmission line.

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Text Books:

1. Bhavesh Bhalja, R. P. Maheshwari and N. G. Chothani, "Protection and Switchgear," *Oxford University Press*, New Delhi, India, 2011
2. Y.G. Paithankar and S.R Bhide, "Fundamentals of Power System Protection", *Prentice-Hall of India*, 2003

Reference Books:

1. S. H. Horowitz and A. G. Phadke, "Power System Relaying," *John Wiley & Sons,* New York, 1996.

2. P. M. Anderson, Power System Protection, IEEE Press, *New York*, 1999.
3. Van C. Warrington A. R. "Protective Relays: Their Theory and Practice,", *Vol 1, Chapman & Hall Ltd,* London, 1962.
4. J. L. Blackburn, "Applied Protective Relaying," *Westinghouse Electric Corporation*, New York, 1982.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1: analyze the operation of digital relays
CO2: know the Protection of Series Compensated Transmission Line
CO3 : realize the concept of busbar protection .
CO4 : evaluate the of performance of numerical relay

U14EE803C REAL TIME CONTROL OF POWER SYSTEMS

Class: B.Tech., **VIII-** Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : lay out of substation / Generating Station
LO2 : equipment of sub LDC
LO3 : power System Control requirements
LO4 : computer Control of Electrical Power Systems

UNIT – I (12)

Substation/ Generating Station: Lay out of substation / Generating Station, Main Equipment in Sub Station/ Generating Station, Instrument Transformers and their importance in measurements and protection, important parameters necessary for Grid operation.

Scada Functions: Introduction to SCADA: Grid Operation & Control, Difficulties in operating the large power systems manually, need for going to SCADA operation, advantages of SCADA operation.

UNIT-II (12)

Remote Terminal Unit (RTU) & Communication Practices: Major Components, Types of Communications Power Line Carrier Communications, Microwave, Optical fibre, VSAT Communications.

Sub-Load Dispatch Center (SUB-LDC): Various Equipment in Sub LDC, Work Stations details, Functionality and responsibilities of Sub LDC

UNIT-III (12)

Introduction to SCADA Protocols and Communication Standards for Electrical Power Systems: Power System Control requirements and evolution of Protocol for Communication.

Real Time Software: Classification of Programs, Structure of Real time Programs, Construction Techniques & Tools, Programming Language Requirements for Process Control.

UNIT-IV (12)

Computer Control of Electrical Power Systems: Evolution of System Control, time scale of system control, online computer control and Software Elements.
Southern Regional Load Dispatch Center (SRLDC): Functions & Responsibilities of SRLDC, Operations carried at SRLDC, Overview of SCADA, and Real Time Operation in detail.

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Text Books:

1. Hassan Bevrani: Robust Power System Frequency Control, Power Electronics and Power Systems, *Edition illustrated Publisher Springer*, 2009.
2. Michael John Howard Sterling: Power system control, Volume 6 of IEE control engineering series, *Edition illustrated Publisher Peregrinus [for] the Institution of Electrical Engineers,* 1978.

Reference Books:

1. TorstenCegrell, "Power System control –Technology", *Prentice –Hall International series in Systems and control Engineering,* 1986.
2. S. Bennett and D.A. Linkens (Editors): Real –Time Computer Control, *IEE Control Engineering series (24), peter Peregrinus Ltd.*, 1984.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1 : describe Lay out of substation / Generating Station.
CO2 : analyze equipment of sub LDC.
CO3 : list Power System Control requirements & Solve Problems.
CO4 : define computer control of electrical power systems & Solve Problems.

U14EE804A COMPUTER METHODS IN POWER SYTEMS

Class: B.Tech. **VIII**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on

LO1 : the basic incidence and network matrices and the transformations required to compute them

LO2 : fault analysis when the network is subjected to various types of short circuits.

LO3 : modelling of synchronous and induction machines and determining the stability of the power systems using numerical methods.

LO4 : load flow analysis in power systems and the state estimation techniques

UNIT – I (12)

Network Modeling: Introduction, Graphs, Incidence matrices, Primitive network and matrices, types of network matrices, formation of Y_{bus} by inspection, Y_{bus} by singular transformation, Π representation of off nominal transformers, Step by Step algorithm for formation of Z_{bus}, Modification of Z_{bus} matrix for changes in the network.

UNIT – II (12)

Short Circuit Studies: Introduction, Physical Assumptions, Three phase balanced networks and faults, Symmetrical Components, Fault analysis in phase impedance form, General fault representation in phase quantities, Symmetrical Component Analysis, Short circuit calculations for balanced networks using Z_{bus}.

UNIT – III (12)

Transient Stability Analysis: Representation of synchronous Machines, Modeling of transmission networks and load, Swing equation, Equal area criterion, Solution of Swing equation by Numerical methods, Modified Euler's Method, Runge - Kutta fourth order Method.

UNIT – IV (12)

Review of load flow methods: Gauss Siedel, Newton Raphson, Decoupled methods

Introduction to Power System State Estimation: Weighted least square technique, Static State estimation of power systems, Treatment of Bad data.

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Text Books:

1. Stagg and E.L.Abaid, "Computer Methods in Power systems", *McGraw-Hill*, 1968
2. M.A. Pai, "Computer Techniques in Power System Analysis", *Tata McGraw-Hill*, 2/e, 2006.

Reference Books:

1. Nagrath & Kothari, " Modern Power System Analysis", *McGraw-Hill*, 4/e, 2011
2. K.Uma Rao, "Computer Techniques and Models in Power Systems", *I.K. International Publishers*, 2/e, 2014.
3. A.J. Wood and B.F. Wollenberg, "*Power Generation Operation and Control*", *John Wiley & Sons*, 2/e,1996

Course Learning Outcomes (COs):

After completion of this course, students will be able to….

CO1 : formulate the network matrices and determine the z-bus and y-bus

CO2 : summarize the need for short circuit studies and perform short circuit analysis on three phase networks.

CO3 : model the various parts of power system and predict the stability of power systems.

CO4 : determine the power system load flow solution and analyze the network using state estimation technique.

U14EE804B SMART ELECTRIC GRID

Class: B.Tech., **VIII**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1 : smart grid and its functions
LO2 : tools and techniques for smartgrid
LO3 : distribution generation technologies
LO4 : communication technologies and smart grid

UNIT-I (12)

Introduction to Smart Grid: What is Smart Grid? Working definitions of Smart Grid and Associated Concepts –Smart Grid Functions-Traditional Power Grid and Smart Grid –New Technologies for Smart Grid – Advantages –Indian Smart Grid –Key Challenges for Smart Grid.
Smart Grid Architecture: Components and Architecture of Smart Grid Design –Review of the proposed architectures for Smart Grid. The fundamental components of Smart Grid designs – Transmission Automation – Distribution Automation –Renewable Integration

UNIT-II (12)

Tools and Techniques for Smart Grid: Computational Techniques –Static and Dynamic Optimization Techniques –Computational Intelligence Techniques –Evolutionary Algorithms – Artificial Intelligence techniques.

UNIT-III (12)

Distribution Generation Technologies: Introduction to Renewable Energy Technologies – Micro grids –Storage Technologies –Electric Vehicles and plug –in hybrids –Environmental impact and Climate Change –Economic Issues. Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

UNIT-IV (12)

Communication Technologies and Smart Grid: Introduction to Communication Technology – SynchroPhasor Measurement Units (PMUs) –Wide Area Measurement Systems (WAMS).
Control of Smart Power Grid System: Load Frequency Control (LFC) in Micro Grid System – Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid.Case Studies and Test beds for the Smart Grids.

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Text Books:

1. Stuart Borlase, Smart Grids, Infrastructure, Technology and Solutions, *CRC Press*, 2013.
2. Gil Masters, Renewable and Efficient Electric Power System, *Wiley-Electrical & Electronics Engineering Press*, 2004.

Reference Books:

1. A.G. Phadke and J.S. Thorp, "Synchronized Phasor Measurements and their

Applications", *Springer Edition*, 2010.
2. T. Ackermann, Wind Power in Power Systems, Hoboken, NJ, USA, *John Wiley*, 2005.

Course Learning Outcomes (COs):

After completion of this course, students will be able to…

CO1 : define definitions of Smart Grid.
CO2 : describe the principle of tools and techniques for smartgrid.
CO3 : illustrate Distribution Generation Technologies.
CO4 : describe Communication Technologies and smart grid.

U14EE804C DESIGN OF ELECTRICAL MACHINES

Class: B.Tech., **VIII**-Semester **Branch** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: design fundamental concepts of electrical machine.
LO2 : knowing the main dimensions of d.c. machines.
LO3 : understand the design main dimensions & cooling systems of transformers.
LO4: acquiring the design main dimensions & cooling systems of induction & synchronous machines.

UNIT-I (12)

Basic Considerations: Basic concept of design, Limitation in design, Standardization, modern trends in design and Manufacturing techniques, Classification of insulating materials. Modes of heat dissipation & temperature rise time curves. Methods of cooling ventilation (induced & forced, Radial & axial), Direct cooling & quantity of cooling medium. Calculation of total mmf and magnetizing current. Specific permeance and leakage reactance.

Design of DC Machines: Output equation, choice of specific loading and choice of number of poles, Design of Main dimensions of DC machines, Design of armature slot dimensions, Commutator and brushes, Magnetic circuit – estimation of ampere turns, Design of yoke and poles- main and inter poles, Field windings- shunt, Series and inter poles.

UNIT-II (12)

Design of Transformers (Single Phase): Output equation for single phase, Choice of specific loadings, Expression for volts/turn, determination of main dimensions of the core, types of windings and estimation of number of number of turns and conductor cross sectional area of primary and secondary windings, estimation of no load current, Expression for leakage reactance and voltage regulation.

Design of Transformers (Three Phase): Output equation for three phase transformers, Choice of specific loadings, expression for volts/turn, Determination of main dimensions of the core, Types of windings and estimation of number turns and conductor cross sectional area of primary and secondary windings, Estimation of no load current, expression for leakage reactance and voltage regulation. Design of tank and cooling tubes (round and rectangular).

UNIT-III (12)

Design of Induction Motors: Output equation, choice of specific loadings, Main dimensions of three phase induction motor, Stator winding design, Choice of length of the air gap, estimation of number of slots for the squirrel cage rotor, Design of Rotor bars and end ring, Design of Slip ring induction motor, Estimation of No load current and leakage reactance, and Circle diagram.

UNIT-IV (12)

Design of Synchronous Machines: Output equation, Choice of specific loadings, Short circuit ratio, Design of main dimensions, Armature slots and windings, Slot details for the stator of salient and non- salient pole synchronous machines. Design of rotor of salient pole synchronous

machines, Magnetic circuits, Dimensions of the pole body, Design of the field winding, and Design of rotor of non- salient pole machine, Introduction to computer aided design.

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Text Books:

1. Sawhney A.K., Chakrabarti A., "A Course in Electrical Machine Design", *Dhanpat Rai & Sons Company Limited*, New Delhi, 6/e, 2006.
2. Mittle V.N., Mittle A., "Design of Electrical Machines", *Standard Publications and Distributors*, New Delhi, 2002.

Reference Books:

1. Sen, S.K, "Principles of Electric Machine Design with Computer Programmes", *Oxford & IBH Publishing Company Private Limited*, 2001, Reprint 2004.
2. Agarwal R.K, S.K.Kataria and Sons "Principles of Electrical Machine Design, NewDelhi, 2002.
3. Shanmugasundaram,A., Gangadharan G. and Palani R., "Electrical Machine Design DataBook", *New Age International Publishers Private Limited*., 1/e, 1979, Reprint 2005.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1: design of various parts of dc machines and solve the problems.
CO2 : design concepts of transformers and know about how to design the parts.
CO3 : design concepts of induction machines and solve the problems
CO4 : design concepts of synchronous machines and solve the problems

U14EE805 POWER SYSTEMS LABORATORY

Class: B.Tech., **VIII**-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge in/on

LO1 : performance of long transmission lines and reactive power control
LO2 : characteristics of protective relays
LO3: short circuit analysis and sequence components of power system elements
LO4 : breakdown strength of dielectrics

LIST OF EXPERMENTS

1. Performance characteristics of long transmission line.
2. Reactive power control of long transmission line.
3. Operating characteristics of IDMT over current relay
4. Operating characteristics of Static differential Relay
5. Fault studies on DC Network Analyzer
6. Determination of breakdown strength of oil
7. Sequence reactances of three phase transformer
8. Sequence reactances of alternator
9. LG Fault analysis on unloaded alternator
10. LL fault analysis on unloaded alternator
11. Symmetrical component analyzer.
12. Reactive power control using Tap changing transformer.

Laboratory Manual:

1. Manual for "Power Systems Laboratory" *prepared by the Department of EEE.*

Text Book:

1. C.L.Wadhwa, "Electrical Power Systems", *New age International*, 6/e, 2014.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : determine the performance characteristics of a long transmission line and reactive power control
CO2 : determine the operating characteristics of protective relays
CO3 : compute fault currents and determine the sequence components of power system elements
CO4 : determine the breakdown strength of liquid dielectrics

U14EE806 RENEWABLE ENERGY SYSTEMS LABORATORY

Class: B.Tech., VIII-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge in/on

LO1: measurement of solar energy radiation and Sunshine with reference to time.
LO2: performance charactertics of various PV devices and its series parallel Connections
LO3: modeling and simulation of Solar and Wind turbine System.
LO4 : modeling and simulation of hybrid power system applications

LIST OF EXPERIMENTS

1. Solar radiation measurement by using Pyrometer.
2. Solar radiation measurement by using Pyreheliometer.
3. Measurement of sun shine hours using sun shine recorder.
4. Performance characteristics of solar photovoltaic devices.
   b. Single crystalline silicon PV module.
   c. Multi crystalline silicon PV module.
5. Performance evaluation of solar PV collector for series and parallel connection.
6. Effect of tilt angle on solar PV Panel.
7. Effect of surrounding temperature and intensity on solar PV Panel.
8. Wind Turbine Modeling and Simulation using Matlab -simulink .
9. Solar Panel Modeling and Simulation using Matlab –simulink.
10. Simulation of Stand-alone PV systems using Matlab -Simulink.
11. Simulation of Grid Connected PV systems using Matlab -Simulink.
12. Maximum power tracking of a wind energy system.
13. Modeling and Simulation of wind turbine grid connection using Matlab –simulink.
14. Simulation of model of a variable pitch wind turbine using Matlab –Simulink.

Laboratory Manual:

1. Manual for "Renewable Energy Systems Laboratory" *prepared by the Department of EEE.*

Text books:

1. Solanki "Renewable Energy Technologies: Practical Guide For Beginneers", *PHI Learning Pvt. Ltd.*, 2008.
2. D.Mukherjee "Fundamentals of Renewable Energy Systems", *New Age International publishers*, 2007.
3. Remus Teodorescu, Marco Liserre, Pedro Rodríguez "Grid Converters for Photovoltaic and Wind Power Systems", *John Wiley & Sons*, 2011.
4. Gilbert M. Masters "Renewable and Efficient Electric Power Systems", *John Wiley & Sons*, 2004.

Course Learning Outcomes (COs):

After completion of this course, students will be able to

CO1 : observe the variation of solar energy radiation &Sunshine with reference to time
CO2 : analyze the Performance character tics various PV devices and its series parallel Connections
CO3 : asses the Performance of Solar& Wind turbine System
CO4 : design of Different Hybrid power system applications.

U14EE 807 MAJOR PROJECT WORK *PHASE-II*

Class: B.Tech. VIII-Semester **Branch:** Electrical & Electronics Engineering

Teaching Scheme :

L	T	P	C
-	-	13	7

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…..
LO1: problem based and project based learning
LO2: major project design in one of the selected areas of specialization with substantial multi-disciplinary component
LO3: analytical and research skills
LO4: team work, leadership and interpersonal skills

Student has to continue the major project work in eighth semester as Major Project Work Phase-II.

The evaluation for Major project work *Phase-II* is as follows:

Assessment	Weightage
Project Supervisor Assessment	20%
DPEC Assessment *: Progress presentation-II, Final presentation & Viva-voce and Final Project Report*	20%
End Semester Examination: *Oral (PPT) Presentation & Viva Voce*	60%
Total Weightage:	**100%**

DPEC shall decide the course of action on the students, who fail to complete the Major project work *Phase-II*, submit final project report and give oral (PPT) presentation.

Course Learning Outcomes (COs):
After completion of this course, the students will be able to
CO1: demonstrate creativity in the design of components, systems or processes of their program of study
CO2: design an innovative product by applying current knowledge and adopt to emerging applications of engineering & technology
CO3: work cooperatively with others to achieve shared goal by motivating team-mates with a clear sense of direction, values and ethics
CO4: write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic