DEPARTMENT OF ELECTRONICS & INSTRUMENTATION ENGINEERING

SCHEME OF INSTRUCTIONS & EVALUATION and SYLLABI

(Applicable from the academic year 2014-15)

(I Semester to VIII Semester)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15

(*An Autonomous Institute under Kakatiya University, Warangal*)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION

I-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

(COMMON TO ALL BRANCHES)

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)

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):

Upon 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

Text Books:

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

Reference Books:

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

Course Learning Outcomes(COs):

Upon 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).

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(LOs):

Upon 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.

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):

Upon 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):

Upon 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.

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):

Upon 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

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):

Upon 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.

Text Books:

1. Edward Hughes, "Electrical & Electronics Technology", 10th edn., *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):

Upon 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.

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):

Upon 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.

Text Books:

1. Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers,* New Delhi, 40th edn., 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, 5th edn., 2013.
3. Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press*, 9th edn., 2013.

Reference Books:

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

Course Learning Outcomes(COs):

Upon 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):

Upon 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.

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):

Upon 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):

Upon 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

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):

Upon 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.

Text Books:

1. Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses – 2nd edn., *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):

Upon 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 (LOs):

LO1. To perform and engage in a variety of physical activities
LO2. To develop and maintain physical health and fitness through regular participation in physical activities
LO3. To demonstrate positive self esteem, mental health and physiological balance through body awareness and control
LO4. 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):

Upon 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 – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION

II-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

COMMON FOR ALL BRANCHES

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.

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):

Upon 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**,** 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.

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):

Upon 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.

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):

Upon 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).

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):

Upon 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.,.

- *understand the fundamental principles and applications of lasers and Optical fibers.*
- *exposed to various material properties which are used in engineering applications and devices.*

U14ME204ENGINEERING 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.

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):

Upon 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

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):

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

- develop writing skills with a focus on accuracy to develop error free English.
- develop word power to enable to use them in speaking and writing.
- develop reading skills with a focus on developing reading comprehension skills .
- 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.

Text Books:

1. Edward Hughes, "Electrical & Electronics Technology", 10th edn., *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):

Upon 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 structure, 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

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):

Upon 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.

Text Books:

1. Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers,* New Delhi, 40th edn., 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, 5th edn., 2013.
3. Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press*, 9th edn., 2013.

Reference Books:

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

Course Learning Outcomes(COs):

Upon 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.

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):

Upon 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):

Upon 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):

Upon 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):

Upon 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.

Text Books:

1. Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses – 2nd edn., *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):
Upon completion of the course, the student will be able to,

- *understand human interaction with the environment*
- *understand utmost importance of the sustainable use of natural resources*
- *get acquainted with ecosystem and conservation of biodiversity*
- *gain the knowledge of control measures of environmental pollution and natural disaster management*
- *understand the conflict between the existing development strategies and need for environmental conservation*
- *understand various environmental protection / control acts*
- *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)

Upon 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 (LOs):

LO1. To perform and engage in a variety of physical activities
LO2. To develop and maintain physical health and fitness through regular participation in physical activities
LO3. To demonstrate positive self esteem, mental health and physiological balance through body awareness and control
LO4. 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

- *arouse the social consciousness of the students*
- *provide them with opportunity to work with people in villages and slums*
- *expose them to the reality of life*
- *bring about a change in their social perceptions*
- *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):

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

- *develop his / her personality through community service rendered*
- *apply their education to find solutions to individual and community problems*
- *acquire capacity to meet emergencies and natural disasters*
- *acquire a democratic attitude, leadership qualities and practice national integration*

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION AND EVALUATION

III-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & INSTRUMENTATION ENGINEERING

S. No.	Course Category	Course Code	Course Name	Periods/ Week			Credits (C)	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	BS	U14MH301	Engineering Mathematics-III	3	1	-	4	15	25	40	60	100
2.	PC	U14EI302	Electrical and Electronic Measurements	3	1	-	4	15	25	40	60	100
3.	PC	U14EI303	Digital Circuits and Logic Design	3	1	-	4	15	25	40	60	100
4.	PC	U14EI304	Electronic Devices and Circuits	3	1	-	4	15	25	40	60	100
7.	ES	U14EE310	Network Analysis and Synthesis	3	1	-	4	15	25	40	60	100
5.	PC	U14EI305	Measurements Laboratory	-	-	3	2	40	-	40	60	100
6.	PC	U14EI307	Electronic Devices and Circuits Laboratory	-	-	3	2	40	-	40	60	100
8.	ES	U14EE311	Electrical Technology and Networks Laboratory	-	-	3	2	40	-	40	60	100
			Total	**15**	**5**	**9**	**26**	**195**	**125**	**320**	**480**	**800**
9.	MC	U14MH309	Compliance with Current English	-	-	2	1	100	-	100	-	100

Student Contact Hours/Week : 31
Total Credits : 26

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.

Text Books:

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

Reference Books:

1 Kreyszig E., "Advanced Engineering Mathematics", John Wiley & Sons, Inc., U.K 9th edn., 2013.

2 R.V.Churchill, "Complex Variables and its Applications", McGraw-Hill, New York, 9th edn., 2013.

3 S.S.Sastry, "Engineering Mathematics", Vol. II ,Prentice Hall of India, 3rd edn., 2014

Course Learning Outcomes (COs):

Upon 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

U14EI302 ELECTRICAL AND ELECTRONIC MEASUREMENTS

Class: B.Tech. III-Semester

Branch: Electronics & Instrumentation 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 on /in…

LO1: principles and operation of electrical and electronic measuring instruments

LO2: potentiometers, bridge circuits and applications

LO3: digital meters and utilization of CRO for measurement and data presentation

LO4: distinguished features of special oscilloscopes, signal analyzers and data recorders

UNIT – I (9+3)

Measuring Instruments: Review of measurement system and performance characteristics; PMMC- Range extension of DC ammeter and DC voltmeter; Measurement of AC voltage using rectifier type and thermocouple type instruments; AC indicating instruments - Moving iron, Electrodynamic and Electrostatic type instruments (*Principle of operation, Torque expression and applications*); Single phase energy meter - Current transformer and Potential transformer *(Principle of operation and applications).*

UNIT – II (9+3)

Potentiometers: Basic potentiometer circuit – Crompton's DC potentiometer, Applications of DC potentiometers, AC potentiometers and classification.

Bridges: General bridge balance equation, Wheatstone bridge, Kelvin's double bridge, Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge, De sauty's bridge, Schering bridge – Wien's bridge , Bridge calibration, Wagner earthing device.

UNIT – III (9+3)

Q-Meter: Basic measurement circuit, Measurement of low impedance and high impedance components.

Digital meters: Performance characteristics, Digital voltmeters- Ramp type, Dual slope type, Successive approximation register type DVMs ; Review of DMM block diagram.

Oscilloscopes: Review of CRO block diagram, Attenuators and probes of CRO, Dual beam oscilloscope, Dual trace oscilloscope, Measurement of phase and frequency using Lissajous patterns.

UNIT – IV (9+3) (*Qualitative treatment only*)

Special oscilloscopes: Sampling oscilloscope, Digital storage oscilloscope.

Signal analyzers, Recorders and Display systems: Frequency selective and Heterodyne wave analyzers, Harmonic distortion analyzer – Total harmonic distortion analyzer(THD), Spectrum analyzer; X-Y Recorder, Magnetic tape recorder , Data logger, Digital tape recorder; LED and LCD Display systems.

Text Books:

1 Helfrick. A.D and Cooper W.D., "Modern Electronic Instrumentation and Measurement Techniques", *PHI* , 2nd edn., , 1994, New Delhi. (Chapter 4,5,6,7 and 9)

Reference Books:

1 P. Pruthviraj, B. Bhudaditya, S. Das and K. Chiranjib, "Electrical and Electronic Measurement and Instrumentation", *McGraw Hill Education* ,2nd edn., 2011, New Delhi.

2 Sawhney A.K, "Electrical and Electronic Measurement and Instrumentation", 10th edn., 1994, New Delhi.

3 David A Bell, "Electronic Instruments and Measurements", *Dhanpat Rai & Sons* , *Oxford University Press* 3rd edn., 2003, New Delhi.

Course Learning Outcomes (COs):

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

CO1: use various electrical and electronic measuring instruments

CO2: explain the working principle, construction and operation of indicating, analyzing and recording types of instruments

CO3: use bridge circuits for the measurement of electrical parameters (R, L and C)

CO4: explain the features, operation and applications of DVM, DMM, CRO, DSO, signal analyzers

U14EI303 DIGITAL CIRCUITS AND LOGIC DESIGN

Class: B.Tech. III-Semester

Branch: E&I and CSE

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.

Text Books:

1 Zvi. Kohavi, "Switching and Finite Automata Theory", *Tata McGraw-Hill,* 2nd edn., 2008, New Delhi. (Chapter 3,4,5 and 9)

2 R.P. Jain, "Modern Digital Electronics", *Tata McGraw-Hill,* 3rd edn., 2003, New Delhi. (Chapter 1, 2, 4 to 8)

Reference Books:

1 Moris Mano," Digital Design", *PHI* , 3rd edn., 2003, New Delhi.

2 A.Anand Kumar, "Switching Theory and Logic Design", *PHI* ,1st edn., 2013, New Delhi. (Reprint)

3 Herbert Taub and Donald Schilling, "Digital Integrated Circuits", *Tata McGraw-Hill* 2008, New Delhi.

Course Learning Outcomes (COs):

Upon completion of the course, 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

U14EI304 ELECTRONIC DEVICES AND CIRCUITS

Class: B.Tech. III-Semester

Branch: Electronics & Instrumentation 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: small signal analysis of BJT amplifiers using h-parameters and r_e models
LO2: the frequency analysis of single stage and multistage amplifiers using BJT and FET
LO3: BJT feedback amplifiers and oscillators
LO4: large signal amplifiers and linear wave shaping circuits

UNIT – I (9+3)

Small signal transistor amplifier analysis: Review of BJT biasing methods; Two port system modeling concepts, Hybrid equivalent model- CE, CB and CC configurations, Complete and Approximate small signal analysis of BJT amplifiers in CE, CB and CC configurations; r_e transistor model, BJT small signal analysis using r_e model.

UNIT – II (9+3)

Frequency response of transistor amplifiers: Low frequency response of BJT amplifier, High frequency response of BJT amplifier using hybrid π model, Miller effect capacitance, frequency response analysis of RC coupled amplifier.

Multi stage amplifiers: BJT Cascade amplifier, Choice of BJT configuration in cascade connection, Darlington connection; Multistage frequency effects; BJT constant current source and current mirror circuits.

UNIT – III (9+3)

FET amplifiers: Review of JFET characteristics; JFET biasing; JFET small signal model, JFET small signal low and high frequency analysis - Common source, Common drain configurations; MOSFET - Structure and Operation in depletion and enhancement modes.

Feedback amplifiers and Oscillators: Feedback concepts, Feedback connection types and their analysis, Practical feedback circuits; Principle of oscillators, Analysis of RC and LC oscillators.

UNIT – IV (9+3)

Large signal amplifiers: Amplifier types, Series fed - Class A amplifier, Transformer coupled Class A amplifier; Class B amplifier configurations, Power o/p efficiency; Amplifier distortion; Design considerations - Heat sinks.

Linear wave shaping circuits: Diode clippers, Clipping at two independent levels, Transfer characteristics of clippers and Diode clamping circuits.

Text Book:

1 Robert Boylstad and Lowis Nashelsky, "Electronic Devices and Circuits Theory", 10th edn., *Pearson India*, 2009. (Chapter 2 to 9, 12 and 14)

Reference Books:

1 Millman and Halkias, "Electronic Devices and Circuit " *Mc Graw-Hill* , 1967.

2 Millman.J and Taub.H, "Pulse Digital and Switching Wave Forms", *Mc Graw-Hill*, 1965.

Course Learning Outcomes (COs):

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

CO1: perform the small signal analysis of BJT amplifiers using h-parameter and r_e models
CO2: determine the frequency response of single stage and multistage BJT/FET amplifiers
CO3: analyze BJT feedback amplifiers and oscillators
CO4: differentiate class A, class B amplifiers and explain the operation of wave shaping circuits

U14EE310 NETWORK ANALYSIS AND SYNTHESIS

Class: B.Tech. III-Semester

Branch: E&I and 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 : network Topology, KCL & KVL for D.C and A.C Circuits
LO2 : network Theorems & Transient analysis
LO3 : two port network parameters
LO4 : network functions and Filters

UNIT – I (9 + 3)

Network Topology: Topological description of networks - Lumped Vs Distributed circuits - Network graph theory - Trees, Co-Tress and loops - Incidence matrix - Tie-set and cut-set Matrices - Kirchhoff's Laws and analysis of Networks.

Steady State Analysis of Circuits for Sinusoidal Excitations:-Single phase series, parallel, series-parallel circuits, solutions of AC networks using mesh and nodal analysis.

UNIT – II (9+3)

Network Theorems and applications for A.C. Circuits: Thevenin's - Norton's - Reciprocity - Millman's - Maximum power-Telligen's –Compensation and Substitution Theorems

Time Response Analysis of Networks Using Laplace Transforms: Transient analysis of R-L,R-C,R-L-C series and parallel networks with step , impulse , sinusoidal and pulse excitation. Initial conditions.

UNIT – III(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 – 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 of pole- zero locations for immitance functions.

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.

Filters: LPF, HPF, BPF and BRF constant K-and m derived Filters, Composite filters.

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 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):

Upon completion of this course, students will be able to

CO1 : analyze electric circuits using Network Topology, KCL & KVL
CO2 : evaluate steady state and transient behavior of networks for DC and AC excitations & Solve Problems
CO3 : evaluate Two port network parameters & Solve Problems
CO4 : analyze Network Functions and Filters & Solve Problems

U14EI305 MEASUREMENTS LABORATORY

Class: B.Tech. III-Semester

Branch: Electronics & Instrumentation 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 on/in…

LO1: voltage and current measurement using PMMC
LO2: measurement of electrical parameters using bridge circuits
LO3: measurements using CRO

LIST OF EXPERIMENTS

1. (a) Range extension of PMMC type DC Ammeter
   (b) Conversion of DC Ammeter to DC Voltmeter
2. Design and Calibration of Shunt type ohmmeter
3. Measurement of AC Voltage using rectifier type instrument
4. Measurement of Resistance using wheatstone bridge circuit
5. Measurement of Low resistance using Kelvins double bridge circuit
6. Measurement of Inductance using Maxwell bridge circuit
7. Measurement of Capacitance using Schering bridge circuit
8. Measurement of Frequency using Wiens bridge circuit
9. Measurement of Frequency and Phase using Lissajous patterns in CRO
10. Measurement of signal characteristics using Recorded data signal in DSO
11. Measurement of Voltage using DC Cromptons potentiometer
12. Study and use of Wheatstone bridge for instrumentation applications

Laboratory manual:

1. "Measurements Laboratory Manual", *prepared by Dept of E& I Engg.*

Text Books:

1. Helfrick. A.D and Cooper W.D., "Modern Electronic Instrumentation and Measurement Techniques", *PHI* ,2nd edn., 1994, New Delhi

Course Learning Outcomes (COs):

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

CO1: acquire the skills for handling various electrical & electronic measuring instruments
CO2: design bridge circuits for measurement of electrical parameters
CO3: use CRO and DSO for measurement applications

U14EI307 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Class: B.Tech. III-Semester

Branch: Electronics & Instrumentation 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 on /in…

LO1: V-I characteristics of diodes and transistors
LO2: rectifiers and wave shaping circuits
LO3: design and analysis of transistor amplifiers and oscillators

LIST OF EXPERIMENTS

1. V-I Characteristics of p-n diode
2. Zener diode as voltage regulator
3. Full wave rectifier with and without filters
4. I/O Characteristics of BJT in CB configuration
5. I/O Characteristics of BJT in CE configuration
6. Frequency response of RC coupled amplifier
7. Design of single stage CE amplifier
8. Design of emitter follower
9. Static Characteristics of FET
10. Analysis of Voltage series/ Shunt feedback amplifiers
11. Design of RC Phase shift oscillator
12. Design of diode Clipping/Clamping circuits

Laboratory manual:

1. "Electronic Devices and Circuits Laboratory Manual", *prepared by Dept of E& I Engg.*

Text Books:

1. Robert Boylstad and Lowis Nashelsky, "Electronic Devices and Circuit Theory", *Pearson India* , 10th edn., , 2009

Course Learning Outcomes (COs):

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

CO1: plot the characteristics of diode, BJT and FET
CO2: design and analyze rectifiers and wave shaping circuits
CO3: design and analyze transistor amplifiers and oscillators

U14EE311 ELECTRICAL TECHNOLOGY AND NETWORKS LABORATORY

Class: B.Tech. III-Semester

Branch: E&I and ECE

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 : various theorems for simplification of network.
LO2 : determination of parameters of a choke coil.
LO3 : measurement of 3-Φ active power.
LO4 : performance parameters of static &rotating electrical machines.

LIST OF EXPERMENTS

1. Verification of Kirchhoffs Laws
2. Verification of Superposition Theorem.
3. Verification of Thevenin's Theorem.
4. Measurement of 3-Φ power by two wattmeters method.
5. Frequency response of R-L-C series circuit
6. Determination of Parameters of choke coil.
7. Predetermination of regulation and efficiency of a 1- Φ transformer by O.C. and S.C. tests.
8. Efficiency and voltage Regulation of a 1-Φ transformer by direct load test.
9. Speed control of D.C. Shunt motor.
10. Brake test on 3-Φ induction motor.
11. Determination of self and mutual inductances of a coupled coil.
12. Determination of hybrid parameters and inverse hybrid parameters of a 2-Port network.

Laboratory manual:

1. "Electrical Technology & Networks Laboratory Manual", *prepared by Dept of EEE.*

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to

CO1 : apply network theorems for solving a network.
CO2 : measure 3-Φ active power for balanced load.
CO3 : determine the parameters of choke coil.
CO4 : determine the performance parameters of static &rotating electrical machines.

U14MH309 COMPLIANCE WITH CURRENT ENGLISH

Class: B.Tech. III-Semester **Branch: E&I, 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 – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION AND EVALUATION

IV-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & INSTRUMENTATION ENGINEERING

S.No.	Course Category	Course Code	Course Name	Periods/Week			Credits (C)	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	BS	U14MH401	Engineering Mathematics-IV	3	1	-	4	15	25	40	60	100
2.	PC	U14EI402	Sensors and Transducers	3	1	-	4	15	25	40	60	100
3.	PC	U14EI403	Signals and Systems	3	1	-	4	15	25	40	60	100
4.	PC	U14EI404	Digital Design using VHDL	3	1	-	4	15	25	40	60	100
5.	PC	U14EI405	Linear Integrated Circuits	3	1	-	4	15	25	40	60	100
6.	PC	U14EI406	Computer Architecture and Organization	3	1	-	4	15	25	40	60	100
7.	PC	U14EI407	Digital Design Laboratory	-	-	3	2	40	-	40	60	100
8.	PC	U14EI408	Linear Integrated Circuits Laboratory	-	-	3	2	40	-	40	60	100
			Total	**18**	**6**	**6**	**28**	**170**	**150**	**320**	**480**	**800**
9	MC	U14MH409	Soft and Interpersonal Skills	-	-	2	1	100	-	100	-	100
10	MC#	U14MH209	Environmental Studies	2	-	-	2	15	25	40	60	100

Student Contact Hours/Week : 32+2#
Total Credits : 28

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**.**

Text Books:

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

Reference Books:

1 Gupta and Kapoor, "Fundamentals of Mathematical Statistics", Sulthan Chand and & sons, New Delhi, 11th edn. , 2010.

2 Kreyszig E., "Advanced Engineering Mathematics", John Wiley & Sons, Inc.,U.K., 9th edn., 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

U14EI402 SENSORS AND TRANSDUCERS

Class: B.Tech. IV-Semester

Branch: Electronics & Instrumentation 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: basic principles and parameters of sensors / transducers /system
LO2: resistive transducers and applications
LO3: principles of capacitive, inductive, magnetostrictive and photoelectric transducers
LO4: piezoelectric transducers and different types of vibration and acceleration measurement techniques

UNIT – I (9+3)

Transducers: Sensor and Transducer, Classification of transducers, Examples, Requirements of transducer, Types of uncertainties in instrumentation system.

Dynamic characteristics: Order of measuring system – Zero, First and Second order systems, Examples; System transfer function & System parameters, System dynamic response- Impulse, Step, Ramp and Frequency responses of Zero, First and Second order systems, Dynamic compensation of first and second order systems.

UNIT – II (9+3)

Resistive transducers: Potentiometers - Basic principle of operation, Types of potentiometers – Sensitivity, Linearity and Resolution, Expression for error due to loading effect.

Strain gauges: Piezoresistive effect, Gauge factor, Strain gauge materials, Unbounded and Bonded strain gauges, Semiconductor strain gauges, Quarter, Half and Full bridge strain gauge configurations, Poisson's arrangement, Temperature compensation schemes, Strain gauge calibration using shunt resistor method, Rosettes.

Force and Torque measurement: Cantilever, Column and Proving ring type load cells , Strain gauge type Force and Torque transducers.

UNIT – III (9+3)

Capacitive transducers: Variable gap, Variable area and Variable dielectric types of capacitive sensors, Differential type capacitive transducer, Frequency response of capacitive transducer.

Inductive transducers: Self inductance and Mutual inductance, Variable reluctance type transducer, Push-Pull type inductive transducer, LVDT and RVDT types of transducers, frequency response of LVDT.

Magnetostrictive transducers: Magnetostriction phenomenon, Magnetostrictive materials, applications.

Photoelectric transducers: Photoelectric phenomenon, Photoconductive cell, Photovoltaic and Photo emissive transducers.

Speed measurement: Contact and Noncontact type tachometers, Stroboscope and its applications.

UNIT – IV (9+3)

Piezoelectric transducers: Piezoelectric phenomenon, Piezoelectric materials, Sensitivity coefficients, Frequency response of piezoelectric transducer, Piezoelectric semiconductors, Bimorphs, Piezoelectric type strain and torque transducers.

Vibration measurement: Characterization of vibration, Seismic transducer - Measurement of Absolute displacement, Velocity and Acceleration, Amplitude and phase characteristics; Accelerometers - Potentiometric, LVDT, Bonded strain gauge and Piezoelectric types.

Text Books:

1. B.C. Nakra and K.K Chowdhary, "Instrumentation Measurement and Analysis", *Tata McGraw Hill Ltd.*,2nd edn., 2004 , New Delhi.(Chapters 3, 7, 8 and 13)
2. Arun K. Ghosh, "Introduction to Transducers", *PHI*, 2015, New Delhi. (Chapters 1 to 7)

Reference Books:

1. Sawhney A.K, "Electrical and Electronic Measurement and Instrumentation", 18th edn., *Dhanpat Rai & Sons,* 2001, New Delhi.
2. E.O. Doeblin, "Measurement Systems: Application and Design", 5th edn., Mc-Graw Hill, 2004, New York.
3. Rangan, Mani and Sharma, "Instrumentation Devices & Systems", 2nd edn., *TMH*, 2008, New Delhi.

Course Learning Outcomes (COs):

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

CO1: explain the basic principles and dynamic specifications of various types of sensors/transducers/systems
CO2: measure various parameters like displacement, force and torque using resistive transducers
CO3: discuss the operating principles of capacitive, inductive, magnetostrictive, and photoelectric transducers.
CO4: explain vibration and acceleration measurement techniques

U14EI403 SIGNALS AND SYSTEMS

Class: B.Tech. IV-Semester

Branch: Electronics & Instrumentation 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 on/in…

LO1: continuous-time (CT) and discrete-Time (DT) signals & systems and convolution
LO2: continuous-time Fourier transform (CTFT) and discrete-time Fourier series (DTFS)
LO3: discrete-time Fourier transform (DTFT) and its applications
LO4: z-Transform, stability of LTI systems and realizations of IIR systems

UNIT – I (9+3)

Signals and Systems: Continuous-time (CT) and discrete-time (DT) signals, Sampling theorem (statement only), Transformations of independent variable, Exponential and sinusoidal signals, Singularity functions, CT & DT Systems, Basic system properties.

Linear Time–Invariant (LTI) Systems: DT-LTI systems, Convolution sum, CT-LTI systems, Convolution integral, Properties of LTI systems, LTI systems described by differential and difference equations, FIR and IIR systems.

UNIT – II (9+3)

Continuous-Time Fourier Transform (CTFT): CTFT for representation of aperiodic signals, CTFT for periodic signals, Properties of the CTFT, Convolution property, Multiplication property, Systems characterized by linear constant–coefficient differential equations (LCCDE).

Discrete-Time Fourier Series (DTFS): Fourier series representation of DT periodic signals, Properties of DTFS, Fourier series and LTI systems, Filtering, Examples of DT filters described by difference equations.

UNIT – III (9+3)

Discrete-Time Fourier Transform (DTFT): DTFT for aperiodic signals, DTFT for periodic signal, properties for the DTFT, Convolution property, Multiplication property, Systems characterized by linear constant-coefficient difference equations (LCCDE).

UNIT – IV (9+3)

***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.

Block Diagram Representations: Structures for IIR systems - Direct, cascade and parallel form realizations of IIR systems.

Text Book:

1. Alan V. Oppenheim and Alan S.Willsky with S. Hamid Nawab, "Signals & Systems",*PHI*, 2/e, 2010 *(Chapters 1,2,3,4,5 and 10)*.

Reference Books:

1. Simon Haykin and Barry Van Veen, "Signals & Systems", Wiley India, 2/e , 2008.
2. Mrinal Mandal and Amir Asif, "Continuous and Discrete Time Signals and Systems", Cambridge University Press, 1/e, 2008.
3. M.J.Roberts and Govind Sharma, "Fundamentals of Signals and Systems", McGraw Hill, 2/e, 2010.
4. H.P. Hsu, "Signals & Systems", Schaum's Outlines (McGraw Hill), 2/e, 2009.
5. B.P.Lathi, ''Signals Systems and Communication", BS Publications, 2003.

Course Learning Outcomes(Cos):

Upon completion of this course, students will be able to

CO1: classify CT and DT signals & systems and perform convolution for finding response of an LTI system to any arbitrary signal

CO2: evaluate CTFT of standard signals, use properties of CTFT for solving LCCDE and find DTFS of periodic signals

CO3: compute DTFT of standard signals, derive properties of DTFT and use them for solving LCCDE

CO4: determine the z-transform of standard DT signals with ROC, use properties of z-transform to solve difference equations, evaluate stability of an LTI system and realize the DT systems in direct, cascade & parallel forms

U14EI404 DIGITAL DESIGN USING VHDL

Class: B.Tech. IV-Semester

Branch: Electronics & Instrumentation 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: structure and programming of PLDs and design of data path/control logic for state machines using ASM charts
LO2: basic terminology and elements of VHDL and behavioral modeling style
LO3: data flow and structural modeling styles and use of generics and configurations
LO4: subprograms / design libraries and hardware description of typical examples

UNIT – I (9+3)

Programmable logic devices (PLDS): Introduction to PLDs, Read only memories(ROMs), Programmable logic array devices (PLAs), Programmable array logic devices(PALs), Implementation of boolean functions on various PLDs, Introduction to FPGAs and CPLDs.

Algorithmic state machines (ASMS): ASM chart, ASM block, Timing considerations, Data path design, Control logic design, One hot method, Multiplexer method, Typical design examples.

UNIT – II (9+3)

VHDL Constructs and Modeling styles: Introduction to VHDL, Primary constructs of VHDL, Entity declaration, Architecture description, Basic elements of VHDL - Identifiers, Data objects, Data types, Operators and Various modeling styles of VHDL.

Behavioral modeling: Elements of Behavioral modeling - Process statement, Variable assignment statement, Signal assignment statement, WAIT, IF, CASE, NULL, LOOP, EXIT, NEXT, ASSERTION and REPORT statements, Design examples using behavioral modeling in VHDL.

UNIT – III (9+3)

Data Flow Modeling: Concurrent signal assignment statement, Comparison of concurrent and Sequential signal assignment statements, Conditional and Selected signal assignment statements, Design examples using Data flow modeling in VHDL.

Structural Modeling: Component declaration, Component instantiation, Design examples using structural modeling in VHDL.

Generics and Configurations: Usage of generics, Design examples using generics, Configuration specification, Configuration declaration.

UNIT – IV (9+3)

Subprograms: Functions and Procedures; Package declaration, Package body, Design file, Design libraries.

Advanced features of VHDL: Generate statements, Binding component instances and Attributes.

Design examples using VHDL: Barrel shifter, Floating point encoder, Dual priority encoder, Comparators, Ones' counter.

Text Books:

1 Moris Mano," Digital Design", 3rd edn., *Prentice Hall of India*, 2003, New Delhi. (Chapters 7 and 8)

2 J. Bhaskar, "VHDL primer", 3rd edn., *Prentice Hall of India*, 2009, New Delhi. (Chapters 1 to 9)

Reference Books:

1 John.F.Wakerly , "Digital Design", 4th edn., *Pearson Education*, 2008.

2 Douglas. L. Perry, "VHDL Programming by Example", 4th edn., *Tata McGraw Hill,* 2002.

3 Charles.H. Roth, Jr., Lizy Kurian John, "Digital System Design", 2nd edn., *Thomson Learning Publications,* 2008.

Course Learning Outcomes (COs):

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

CO1: explain the structure and programming of various PLDs and design state machines using ASM charts
CO2: describe digital circuits using behavioral modeling
CO3: describe digital circuits in data flow and structural modeling and use generics and configurations
CO4: write subprograms using functions and procedures and describe typical example circuits in VHDL

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 Examination	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).

Text Book:

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

Reference Books:

1 Ramakant Gayakwad, "Op-Amps and Linear Integrated Circuits", 3rd edn., *Pearson Education*, 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):

Upon 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

U14EI406 COMPUTER ARCHITECTURE AND ORGANIZATION

Class: B.Tech. IV-Semester

Branch: Electronics & Instrumentation 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 on/in…

LO1: register transfer, micro operations, arithmetic logic shift unit and various computer instructions
LO2: assembly language programming and microprogrammed control unit, basic register and stack organization for execution of different instructions by the computer
LO3: arithmetic algorithms on fixed point, floating point and decimal data, basic aspects of interfacing i/o modules peripherals for data transfer between CPU and peripherals
LO4: memory sub system, its hierarchy, architecture and programming of 8085 microprocessor

UNIT–I (9+3)

Block diagram of Computer, Types of Computer , Evolution of computers

Register transfer and Microoperations: Register transfer language, Register transfer, Bus and Memory transfers; Arithmetic microoperations, Logic microoperations, Shift microoperations; Arithmetic logic shift unit.

Basic computer organization and Design: Instruction codes, Computer registers, Common bus system, Computer instructions, Instruction cycle, Memory reference instructions, I/O and Interrupt instructions, Design of accumulator logic.

UNIT–II (9+3)

Programming the basic computer: Machine language, Assembly language, Programming Arithmetic and Logic operations, Subroutines, I/O programming.

Microprogrammed Control: Control memory, Address sequencing, Microprogram example, Design of control unit.

Central processing unit: General register organization, Stack organization, Infix, Prefix and Postfix notations, Instruction formats, Addressing modes, RISC Vs CISC.

UNIT–III (9+3)

Computer arithmetic: Addition, Subtraction, Multiplication and Division algorithms on fixed point and Floating point data, Decimal arithmetic operations.

Input-Output Organization: Peripheral devices, Asynchronous data transfer, Modes of data transfer, Priority interrupts, DMA, Serial communication.

UNIT–IV (9+3)

Memory organization: Memory hierarchy, Main memory, RAM and ROM, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

8085 CPU: 8085 Architecture, Instruction set, Addressing modes, Pin configuration, Timing diagrams, Interrupts, Basic assembly language programs – Stacks, Subroutine.

Text Books:

1 M. Morris Mano, "Computer System Architecture", 3rd edn., *PHI,* 2001, New Delhi. (Chapters 4 to 8 and 10, 11, 12)

2. Ramesh S Gaonkar , "Microprocessor Architecture, Programming And Applications With The 8085", 5th edn., *PHI,* 2002. (Chapters 2 to 11 for UNIT IV only)

Reference Books:

1 W. Stallings, "Computer Organization and Architecture", 7th edn., *PHI*, 2006, New Delhi.

2 John P. Hayes, "The Computer Architecture and Organization", 3rd Edition, *McGraw Hill*, 1998, New York.

Course Learning Outcomes (COs):

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

CO1: design ALU & basic instructions required for computer system with architectural and organizational aspects

CO2: articulate simple algorithms in ALP, design a typical microprogrammed control unit and use general purpose & stack memory for execution of different types of instructions

CO3: implement arithmetic algorithms on fixed point, floating point , decimal data and articulate design of peripheral interfaces for i/o data transfer

CO4: explain memory sub system of computer , describe 8085 µp architecture, addressing modes and implement simple arithmetic logic & data processing algorithms using ALPs

U14EI407 DIGITAL DESIGN LABORATORY

Class: B.Tech. IV-Semester

Branch: Electronics & Instrumentation 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: simulation of combinational/sequential circuits using VHDL

List of Experiments

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 Design and Simulation of Adders/Subtractors using VHDL.
8 Design and Simulation of Code Converters using VHDL.
9 Design and Simulation of Decoders and Encoders using VHDL.
10 Design and Simulation of Multiplexer and Demultiplexer using VHDL.
11 Design and Simulation of SR, JK, D & T Flip-flops using VHDL.
12 Design and Simulation of Counters and Shift Registers using VHDL.

Laboratory Manual:

1 "Digital Design 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*, 2001.

2 J. Bhaskar, "VHDL Primer", 3rd edn., *Prentice Hall of India*, 2009, New Delhi.

Course Learning Outcomes (COs):

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

CO1: implement combinational circuits using digital ICs
CO2: implement sequential circuits using digital ICs
CO3: simulate of combinational/sequential circuits using VHDL

U14EI408 LINEAR INTEGRATED CIRCUITS LABORATORY

Class: B.Tech. IV-Semester **Branch:** Electronics & Instrumentation 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 on/in…

LO1: static and dynamic parameters of operational amplifier
LO2: operational amplifier applications
LO3: functioning of 555 IC timer as multi vibrators, voltage regulator and PLL

List of Experiments

1. Measurement of static and dynamic parameters of Op-Amp IC 741
2. Design and testing of differentiator using Op-Amp IC 741
3. Design and testing of integrator using Op-Amp IC 741
4. Design and testing of instrumentation Amplifier using Op-Amp IC 741
5. Design and testing of log amplifier using Op-Amp IC 741
6. Design and testing of precision rectifier using Op-Amp IC 741
7. Design and testing of second order active low pass filter using Op-Amp IC 741
8. Design of a Wien's bridge oscillator for specified frequency using Op-Amp IC 741
9. Design and testing of astable multivibrator using IC 555
10. Design and testing of monostable multivibrator using IC 555
11. Design and testing of an FSK generator using IC 555
12. Design a voltage regulator using IC 723 for a given O/P voltage and load current

Laboratory Manual:

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

Text books:

1. Roy Choudhary, Shail Jain," Linear Integrated Circuits", 2nd edn., *New Age International Pvt. Ltd*. 2003, New Delhi.

Course Learning Outcomes (COs):
Upon completion of this course, students will be able to…

CO1: measure the characteristics of operational amplifier
CO2: implement circuits using operational amplifier
CO3: design IC 555 based multi vibrator and analyze PLL and voltage regulator

U14MH409 SOFT AND INTERPERSONAL SKILLS

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

- Robert.T.Kiyosaki and Sharon L.Lechter, "Rich Dad Poor Dad", *Warmer Books*,1997.
- Shiv Khera, "You can Win" New Dawn Press, 2004.
- APJ Abdul Kalam, "Wings of Fire: An Autobiography of APJ Abdul Kalam", University Press,1999.
- David Joseph Schwartz, "The magic of thinking big", Simon & Schuster Inc., 1/e, 1987.
- 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.

U14MH209 ENVIRONMENTAL STUDIES

Class: B.Tech. IV-Semester **Branch:** Common to all

Teaching Scheme:

L	T	P	C
2	-	-	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. 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.

Text Books:

1 Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses – 2nd edn., *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:

Upon 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 – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION AND EVALUATION

V-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & INSTRUMENTATION ENGINEERING

S.No.	Course Category	Course Code	Course Name	Periods/ Week			Credits (C)	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	PC	U14EI501	Process Instrumentation	3	1	-	4	15	25	40	60	100
2.	PC	U14EI502	Digital Signal Processing	3	1	-	4	15	25	40	60	100
3.	PC	U14EI503	Microprocessors and Interfacing	3	1	-	4	15	25	40	60	100
4.	PC	U14EI504	Electro Magnetic Theory	3	1	-	4	15	25	40	60	100
5.	PC	U14EE506	Control Systems Engineering	3	1	-	4	15	25	40	60	100
6.	PC	U14EI505	Instrumentation Laboratory	-	-	3	2	40	-	40	60	100
7.	PC	U14EI507	Signal Processing Laboratory	-	-	3	2	40	-	40	60	100
8.	PC	U14EI508	Microprocessors and Interfacing Laboratory	-	-	3	2	40	-	40	60	100
9.	PR	U14EI509	SEMINAR	-	-	-	1	100	-	100	-	100
			Total	**15**	**5**	**9**	**27**	**295**	**125**	**420**	**480**	**900**

Student Contact Hours/Week : 29
Total Credits : 27

U14EI501 PROCESS INSTRUMENTATION

Class: B.Tech. V-Semester **Branch:** Electronics & Instrumentation 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 on /in…

LO1: measurement of industrial process parameters like pressure, temperature, flow and level
LO2: principles of hygrometers and densitometers
LO3: basic techniques utilized for viscosity and sound measurement
LO4: industrial standards for process measurement, instrumentation symbols, data conversion and transmission methods

UNIT–I (9+3)

Temperature measurement: Temperature scales, Bimetallic thermometer, Filled in thermometer, RTD - Materials, R-T characteristics, Construction and Lead wire compensation schemes; Thermistor- Materials and R-T characteristics; Thermocouple, Thermoelectric effects, Thermoelectric laws, Materials, Construction, Cold junction compensation and Thermopile– Pyrometer, Stefan-Boltzman's law, Planck's law, Total radiation pyrometer and Selective radiation pyrometer.

Level measurement: Sight glass method, Float gauges, Hydrostatic pressure tube and Bubbler or purge technique, Level transducers - Resistive, Capacitive, Ultrasonic and Nucleonic types.

UNIT – II (9+3)

Pressure measurement: Pressure scales, Manometers and their types, Pressure sensing elements: Bourdon tube, Bellows, Capsule and Diaphragms, Pressure transducers - Potentiometric, Strain gauge, Strain tube, Variable reluctance, LVDT and PZT types; Vacuum measurement, Thermal conductivity and Ionization (Hot Cathode) type of vacuum gauges, High pressure measurement using bridgemann gauge, Force balance transducer, Dead weight tester.

Humidity measurement: Absolute humidity and Relative humidity, Hygrometers - Hair and Humistor types, Automatic measurement of dew point.

UNIT – III (9+3)

Flow measurement: Laminar and Turbulent flows, Head type flow meters, Expression for volumetric flow rate, Velocity profiles, Venturimeter, Orifice meter, Flow nozzle meter and Pitot static tube, Rotameter, Electromagnetic flow meter, Turbine flow meter, Strain gauge flow meter, Ultrasonic flow meter, Thermal flow meter, Anemometers - Hotwire and Laser types.

Density measurement: Hydrometers - Optical and LVDT types, Air bubbler system, Weighing methods.

UNIT – IV (9+3)

Viscosity measurement: Dynamic viscosity and Kinematic viscosity, Falling body viscometer, Capillary tube viscometer (viscosity–to–pressure converter), Rotational viscometer, Variable area type viscometer (viscosity–to–displacement converter), Saybolt viscometer

Sound measurement: Characteristics of sound – Sound Levels (SPL and PWL), Variation of Intensity of sound with distance, Sound measurement conditions, Loudness; Sound Level meter, Microphones, Capacitive, Carbon, Piezoelectric and Electrodynamic types

Data transmission and Data conversion: Data transmission - Pneumatic and Electric types; Data converters - P- I converter and I-P converter; Instrumentation symbols

Text Books:

1 B.C. Nakra, K.K Choudhry, "Instrumentation Measurement and Analysis", 2nd edn., *Tata McGraw Hill*, 2006, New Delhi. (Chapters 10 to 13)

2 D.V.S. Murthy, "Transducers and Instrumentation", 2nd edn., *Prentice Hall of India*, 2008, New Delhi. (Chapters 5 to 7)

Reference Books:

1 Arun K. Ghosh, "Introduction to Transducers", 4th edn., *PHI*, 2012, New Delhi.

2 Rangan, Mani and Sharma, "Instrumentation Devices and Systems", 2nd edn., *TMH*, 2008, New Delhi.

3 A.K. Sawhney, "Electrical and Electronics Measurements and Instrumentation", *Dhanpatrai* & Co., 1996, New Delhi.

4 B.G. Liptak, "Instrument Engineers Hand Book, Vol.I & Vol.II", 4th edn., *Chilton book co*., 2006, Philadelphia.

Course Learning Outcomes(COs):

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

CO1: recognize and devise different types of pressure, temperature, flow & level transducers
CO2: identify and infer on density and humidity sensors/ transducers employed in process industry and on their calibration aspect
CO3: distinguish various types of viscometers and appraise on sound measurement using sound level meter
CO4: demonstrate skills required for process data conversion and transmission and recall instrumentation symbols

U14EI502 DIGITAL SIGNAL PROCESSING

Class: B.Tech. V-Semester

Branch: Electronics & Instrumentation 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 on/in…

LO1. discrete Fourier transform (DFT), computational complexity of DFT and efficient implementation of DFT using fast Fourier transform (FFT)

LO2. specifying characteristics of frequency selective filters, design of linear-phase FIR filters

LO3. classical analog Butterworth & Chebyshev filters, converting analog filter into equivalent digital filter to design digital IIR filters

LO4. correlation, basic theory of adaptive signal processing and its applications

UNIT – I (9+3)

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.*(Chapters 7&8 of text book-1)*

UNIT – II (9+3)

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.
(Chapter 10 of text book-1)

UNIT – III (9+3)

Infinite Impulse Response (IIR) Filters: Realizability 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. *(Chapter 10 of text book-1)*

UNIT – IV (9+3)

Correlation: Correlation of discrete time signals, Auto correlation, Properties of auto correlation function, Cross correlation, Matrix form representation, Example problems for computation of correlation functions. *(Selected portion from chapter 2, i.e. 2.6 from text book-2)*

Adaptive Filters: Concepts of adaptive filtering, configurations, Basic wiener filter theory, Cost function, Error performance surface, Basic LMS algorithm & its implementation, Practical limitations of basic LMS algorithm, RLS algorithm, Limitations of RLS algorithm.

Applications of Adaptive filters: Fetal monitoring - Cancelling of maternal ECG during labour; Adaptive telephone echo cancellation. *(Chapter 10 of text book-2)*

Text Book:

1 John G.Proakis and D.G.Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", *Pearson education*, 4/e, 2007. *(Chapters 2, 7, 8 and 10)*

2 Ifeachor, Digital Signal Processing-A practical Approach, *Pearson Education India*, 2/e, 2002. *(Chapter 10)*

Reference Book:

1 A. V. Oppenheim and R. W. Schafer, "Discrete-Time Signal Processing", PHI, 2/e, 1999.
2 Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", TMH, 4/e, 2013.
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):

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

CO1: find the DFT of a DT sequence, perform circular convolution using DFT & IDFT and compute 2, 4 & 8-point DFT of a sequence using radix-2 DIT & DIF algorithms

CO2: design a linear-phase FIR filter with a prescribed magnitude response using windowing & frequency-sampling methods

CO3: design an IIR Butterworth/Chebyshev digital filter meeting the required specifications by performing impulse invariance/bilinear transformation

CO4: compute auto & cross correlation sequences for given DT sequences, explain the need & use of adaptive filters, LMS & RLS algorithms for updating weight vectors and describe popular applications of adaptive filters

U14EI503 MICROPROCESSORS AND INTERFACING

Class: B.Tech. V-Semester

Branch: E&I and CSE

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 on /in…

LO1: architectural issues of 8086 microprocessor
LO2: programming concepts of 8086 microprocessor
LO3: interfacing of peripheral devices to 8086 through 8255 (PPI), 8257 (DMA), 8259 (PIC)
LO4: serial data communication types and standards RS232, IEEE 488 bus

UNIT–I (9+3)

Introduction to Microprocessors - Evolution, Review of 8085 MPU architecture,
8086 Family Architecture: Organization of 8086 CPU, Concept of memory segmentation, Segment registers, Physical and Logical addressing, Addressing modes and Instruction formats, Instruction set.

UNIT–II (9+3)

Assembly Language Programming: Assembler directives, Simple programming of 8086, Arithmetic, Logical and Data processing programs; Implementation of control loops, Structures, Strings, Procedures, Macros.
Pin configuration, Minimum / Maximum modes, Timing diagrams, Delay subroutines.

UNIT–III (9+3)

Interfacing with 8086: 8086 Interrupts, Interrupt service routines, Priority interrupt controller 8259, Programmable peripheral interface 8255, Interfacing of switches, Keyboards, LEDs, Stepper motor, ADCs and DACs.

UNIT–IV (9+3)

DMA Controller 8257, Programmable Timer/Counter 8254.
Serial Data Communication through 8086: Types of serial communication, Synchronous and Asynchronous communication, Serial data communication through USART 8251, Serial data communication standards, RS-232, IEEE 488 Bus (GPIB).

Text Books:

1 D.V.Hall, "Microprocessors and Interfacing: Programming & Hardware", 2nd edn., *Tata McGraw Hill*, 1992,New Delhi. (Chapters 3 to 10)

2 Yuchang Liu, Glen A. Gibson, "Microcomputer Systems - The 8086/8088 Family Architecture, Programming and Design", 2nd edn., *PHI*, 1995,New Delhi. (Chapters 2 to 11)

Reference Books:

1 Kenneth J. Ayala, Ayala Kenneth," The 8086 Microprocessor: Programming and Interfacing The PC", *West Pub*., 1994.

2 Barry B. Brey," The Intel Microprocessors: Architecture, Programming and Interfacing", 2nd edn., *PHI,* 1998, New Delhi.

Course Learning Outcomes(COs):

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

CO1: explain 8086 architecture and instructions
CO2: use assembler directives and write assembly language programs (ALPs)
CO3: write ALPs for interfacing i/o devices with 8086 µp through PPI / PIC
CO4: discuss serial communication modes and standards

U14EI504 ELECTROMAGNETIC THEORY

Class: B.Tech. V-Semester

Branch: Electronics & Instrumentation Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objective(LOs):

This course will develop student's knowledge in/on…

LO1: behavior of static electric and magnetic fields in standard configurations
LO2: behavior of conductors and dielectrics in static electric and magnetic fields
LO3: electromagnetic wave propagation
LO4: fundamentals of Wave guides and Antennas

UNIT – I (9+3)

Review: Vector algebra, Differential calculus, Del operator, Gradient, Divergence, Curl ; Integral calculus, Line, Surface and volume integrals, Divergence theorem, Stokes theorem; Curvilinear coordinates.

Electrostatics: The electric field, Continuous charge distributions, Electric Flux density, Gauss's law and its applications, Electric potential, Laplace's equation and Poisson's equation, Boundary conditions, Electrostatic energy.

UNIT – II (9+3)

Electric fields in materials: Conductors, Induced charges, Surface charge and Force on the conductor, Capacitors , Polarization in dielectrics, Electric susceptibility.

Magnetostatics: Magnetic flux density, Magnetic field strength, Steady currents, Biot - Savart's law, Ampere's law, Magnetic vector potential, Boundary conditions.

Magnetic Fields in Materials: Diamagnets, Paramagnets, Ferromagnets, Torque and Force on magnetic dipoles, Magnetization, Magnetic susceptibility.

UNIT – III (9+3)

Electrodynamics: Electromotive force , Faraday's law, Induced electric field, Inductance, Maxwell's equations, Continuity equation, Inconsistency of Ampere's law.

Electromagnetic waves: Wave equations for electric and magnetic fields in free space, Uniform plane waves, Wave equations for conductive medium, Sinusoidal time variations, Wave propagation in conductors and dielectrics, Depth of penetration, Surface impedance.

Power Flow: Poynting's theorem, Time average poynting vector and Power.

UNIT – IV (9+3)

Reflection and Transmission of plane waves: Reflection of a Plane wave at normal incidence, Reflection of a plane wave at oblique incidence.

Wave guides: Rectangular wave guide, Transverse electric modes, Transverse magnetic modes, Impossibility of transverse electromagnetic mode in rectangular wave guide.

Antenna Fundamentals: Hertzian dipole, Half wave dipole antenna, Small loop antenna, Antenna characteristics.

Text Books:

1 David J. Griffiths, "Introduction to Electrodynamics", 4th edn., *Pearson Education*, 2013. (Chapters 1 to 7)

2 Mathew N. O. Saiduku, "Principles of Electromagnetics", 4th edn., *Oxford University Press*, 2009. (Chapters 1 to 5 and 7,10, 12, 13)

Reference Books:

1 Edward C. Jordan and Keith G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd edn., *Prentice Hall India*, 1968.

2 William H. Hayt and John A. Buck, "Engineering Electromagnetics", 6th edn., *TMH*, 2000.

3 Amalendu Patnaik, Jin Au Kong and Liang Chi Shen, "Engineering Electromagnetics", *Cengage Learning India*, 2011.

Course Learning Outcomes(COs):

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

CO1: apply vector calculus to understand the behavior of static electric and magnetic fields in standard configurations
CO2: discuss and analyze the behavior of conductors and dielectrics in static electric and magnetic fields
CO3: describe and analyze electromagnetic wave propagation
CO4: describe and analyze wave guides and antennas

U14EE506 CONTROL SYSTEMS ENGINEERING

Class: B.Tech. V-Semester

Branch: E&I and EEE

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 : 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.

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):

Upon 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.

U14EI505 INSTRUMENTATION LABORATORY

Class: B.Tech. V-Semester

Branch: Electronics & Instrumentation 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 student's knowledge on/in…

LO1: various transducers for measurement of physical parameters
LO2: calibration of instruments
LO3: signal conditioning circuits for transducers

LIST OF EXPERIMENTS

1. (a) Measurement of Strain using Strain Gauge transducer
   (b) Measurement of Force using Strain Gauge transducer
2. (a) Measurement of Displacement using LVDT type transducer
   (b) Measurement of Pressure using Bourdon tube transducer
3. (a) Measurement of Displacement using Optical type transducers
   (b) Measurement of Displacement using Hall effect transducer
4. Measurement of Temperature using RTD and Thermistor
5. Study and Use of Electro - pneumatic converter (I -P converter)
6. Measurement of Temperature using Thermocouple and IC based temperature sensor (AD590)
7. (a) Measurement of Angular Displacement using Variable area type Capacitive transducer
   (b) Measurement of Level using Variable dielectric type Capacitive transducer
8. Measurement of Flow using Turbine, Orifice and Venturi Flow meters
9. Measurement of Speed using Stroboscope and Tachometer
10. Measurement of Sound using Sound level meter
11. Calibration of Pressure transmitter using U tube manometer
12. Measurement of acceleration using Piezoelectric accelerometer

Laboratory manual:

1. "Instrumentation Laboratory Manual", *prepared by Dept of E& I Engg.*

Text Books:

1. B.C. Nakra, K.K Choudhry, "Instrumentation Measurement and Analysis", 2nd edn., *Tata McGraw Hill*, 2006, New Delhi.

Course Learning Outcomes(COs):

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

CO1: measure various physical parameters using appropriate transducers
CO2: draw characteristic curves of various transducers
CO3: use selective standards for calibration of measuring instruments

U14EI507 SIGNAL PROCESSING LABORATORY

Class: B.Tech. V-Semester

Branch: Electronics & Instrumentation 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 on / in

LO1: basic commands and functions of MATLAB
LO2: time and frequency analysis of signals/systems using MATLAB
LO3: implementation and testing of FIR and IIR Filters using MATLAB

List of Experiments

1. MATLAB Program to
   a. Generate - Unit step, Ramp, Impulse, Exponential and Sinusoidal Signals.
   b. Perform mathematical operations on signals.
   c. Perform scaling, shifting and delay operations on the sequences.
2. MATLAB Program for 3-sample moving averager to filter noise
3. MATLAB program on
   a. Correlation of two sequences.
   b. Convolution of two sequences.
4. MATLAB Program to Compute DFT and 4-pt FFT. (with and without using the command 'FFT')
5. MATLAB Program to observe the spectrum of a given signal.
6. MATLAB programs to perform linear/Circular Convolution using DFT.
7. MATLAB Program to study the given system (impulse response, poles and zeros, frequency response and linear phase characteristics).
8. MATLAB Program to Design a Butterworth IIR Filter (All types of filters).
9. MATLAB Program to Design Chebyshev filter.
10. MATLAB Program to study the types of FIR filters.
11. MATLAB program to observe magnitude response of various filters
12. MATLAB Program to Design FIR Filter using windows.

Laboratory manual:

1. "Signal Processing Laboratory Manual ", *prepared by Dept of E& I Engg.*

Text Books:

1. John G.Proakis and Vinay K. Ingle, "Digital Signal Processing using MATLAB", 3rd edn., *PHI,* 2006, New Delhi.

Course Learning Outcomes(COs):
Upon completion of this course, students will be able to…

CO1: write simple MATLAB programs for representation of signals
CO2: compute time and frequency response of signals/systems
CO3: implement IIR/FIR filters using MATLAB

U14EI508 MICROPROCESSORS AND INTERFACING LABORATORY

Class: B.Tech. V-Semester **Branch:** Electronics & Instrumentation 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 on/in…

LO1: implementation of simple arithmetic, logical and data processing algorithms using assembly language programs
LO2: implementation of simple data conversion and string manipulation algorithms using assembly language programs
LO3: ALPs for interfacing data converters and i/o devices with 8086 µp

List of Experiments

1. Study of 8086 Trainer Board
2. ALPs for simple Arithmetic operations (Addition, Subtraction, Multiplication and Division) on Single and Double Precision data
3. ALPs for
   a. Finding Largest / Smallest Number
   b. Arranging in Ascending/ Descending order
4. ALP for finding Factorial using recursive procedures
5. ALPs for String manipulation
6. ALPs for Code conversions
   a)BCD to Binary b) Binary to BCD
   c)ASCII to Binary d)Binary to ASCII
7. ALP for Password checking
8. ALP for generation of time delays
9. ALPs for waveform generation using DAC module
   a)Square wave b) Saw tooth c)Triangular
10 ALP for conversion of analog signal to digital data using ADC module
11 ALP for LED/LCD, Stepper Motor interfacing
12 ALP for Keyboard interfacing

Laboratory manual:

1. "Microprocessors and Interfacing Laboratory Manual", *prepared by Dept of E&I Engg.*

Text Books:

1. D.V.Hall, "Microprocessors and Interfacing: Programming & Hardware", 2nd edn., *Tata McGraw Hill*, 1992,New Delhi.
2. Yuchang Liu, Glen A. Gibson, "Microcomputer Systems - The 8086/8088 Family Architecture, Programming and Design", 2nd edn., *PHI*, 1995,New Delhi.

Course Learning Outcomes(COs):
Upon completion of this course, students will be able to…

CO1: use development boards and assembler/dissembler software
CO2: program 8086 µp for implementing arithmetic, logic and data processing algorithms
CO3: write ALPs for interfacing signal converters and I/O devices

U14EI509 SEMINAR

Class: B.Tech. V-Semester

Branch: Electronics & Instrumentation 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):

Upon 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 – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION AND EVALUATION

VI-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & INSTRUMENTATION ENGINEERING

S. No.	Course Category	Course Code	Course Name	Periods/ week			Credits (C)	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	OE	U14OE601	Open Elective-I	4	-	-	4	15	25	40	60	100
2.	PC	U14EI602	Process Control	3	1	-	4	15	25	40	60	100
3.	PC	U14EI604	VLSI Design	3	1	-	4	15	25	40	60	100
4.	PC	U14EI605	Micro Controllers and Embedded Systems	3	1	-	4	15	25	40	60	100
5.	PE	U14EI606	Professional Elective-I	4	-	-	4	15	25	40	60	100
6.	ES	U14EC610	Analog and Digital Communications	3	1	-	4	15	25	40	60	100
7.	PC	U14EI607	Simulation Laboratory	-	-	3	2	40	-	40	60	100
8.	PC	U14EI608	Micro Controllers and Embedded Systems Laboratory	-	-	3	2	40	-	40	60	100
9.	PR	U14EI609	MINI PROJECT	-	-	-	2	100	-	100	-	100
			Total	**20**	**4**	**6**	**30**	**270**	**150**	**420**	**480**	**900**

Open Elective-I

U14OE 601A: Disaster Management
U14OE 601B: Project Management
U14OE 601C: Professional Ethics in Engineering
U14OE 601D: Rural Technology and Community Development

Professional Elective-I

U14EI 606A: Digital Image Processing
U14EI 606B: DSP Processors
U14EI 606C: Neural Networks and Fuzzy Logic

Student Contact Hours/Week : 30
Total Credits : 30

U14OE 601A: 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.

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:

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):

Upon 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

U14OE 601B: 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.

Text Books:

1 Harold Kerzner, "Project Management: A Systems Approach to Planning, Scheduling and Controlling", *John Wiley & Sons Inc.,* 10th edn., 2009.

Reference Books:

1 Jack R Meredith & Samuel J mantel Jr, "Project Management : A Managerial Approach" , *John Wiley & Sons Inc*., 8th edn., 2012.

2 John M Nicholas & Herman Steyn, "Project Management for Business, Engineering and Technology", *Taylor & Francis*, 4th edn., 2012.

3 Adedeji B. Badiru, "Project Management: Systems, Principles and Applications", *CRC Press*, 2012.

Course Learning Outcomes(COs):

Upon 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*

U14OE 601C: 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).

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):

Upon 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*

U14OE 601D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

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: concepts of community organization and development and other related issues in an 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.

Text Books:

1 M.S. Virdi, "Sustainable Rural Technology", *Daya Publishing House*, ISBN: 8170355656, 200

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):

Upon 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. describe in detail the process of community development, different aspects of community organization and community mobilization covering needs, benefits and challenges related to it

CO5. explain different models of community organization for bringing social change

U14EI602 PROCESS CONTROL

Class: B.Tech. VI-Semester

Branch: Electronics & Instrumentation 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 on/in…

LO1: mathematical formulation of processes, process modeling and process dynamics
LO2: discontinuous & continuous controller modes, controller characteristics and controller performance
LO3: design, selection & tuning of a controller based on process characteristics and control environment
LO4: basic principles involved in various types of physical controllers and actuators employed in process industry

UNIT – I (9+3)

Process and its dynamics: Importance of Process control system (PCS) , Block diagram of PCS , example of PCS, Process characteristics, Process variables, Load variables, Process dead time, Process regulation , Process degree of freedom and Process parameters.

Process modeling and dynamic response: Process model for liquid level process with linear and non-linear resistance elements, Process model for liquid level process with constant flow outlet , Process model for mixing process, Process model for liquid tank systems (Interacting and Non-Interacting systems), Process model for pure dead time process , Step response of liquid processes , Basic process models of gas, Flow and Thermal processes.

UNIT – II (9+3)

Controller characteristics and response: Control system parameters (% Controller output, Control lag, Controller range and Controller dead time), Discontinuous controllers (ON-OFF, Multiposition, Single speed and Multi Speed), Continuous controllers (Proportional, Integral, Derivative, PI, PD & PID), Frequency response of P, PI & PID controllers.

Dynamic behavior of feedback controlled process: Closed loop process transfer function of feedback PCS, Servo and Regulator transfer functions, Closed loop step response, Effect of continuous controllers on the response of a controlled process.

UNIT – III (9+3)

Controller tuning: Controller design outline, Simple performance criteria- One quarter decay ratio; Time Integral performance criteria- MISE , Cohen coon technique , Gain margin and Phase margin Techniques , Zeigler Nichols tuning technique.

Control configurations *(Block diagram Approach)***:** Cascade control , Selective control , Split range control, Feed forward control (FFC) , FFFBC , Ratio control , Programmed adaptive control , Self adaptive control , Inferential control , Multivariable control.

UNIT – IV (9+3) *(Qualitative Treatment only)*

Final control elements: Control valve(CV) characteristics , CV sizing , Valve positioner , Types of control valves (Butterfly, Diaphragm, Globe & Ball valves), Electromagnetic relay, Solenoid , Single acting type hydraulic actuator

Analog Controllers: Pneumatic PID controller , Hydraulic PID controller , Electronic controllers (P,PI & PID).

Text Books:

1 Surekha Bhanot, "Process Control: Principles And Applications", 6th edn., 2011, *Oxford University Press,. (Chapters 1 to 6, 8, 10 to 12)*

2 G. Stephanopoulos, "Chemical Process Control", 6th edn., *PHI*, 1998. *(Chapters 5, 10, 11, 13, 14, 16, 18, 20 to 23)*

Reference Books:

1 C.D. Johnson, "Process Control Instrumentation Technology", 4th edn., 1996, *PHI,*.

2 D.P. Eckmann, "Automatic Process Control", *Wiley Eastern Ltd*, 1st edn, 2008, New Delhi.

3 D.R. Coughanowr, "Process Systems Analysis And Control", 3rd edn, *McGraw Hill*, 2009, New York.

4 B.G. Liptak, "Instrument Engineers Hand Book, Vol.III", 4th edn., *Chilton book co*., 2003, Philadelphia,.

Course Learning Outcomes(COs):

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

CO1: outline & interpret the procedural steps of process modeling and process dynamics
CO2: classify & utilize different controller modes of operation by analyzing its characteristics and response
CO3: illustrate & interpolate the design rules of controller tuning for optimum performance
CO4: select & devise appropriate control system configuration to regulate process under various operating conditions and Summarize the types of physical controllers and actuators employed in process industry

U14EI604 VLSI DESIGN

Class: B.Tech. VI-Semester

Branch: Electronics & Instrumentation 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: fabrication Process and Electrical Properties of MOS Transistors.
LO2: stick Diagrams and Mask Layouts for MOS circuits.
LO3: scaling and Subsystem Design with Structured Approach.
LO4: basic Concepts of Verilog and description of various levels of abstraction (Behavioral, Dataflow, Gate Level and Switch Level)

UNIT–I (9+3)

Review of Micro Electronics and Introduction to MOS Technology: Introduction to IC Technology, MOS Technology and VLSI, Basic MOS transistor, Photolithographic Process, Etches, Deposition Techniques, Fabrication Process of nMOS, CMOS and BICMOS Transistors, Production of E-Beam Masks.

Basic Electrical Properties of MOS Transistor: Derivation of Drain to Source Current, Threshold Voltage, Transconductance, Pass Transistor, nMOS Inverter, Pull Up/Pull Down ratios, Alternate forms of Pull Up, CMOS Inverter, BiCMOS Inverters, Latch Up in CMOS Circuits

UNIT–II (9+3)

MOS and BiCMOS Circuit Design Processes: MOS Layers, Stick Diagrams and Symbolic Diagrams, nMOS Design Style, CMOS Design Style, Lay Out and Lambda Based Design Rules , Contact Cuts, Layout Diagrams.

Basic Circuit Concepts: Sheet Resistance, Area Capacitances of Layers and Calculations, Delay Unit, Inverter Delays, Rise Time and Fall Time estimation

UNIT – III (9+3)

Scaling of MOS Circuits: Scaling Models and Scaling Factors, scaling factors for device parameters and limitations of scaling.

Subsystem Design and Layout: Architectural Issues, Switch Logic, Gate Logic, examples of Structured Design, Clocked Sequential Circuits and System Considerations

UNIT–IV (9+3)

Verilog HDL : Hierarchical Modeling Concepts , Basic concepts - Data types , Modules and ports; Gate level modeling , Dataflow modeling , Behavioral modeling , Design examples of Combinational and Sequential circuits , Switch level modeling ; Tasks and Functions.

Text Books:

1 Douglas A Pucknell and Kamran Eshraghian, "Basic VLSI Design", *PHI,* 3rd Edition, 2008 (Chapters 1 to 6)

2 Samir Palnitkar, "Verilog HDL–Guide To Digital Design And Synthesis", *Pearson Education,* 3rd Edition, *2003.* (PART-I: Chapters 2 to 8)

Reference Books:

1 Weste and Eshraghian, "Principles Of CMOS VLSI Design", *Addison Wesley*, 2nd Edition, 2008.

2 John P Uyemura, "Chip Design For Submicron VLSI: CMOS Layout And Simulation", Thomson India Edition, 2010.

Course Learning Outcomes(COs):

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

CO1: explain various steps of Fabrication Process and Electrical Properties of MOS Transistors.
CO2: describe the Color Codes, Symbols and sketch the Stick Diagrams and Mask Layouts for MOS circuits.
CO3: determine the scaling factors for various device parameters and outline the structured design approach for several example circuits.
CO4: write Verilog description of digital circuits using Behavioral, Dataflow, Gate and Switch Levels of abstraction.

U14EI605 MICROCONTROLLERS AND EMBEDDED SYSTEMS

Class: B.Tech. VI-Semester

Branch: Electronics & Instrumentation 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: purpose of Embedded systems and 8051 core as CPU

LO2: serial data communications, interrupts of 8051 microcontroller, its programming and interfacing with various modules

LO3: software programs in terms of ALPs and .C for serial data communication using timers and interrupts, subroutines, ISRs, hardware software co-design for complete embedded system development

LO4: basic functions of OS, Multiprocessing and Multitasking, task scheduling, Synchronization and choosing the proper RTOS for an embedded system development

UNIT – *I* (9+3)

Introduction to Embedded Systems, Embedded Systems Vs General Computing Systems, Classification of Embedded Systems, Purpose of Embedded System, Core of the Embedded System, Memory, Communication Interface, Embedded Firmware, Other System Components.
Overview of 8051 Microcontroller, 8051 Architecture, Hardware Units of 8051, Memory Organization, I/O Ports, Timers and Counters.

UNIT – II (9+3)

Serial data input and output, Interrupts of 8051.
8051 Assembly Language Programming concepts, Programming Model, Addressing modes, Instruction set of 8051 and Programming, Microcontroller Interfacing with Keyboard, Display Units (LED and LCD), Interfacing of DAC and ADC.

UNIT – III (9+3)

Serial data communication, Use of Interrupts & Service Routines.
Fundamental Issues in Hardware Software Co-Design, Embedded Firmware Design Approaches, Embedded Firmware Development Languages, Programming in "Embedded C".

UNIT – IV (9+3)

Real-Time Operating System (RTOS) based Embedded System Design, Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling -Putting them Altogether, Task Communication, Task Synchronizations, Device Drivers, selection of RTOS.

Text Books:

1 Shibu K V, "Introduction to Embedded Systems", *McGraw Hill Education (India) Pvt. Ltd.*, 2009.(Chapter 1, 2, 5, 6, 7, 9 and 10)

2 Manish K Patel, "The 8051 Microcontroller Based Embedded Systems", *McGraw Hill Education (India) Pvt. Ltd.*, 2014.(Chapter 2 to 21)

Reference Books:

1 Kenneth J. Ayala, "The 8051 Microcontroller", 3rd Edition, *Cenage learning*, 2007.

2 Mazidi, "The 8051 Microcontroller And Embedded Systems Using Assembly And C", 2nd Edition, *Pearson Education India*, 2011.

3 Iyer & Gupta, "Embedded Real Time Systems Programming", *TMH, New Delhi*, 2003.

Course Learning Outcomes(COs):

Upon completion of this course, students will be able to

CO1: explain the purpose of embedded systems and use of 8051 as the CPU
CO2: explain Serial data communication modes, interrupts of 8051, program for interface problems with various I/O modules
CO3: implement required software programs in terms of ALPs and .C for serial data communication using timers and interrupts, subroutines, ISRs and design a complete embedded system developing the required firmware
CO4: advocate fundamental issues in choosing the proper OS for an embedded system out of the RTOS currently available in the market

U14EI606A DIGITAL IMAGE PROCESSING

Class: B.Tech. VI-Semester

Branch: Electronics & Instrumentation Engineering

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. image fundamentals and importance of various Transformations
LO2. image enhancement using various techniques and image restoration techniques.
LO3. various image compression algorithms
LO4. image segmentation fundamentals and segmentation techniques

UNIT – I (12)

Introduction: Elements of Digital Image Processing system, Digital Image representation, Image acquisition, Image model, Sampling and Quantization, Relationship between pixels-neighborhoodness, path, Connectivity, Distance measures; Arithmetic and Logical operations on images, Basic Transformations -translation, Scaling, Rotation, Perspective Transformations; Color image fundamentals.

Image Transforms: Two dimensional DFT and its properties, DCT Unitary Transforms- Walsh Transform, Hadamard Transform, Haar Transform, Slant Transform, KL Transform.

UNIT – II (12)

Simple Intensity Transforms, Histogram equalization and specification techniques, Noise distributions, Bit plane slicing and gray level slicing

Enhancement with filtering: 2D convolution, smoothing filters-mean, median and Gaussian filtering; sharpening filtering-High boost filtering and un sharp masking; Enhancement in frequency domain, Homomorphic filtering, Color image enhancement.

Image Restoration: Image Restoration - degradation model; unconstrained restoration-Inverse filtering; constrained restoration-Wiener filtering, Least square filter.

UNIT – III (12)

Image Compression: Redundancy – Coding redundancy, interpixel redundancy, Psychovisual redundancy; Image compression system model, fedility criteria noiseless and noisy coding; error free compression – Huffman, Run length encoding, arithmetic coding, Bit-plane coding, constant area coding, lossless predictive coding; Lossy compression – Lossy predictive coding, Transform coding, JPEG 2000

UNIT – IV (12)

Image Segmentation: Detection of discontinuities – Point detection, line detection, Edge detection, threshold based edge detection,Edge Linking, pixel connectivity; Region – Oriented segmentation , Region similarity, Region growing, Limitations of region growing, Region splitting and Merging.

Morphological Image Processing: Structuring element, Fitting and hitting, Dilation, Erosion, Opening and closing, Hit–or–Miss Transform, Basic Morphological Algorithms, Grey Scale Morphology

Text Books:

1 R.C.Gonzalez and R.E. Woods, "Digital Image processing", 2nd edition, *Pearson Education*, New Delhi.(2004)

Reference Books:

1 Rafael C. Gonzalez, Richard E. Woods, Steven Eddins," Digital Image Processing using MATLAB", 1st edition, Pearson Education, Inc., 2004

2 William K. Pratt, "Digital Image Processing", 4th edition, John Wiley, New York, 2002

3 Sridhar, "Digital Image Processing", Oxford university press, 1st edition, 2013

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to….

CO1. analyze basic image fundamentals and perform various operations & Transforms on images.
CO2. implement the Image Enhancement, Compression and Segmentations.
CO3. apply the advanced mathematics to improve the image processing Techniques.
CO4. formulate solutions to real world issues in image processing.

U14EI606B DSP PROCESSORS

Class: B.Tech. VI-Semester

Branch: Electronics & Instrumentation Engineering

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: fundamentals of Programmable DSPs (PDSPs)
LO2: architectural features and instruction set of TMS3205X processor
LO3: execution control and pipelining in TMS320C5X processor
LO4: *DSP development tools and multi tasking capability of CCS*

UNIT - I (12)

Introduction: Comparison between general purpose and Digital Signal Processors, need for specialized processors, RISC and CISC; Data formats ,Number formats for signal and coefficients in DSP systems, Dynamic range and precision.

Fundamentals of Programmable DSPs : Multiplier and Multiplier accumulator, Modified Bus Structures and Memory access in P,DSPs, Multiple access memory , Multi,ported memory , VLIW architecture, Pipelining , Special Addressing modes in PDSPs , On chip Peripherals, Computational accuracy in DSP processor

UNIT - II (12)

TMS320C5X Processor Architecture: Bus structure, central arithmetic unit, ARAU, PLU, AGU, on chip memory, on chip peripherals.

TMS320C5X Processor Assembly language Instructions : Assembly language syntax, Addressing modes, arithmetic and logical instructions, load/store instructions, program control instructions, zero over head looping and peripheral control instructions.

UNIT - III (12)

TMS320C5X Processor Execution Control and Pipelining : Hardware looping, interrupts, stacks, relative branch support, pipelining and performance, pipeline depth, interlocking, branching effects, pipeline programming , Pipelined instruction execution, specialized hardware for zero,overhead looping.

UNIT - IV (12)

DSP Tools: Assembler, Debugger, C,Compiler, Linker, Editor, Code Composer studio (CCS).
Implementation Of Basic DSP Algorithms: Convolution of two sequences, FFT Algorithm for DFT Computation, ,Computation of signal spectrum, FIR and IIR Filters.

Text Book:

1 B. Venkataramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", 2nd Edition, *Tata McGraw,Hill,* 2011.(Chapters 2 to 6)

Reference Books:

1 Avtar Singh and S. Srinivasan, "Digital Signal Processing", 2nd edition, *Thomson Publications*, 2004.

2 TMS320 C 5X Users guide—Texas Instruments

Course Learning Outcomes (COs):
Upon completion of this course, students will be able to

CO1: illustrate the features of PDSPs that improve the processor efficiency
CO2: explain the architectural features, addressing modes and instruction set of TMS3205X processor
CO3: describe the pipelining operation and the effect of pipeline conflict in TMS320C5X
CO4: use CCS as integrated development environment

U14EI606C NEURAL NETWORKS AND FUZZY LOGIC

Class: B.Tech. VI-Semester

Branch: Electronics & Instrumentation Engineering

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: the fundamental concepts of Artificial Neural Networks
LO2: associate Memories referring to Bidirectional Associate Memory and Hopfield Networks.
LO3: fuzzy sets, fuzzy logic and use of heuristics based on human experience
LO4: neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems

UNIT-I (12)

Fundamental Concepts and Models of Artificial Neural Networks: Biological Neuron and their Artificial Models, Models of Artificial Neural Network, Neural Network learning Rules: Hebbian rule, Perception learning rule its convergence theorem, Delta learning rule, Widrow-Hoff rule, Correlation learning rule, Winner-Take-All learning rule, Outstar learning rule, Comparison of learning rules.

UNIT-II (12)

Associative memory: Associate Memories: Basic Concepts, Linear Associator. Basic Concepts of Recurrent Autoassociative Memory, Retrieval Algorithm and Storage Algorithm

Bidirectional associative memory and Hopfield memory: Bidirectional Associative Memory Architecture, Processing and Energy function, Associate Memory of Spatio-Temporal patterns, Discrete Hopfield Networks, Continuous Hopfield Networks, Traveling salesman problem, Adaptive Resonance Theory: introduction, cluster structure, simplified ART architecture and its applications

UNIT-III (12)

Fuzzy Sets, Relations and Membership factions: Classical Sets, operations and properties of classical (crisp) sets, Fuzzy Sets, Fuzzy set operations, properties of fuzzy sets, alternative fuzzy set operations, Crisp relations and their properties

Fuzzy relations: operations and properties on fuzzy relations, Fuzzy cartesian product and composition, Crisp/ Fuzzy tolerance and equivalence relations, feature of membership functions, various forms, fuzzification and defuzzification.

UNIT-I (12)

Logic and Fuzzy System: Classical logic, Tautologies, Equivalence, Exclusive–Or & Exclusive-Nor, logical proofs, Deductive inferences, fuzzy logic, Approximate Reasoning

Fuzzy Systems: Fuzzy systems, Natural Language, Linguistic Hedges, Fuzzy (Rule-Based) Systems, Graphical of Fuzzy (Rule-Based) Systems.

Membership value assignment: Intuition, Inference, Rank ordering, Neural networks, Genetic algorithms, Inductive reasoning.

Text Books:

1 J. Zurada, "Artificial Neural Networks", *Tata McGraw Hill*, NewDelhi,1st Edition,1992 ***(Chapters 2, 5, 6,7)***

2 Timhothy J Ross, "Fuzzy Logic with Engineering Application", Wiley publications, India, 3rd Edition, 2010 (Chapters 1, 2,3,4,5,6)

Reference Books:

1 Muller B.Rienhardt,J., "Neural Networks and Introduction",Springer- Verlag,1991.

2 Simon Haykin, "Neural Networks (A Comprehensive Foundations)", McMillan College Pub. Company, New York, 1994.

3 S. Rajashekaran, G.A. Vijaya laxmi pai, " Neural Networks, Fuzzy Logic & Genetic Algorithms", PHI.

4 Bart Kosko, "Neural Networks And Fuzzy Systems", Prentice Hall, New york, 1992.

Course Learning Outcomes (COs):

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

CO1: design and define the learning algorithms of Artificial Neural Networks in feed forward and feedback networks.

CO2: explain Bidirectional Associate Memory & Hopfield Memory and ART Networks.

CO3: identify the concepts of fuzzy sets, fuzzy logic and use of heuristics based on human experience

CO4: implement neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems

U14EC610 ANALOG AND DIGITAL COMMUNICATIONS

Class: B.Tech. VI-Semester

Branch: Electronics & Instrumentation 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. amplitude modulation techniques and their time domain and frequency domain representations
LO2. angle modulation techniques and their time domain and frequency domain representations.
LO3. information theory and pulse digital Modulation techniques;
LO4. baseband Binary Data Transmission system

UNIT-I (9+3)

Introduction: Communication system, Need for modulation, Radio frequency Spectrum, Classification of modulation techniques.

Amplitude Modulation: Time and frequency domain description of AM, DSB waves, Generation and demodulation of AM, DSB waves - coherent demodulation - envelop detection - carrier recovery, SSB, VSB and their Generation and demodulation, FDM, AM transmitters – High level and low level AM transmitters.

UNIT- II (9+3)

Angle Modulation: Instantaneous frequency - Phase and Frequency Modulation - Single tone FM and its spectral analysis; Direct and indirect (Armstrong's) methods of FM generation; FM Demodulation: Balanced slope detector - Phase discriminator, FM transmitters.

UNIT – III (9+3)

Source Coding Systems: Introduction, Discrete Memory less Source (DMS), Information content of message, Entropy, Information Rate, Source coding - Shannon Fanon Coding and Huffman Coding, Shannon Hartley law, Elements of Digital Communication Systems.

Pulse Digital Modulation: Elements of Pulse-Code Modulation (PCM), Quantization, Noise in PCM systems, Signal to quantization noise ratio, Delta modulation (DM), Adaptive Delta Modulation (ADM).

UNIT – IV (9+3)*(Qualitative Treatment only)*

Baseband Data Transmission: Introduction, Baseband Binary PAM Systems, Inter Symbol Interference (ISI), M-ary Baseband Signaling, Binary versus M-ary Signaling Schemes, Eye diagrams.

Bandpass Data Transmission: Bandpass Data transmission system, Generation, detection and constellation diagrams of Coherent Binary amplitude Shift Keying (BASK), Coherent Binary Phase Shift Keying (BPSK), Coherent Binary Frequency shift keying (BFSK), Quadrature Phase Shift Keying (QPSK).

Text Books:

1 Simon Haykin "Analog and Digital Communication Systems", *John Wiley publications, 2nd edition, 1988 (Chapters 3, 4, 5, 6, 7).*

2 K.Sam Shanmugam "Digital and Analog Communications", *John Wiley and sons pvt Ltd., 1st edition,2012 (Chapter 5&8).*

Reference Books:

1 Bruce Carlson "Communication Systems", *McGraw Hill*, 1988

2 P.Chakrabarthi "Analog and Digital Communication Systems", *Dhanpatrai & Co*., 2005

3 R.P.Singh and S.D.Sapre " Communication System", *TMH*, 2008

4 Taub and Schilling " Principles of Communications", *McGraw Hill*, 2009

Course Learning Outcomes(Cos):

Upon completion of this course, students will be able to….

CO1. explain and analyze various AM & FM modulation and demodulation techniques.
CO2. describe various AM & FM transmitters and receivers.
CO3. explain Pulse Digital Modulation techniques and solve problems on source coding techniques
CO4. discuss baseband binary data transmission system techniques

U14EI607 SIMULATION LABORATORY

Class: B.Tech. VI-Semester **Branch**: Electronics & Instrumentation 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 on/in

LO1: simulation and testing of analog circuits using Multisim.
LO2: design and Simulation of digital circuits using Verilog HDL.
LO3: layout design and simulation of simple MOS Circuits.

List of Experiments

1 Simulation and Testing of Differentiator/Integrator using Multisim.
2 Simulation and Testing of Adder/Subtractor using Multisim
3 Simulation and Testing of Multivibrators (555 Timer) using Multisim.
4 Simulation and Testing of BJT Amplifiers using Multisim.
5 Simulation and Testing of Oscillators using Multisim.
6 Simulation and Testing of Instrumentation Amplifier using Multisim.
7 Design and Simulation of Combinational Circuits using Verilog HDL.
8 Design and Simulation of Sequential Circuits using Verilog HDL.
9 Simulation and Synthesis of Full Adder using Verilog HDL.
10 Layout and Simulation of CMOS Inverter.
11 Layout and Simulation of NMOS NAND Gate.
12 Layout and Simulation of CMOS XOR Gate

Laboratory Manual:

1 "Simulation Laboratory Manual" *prepared by Dept of E& I Engg.*

Text books:

1 D.Roy Choudhury, Shail B.Jain," Linear Integrated Circuits", 4th edn., *New Age International Pvt. Ltd*. 2010, New Delhi.

2 J. Bhaskar, "VHDL Primer", 3rd edn., *Prentice Hall of India*, 2009, New Delhi.

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to

CO1: simulate and test analog circuits using Multisim.
CO2: design and simulate digital circuits using Verilog HDL.
CO3: design layouts and simulate simple MOS circuits.

U14EI608 MICROCONTROLLERS AND EMBEDDED SYTEMS LABORATORY

Class: B.Tech. VI-Semester **Branch**: Electronics & Instrumentation 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 on/in

LO1: microcontroller programming using assembler and Embedded C using keil software
LO2: programs for arithmetic, logical and data processing operations
LO3: interfacing of various i/o and application modules to 8051 microcontroller through simulations using Keil and PROTEUS software

List of Experiments

1. Assembly Language Programs (ALPs) / Embedded 'C' Programs (ECPs) for implementing arithmetic operations (Addition, Subtraction) on single and double precision binary data
2. ALPs / ECPs for implementing arithmetic operations (Multiplication, Division) on single and double precision binary data
3. ALP / ECP for sorting array of numbers in ascending / descending order
4. ALP / ECP for searching largest / smallest numbers in an array
5. ALP /ECP for generating specified time delay
6. ALP / ECP for matrix key board interfacing
7. ALP / ECP for seven segment display interfacing
8. ALP / ECP for LCD interfacing
9. ALP / ECP for stepper motor interfacing
10. ALP / ECP for DC motor interfacing
11. ALP / ECP for DAC interfacing
12. ALP / ECP for ADC interfacing

Laboratory Manual:

1 "Microcontrollers & Embedded sytems laboratory Manual" *prepared by Dept of E& I Engg.*

Text books:

1 Mazidi, "The 8051 Microcontroller And Embedded Systems Using Assembly And C", , *Pearson Education India,* 2nd edition, 2011.

2 J. Bhaskar, "VHDL Primer", 3rd edn., *Prentice Hall of India*, 2009, New Delhi.

Course Learning Outcomes(COs):

Upon completion of this course, students will be able to

CO1: develop assembly language and Embedded C programs for 8051 microcontroller under Keil environment
CO2: implement programs for various arithmetic, logic and data processing applications using Keil software
CO3: develop interfacing programs and can simulate and synthesize in PROTEUS environment for 8051

U14EI609 MINI PROJECT

Class: B.Tech. VI-Semester **Branch:** Electronics & Instrumentation 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):

Upon 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 – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION AND EVALUATION

VII-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & INSTRUMENTATION ENGINEERING

S. No.	Course Category	Course Code	Course Name	Periods/week			Credits (C)	Evaluation Scheme				
								CIE			ESE	Total Marks
				L	T	P		TA	MSE	Total		
1.	HS	U14MH701	Management, Economics and Accountancy	3	1	-	4	15	25	40	60	100
2.	PC	U14EI702	Bio Medical Instrumentation	3	1	-	4	15	25	40	60	100
3.	PE	U14EI703	Professional Elective-II	3	1	-	4	15	25	40	60	100
4.	PE	U14EI704	Professional Elective-III	4	-	-	4	15	25	40	60	100
5	ES	U14IT709	Data Structures	4	-	-	4	15	25	40	60	100
6.	PC	U14EI705	Virtual Instrumentation Laboratory	-	-	3	2	40	-	40	60	100
7.	ES	U14IT710	Data Structures Laboratory	-	-	3	2	40	-	40	60	100
8.	PR	U14EI706	Major Project Work *Phase-I*	-	-	7	4	100	-	100	-	100
			Total	**17**	**3**	**13**	**28**	**255**	**125**	**380**	**420**	**800**

Professional Elective-II :

U14EI 703A: Computer Control of Processes
U14EI 703B: Data Communication Networks
U14EI 703C: Non Destructive Testing

Professional Elective-III :

U14EI 704A: Analytical Instrumentation
U14EI 704B: Fiber Sensors and LASER Instrumentation
U14EI 704C: Micro-Electro Mechanical .Systems

Student Contact Hours/Week : 33
Total Credits : 28

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.

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):

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

CO 1: judge the differences between practical and theoretical management.
CO 2: associate an idea of Micro, Macro Economics and Forms of Business Organisations
CO 3 distinguish between Journal and Ledger.
CO 4: assess the profits and losses & financial position through the Balance Sheet.

U14EI702 BIOMEDICAL INSTRUMENTATION

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation 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: origin of bio-potentials and electrodes for bio potential sensing
LO2: origin and recording of bio-electric signals
LO3: bio electric amplifiers and measurement of non-electrical parameters
LO4: respiratory instruments and electrical safety in the medical environment

UNIT - I (9+3)

Introduction: The human body an overview; Generalized medical instrumentation system, Medical measurement constraints.
Origin of Bio-Potentials: Electrical activity of cells, volume conductor fields, Functional organization of the peripheral nervous system, Electroneurogram (ENG), Electromyogram(EMG), Electroretinogram (ERG), Electrodes for biophysical sensing surface electrodes, Micro electrodes.

UNIT- II (9+3)

Electrocardiography: Physiology of heart and circulatory system, Electro conduction system of the heart, ECG waveform, Standard lead system, Block diagram of electrocardiograph, ECG preamplifier, Problems frequently encountered in ECG design, Common mode and other interference reduction circuits, Abnormal ECG waveforms.
Electroencephalography: Anatomy and function of brain, EEG 10-20 electrode system, EEG amplitude and frequency bands, EEG recording modes, EEG diagnostic uses and sleep patterns.

UNIT - III (9+3)

Bio-Electric amplifiers: Isolation amplifier need, Types - Chopper stabilized Amplifier and Physiological signals input guarding.
Blood pressure measurement: Spygmomanometry, Ultrasonic method, Oscillometric method, Direct methods, Systolic, Diastolic and Mean detector circuits, Practical problems in pressure monitoring.
Blood flow measurement: Cardiac output measurement using dilution methods, Electromagnetic flow meter, Ultrasonic flow meter, Plethysmography.

UNIT - IV (9+3)

Respiratory measurements: Mechanics of breathing, Respiratory system measurements, Impedance pneumograph, Spirometer, Pulse oximetry, Blood glucose sensors.
Electrical safety: Physiological effects of electricity, Macro shock hazards, Micro shock hazards, protection ; Distribution and Equipment.

Text Books:

1. John G. Webster "Medical Instrumentation: Application and Design", 3rd edn., *Wiley India Edition,* 2008. *(Chapters 1,4,5,6,7,8,9,14)*
2. Joseph J. Carr and John M. Brown "Introduction to Biomedical Equipment Technolog", 4th edn., *Pearson Education,* 2000. *(Chapters 1,2,6,7,8,9,10,13)*

Reference Books:

1 Cromwell Leslie , Weibell Fred J. , Pfeiffer Eric A. "Biomedical Instrumentation and Measurements", 2nd edn., *PHI Learning,* 1990.

2 Mandeep Singh, "Introduction to Biomedical Instrumentation", *PHI Learning,* 2010.

3 R. S Khandpur and Raghbir Khandpur "Biomedical Instrumentation" *TMH, Professional.* 2004.

Course Learning Outcomes (COs):

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

CO1: explain the origin of biopentials and their sensing using electrodes

CO2: depict the physiology of heart & brain and explain the operation of ECG & EEG recording systems

CO3: explain the operation of bioelectric amplifiers and other devices used for the measurement of blood pressure & blood flow

CO4: list out electrical safety measures in biomedical applications

U14EI703A COMPUTER CONTROL OF PROCESSES

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation Engineering

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 on/in…

LO1: centralized computer control system, direct digital control system and intelligent control systems
LO2: discrete state process control, programmable logic controller (PLC) and programming & networking of PLC
LO3: supervisory control and data acquisition system (SCADA), smart sensor based systems, industrial communication and field buses
LO4: architecture & communication facilities of distributed control system and implementation of automated control for various industrial control applications

UNIT- I (12)

Computers in process control: Expectations from automation, Basic functions, Historical development of control systems, Current trends in computer control of process plants, Functional block diagram of centralized computer control system (CCS); Digital controllers - Components and working of Direct Digital Control (DDC), Benefits of DDC; Digital controller realization - Position and Velocity control algorithms.
Intelligent control systems: AI based systems, Features of intelligent control, Definition of AI, Achievements and Future of AI; Expert systems - Features and Capabilities, Advantages and Disadvantages, Structure, Rule based systems Vs Case based reasoning systems, Forward and backward search strategies.

UNIT - II (12)

Discrete state process control: Comparison between continuous control and discrete control, composite discrete/continuous control, Examples**,** Process specifications, Process objectives, Process hardware, Event sequence description
Programmable Logic Controller (PLC): Basic parts and operation of PLC, Basic symbols used in PLC realization, Relay logic and ladder logic, Ladder commands, Examples of PLC ladder diagram realization, Timers and Counters of PLC, Requirement of communication networks for PLC, Connecting PLC to computer.

UNIT - III (12)

Supervisory control and Data acquisition system (SCADA): Elements of SCADA system, History and benefits of SCADA, SCADA hardware and software, Remote Terminal Unit (RTU), Master station and HMI computer(s) and Communication infrastructure.
Industrial communication and field buses: Introduction; Smart sensor based systems - Smart sensors, Smart transmitters and Smart positioner for control valves; Field bus systems - Field bus structure, Basic requirements and Network topology, HART communication protocol, Factory instrumentation protocol.

UNIT - IV (12)

Distributed control systems (DCS): Comparison of centralized and decentralized systems, Evolution and importance of DCS, Architecture of DCS, Communication facilities for DCS, Display systems in DCS.

Industrial control applications *(Block Diagram Approach)***:** Cement plant, Thermal power plant, Water treatment plant.

Text Books:

1 Y. Krishnakant, "Computer Based Industrial Control", *PHI,* 2/e, 2010. *(Chapters 1,6,7,10,12,13)*

2 Surekha Bhanot, "Process Control: Principles And Applications", *Oxford University Press,* 6/e, 2011. *(Chapters 7, 13 to 16)*

Reference Books:

1 C.D. Johnson, "Process Control Instrumentation Technology", *PHI*, 4/e, 1996.

2 John W. Webb and Ronald A. Reis, "Programmable Logic Controllers: Principles and Applications", *PHI*, 5/e, 2010.

3 Stuart. A. Boyer, "SCADA: Supervisory Control and Data Acquisition", *ISA Press*, 2/e, USA, 1999.

4 S.K. Singh, "Computer Aided Process Control", *PHI*, 3/e, 2005.

Course Learning Outcomes (COs):

Upon completion of this course, students' will be able to…

CO1: explain about current trends in computer control of process plants and identify CCS, DDC & intelligent control systems

CO2: implement & interpret ladder programs for PLC based discrete state process control systems

CO3: describe and analyze smart control systems and communication protocols implemented in industry

CO4: identify & summarize the use of PLC, SCADA and DCS at various operational levels for optimum plant performance

U14EI703B DATA COMMUNICATION NETWORKS

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation Engineering

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: the fundamental concepts of computer networking
LO2: internet protocols such as HTTP, TCP/IP,UDP etc
LO3: various types of routing algorithms
LO4: data security and high speed data transfer methods

UNIT- I (12)

Introduction: Data Communication, Networks, Protocols and Standards, Topology, Categories of Networks, OSI & TCP/IP Protocol suites

Physical layer: Transmission modes, DTE-DCE Interface, Modems, Guided media, Unguided media, Performance, Multiplexing, Switching, DSL, FTTC.

UNIT- II (12)

Data link layer: Data Link Control - Line discipline, Flow control, Error control; Data Link protocols – Asynchronous Protocols, Synchronous protocols, Character oriented protocols, Bit oriented protocols, Link Access Procedures

LANs and MANs: Project 802, Ethernet, Token Bus, Token Ring, FDDI, Fast Ethernet, Gigabit Ethernet, DQDB, SMDS, PPP, IEEE 803.11, WiFi, WLANs, WiMAX , Bluetooth

UNIT- III (12)

Network layer: Repeaters, Bridges, Hubs, Switches, Routers, Gateways, Routing algorithms - Shortest path routing, Distance vector routing, Link state routing; X.25 layers and protocols, Congestion control - Leaky bucket algorithm, TCP/IP Protocol Suite- IP protocol, IP addresses, Subnetting, ARP, RARP; ICMP, ISDN Services and channels, Broadband ISDN, ATM- Design goals, architecture and layers

Session layer: Design issues, Remote procedure cell.

UNIT -IV (12)

Presentation layer: Data compression techniques, Cryptography techniques

Transport layer: Duties of Transport layer, Transport connection, OSI Transport protocol, TCP, UDP

Application layer: BOOTP and DHCP, DNS, TELNET, FTP, SMTP, HTTP, WWW, VoIP, Four aspects of Network security, Firewalls, Privacy, Digital Signatures

Text Books :

1. Behrouz A. Forouzan " Data Communications and Networking " , 5th edition, Tata McGraw-Hill, New Delhi, 2012

Reference Books:

1 Andrew S. Tanenbaum, "Computer Networks " , 4th edition , PHI, New Delhi, 2000

2 Willium Stallings, " Data and Computer Communications " , PHI, 6th edition, New Delhi

3 Douglas E Comer," Computer Networks and Internet " , Pearson Education, Asia, 2000.

Course Learning Outcomes (COs):

Upon completion of this course, students ' will be able to…

CO1: identify the various issues and challenges in the architecture of a computer network
CO2: analyze the ISO/OSI seven layers in a network
CO3: realize protocols at different layers of a network hierarchy
CO4: evaluate security issues in a network

U14EI703C NON DESTRUCTIVE TESTING

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation Engineering

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: radiography and radiographic test procedure.
LO2: ultrasonic testing of materials.
LO3: liquid penetrant testing and magnetic particle testing methods.
LO4: eddy current, acoustic emission, thermal infrared and holographic testing methods.

UNIT - I (12)

Introduction: Introduction to Nondestructive testing and valuation technology- An overview, Materials, manufacturing processes and Nondestructive testing materials.
Radiographic Testing: Sources of X and Gamma rays and their interaction with matter, Equipment, Radiographic procedure, Radiographic technique and acceptance standard, Special radiographic techniques, Safety aspects in radiographic testing.

UNIT - II (12)

Ultrasonic testing of materials: Principle of wave propagation , Reflection, Refraction, Diffraction, Mode conversion and attenuation, Sound field, Piezo-electric effect, Ultrasonic transducers and their characteristics, Ultra sonic equipment and Variables affecting ultrasonic test, Ultrasonic testing, Calibration standards, Interpretations and Guidelines for acceptance and rejection, Effectiveness and Limitations of ultrasonic testing.

UNIT- III (12)

Liquid penetrant test: Basic concepts, Liquid penetrant system, test procedure, Effectiveness and limitations of liquid penetrant testing.
Magnetic Particle Test: Magnetic materials, Magnetization and Demagnetization of materials, Principle of magnetic particle test, Test equipment and procedure, Standardization and Calibration, Interpretation and Evaluation, Effectiveness and limitations.

UNIT - IV (12)

Eddy current testing: Principle of eddy current, Eddy current test system, Applications of eddy current testing, Effectiveness of eddy current testing.
Other Testing Methods: Thermal infrared testing, Acoustic emission testing, Leak testing, Holographic nondestructive testing, Industrial applications of Nondestructive Testing and Evaluation.

Text Books:

1 J Prasad and CGK Nair, "Non destructive Test and Evaluation of materials", 2nd edn., *TMH* , 2011. (Chapters 1 to 9)

2 Peter J Shull, "Nondestructive Evaluation: Theory, Techniques and applications", *Marcel Dekker, Inc.,* New York, 2001. (Chapters 2 to 8, 10)

Reference Books:

1 Krautkramer, Josef and Hebert Krautkramer, "Ultrasonic Testing of Materials", 3rd edn., *Springer- Verlag*, New York, 1983.

2 American Metals Society, "Non-Destructive Examination and Quality Control", *Metals Hand Book:* Vol. 19, 9th edn., OH, 1989.

3 Jack Blitz, "Electrical and Magnetic Methods of Nondestructive Testing", *Springer Publications*, 1979.

Course Learning Outcomes (COs):

Upon completion of this course, students' will be able to…

CO1: apply radiography to test materials.
CO2: illustrate ultrasonic testing procedure and interpret the results
CO3: apply liquid penetrant and magnetic particle methods for testing materials.
CO4: describe eddy current, acoustic emission, thermal infrared and holographic testing methods

U14EI704A ANALYTICAL INSTRUMENTATION

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation Engineering

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: UV and Visible absorption spectroscopy
LO2: principles and applications of analytical methods like IR spectroscopy NMR and ESR
LO3: mass spectrometry, chromatography and electrochemical methods and applications
LO4: environmental pollution monitoring instruments and radiation detectors

UNIT - I (12)

Introduction to instrumental methods: Classification of analytical methods, Types of instrumental methods, Instruments for analysis.

Concepts in spectroscopy: Properties of electromagnetic radiation, Electromagnetic spectrum, Different types of molecular energies, Interaction of radiation with matter, Types of molecular, Atomic spectra (qualitative).

UV-Visible absorption spectroscopy: Radiation sources, Optical filters, Monochromators, Sample holders, Detectors, Beer-Lambert law and deviations, Filter photometers, Single and double beam spectrophotometers.

UNIT - II (12)

Infrared spectroscopy: Sources, Detectors, FTIR spectrophotometer.

Flame emission spectroscopy: Principle, Constructional details of Flame photometer, Single beam and double beam flame photometers, Clinical flame photometer, Interferences in flame photometry.

NMR spectroscopy: Basic principles, continuous wave NMR spectrometer, Pulsed fourier transform NMR spectrometer.

Electron spin resonance spectroscopy: Electron spin resonance (ESR), ESR spectrometer.

UNIT - III (12)

Mass spectrometry: Principle, Inlet sample systems, Ionization methods, Mass analyzers, Ion-collection systems, Resolution, Fourier transform mass spectrometry**.**

Chromatography: Classification, General principles, Column efficiency and Resolution, Column processes and band broadening, Quantitative determinations, Gas and Liquid chromatography, Column packing, sample injection techniques, detectors.

pH meters: Principle of pH measurement, Electrodes, pH meters

UNIT - IV (12)

Industrial gas analyzers: Types of gas analyzers, Paramagnetic oxygen analyzer, Infrared gas analyzer, Thermal conductivity analyzer.

Air pollution monitoring instruments: Types and Concentration of various pollutants, Measurement techniques for carbon monoxide, Sulphur dioxide, Hydrocarbons and Ozone.

Water pollution monitoring instruments: Types of pollutants, Measurement Techniques-Conductivity, Turbidity and Nephelometry.

Radiation detectors: Ionization chamber, Geiger-Muller counter, Proportional counter, Scintillation counter.

Text Book:

1 R.S. Khandpur "Hand Book of Analytical Instruments", 2nd edn., *Tata-McGraw-Hill*, 2007. (Chapter 1 to 4, 9 to 11, 13, 16, 17, 23 and 24)

Reference Books:

1 Willard, Merritt, Dean, Settle "Instrumental Methods of Analysis", 7th edn., *CBS Publisher*, 1989.

2 D.A. Skoog and D.M. West, "Principles of Instrumental Analysis", 2nd edn., *Holt Saunder's publication*, 1998, Philodelphia.

3 B G Liptak "Analytical Instrumentation" *Chilton book Company.*

Course Learning Outcomes (COs):

Upon completion of this course, students' will be able to…

CO1: measure the absorption coefficient of a solution using UV-Visible absorption spectroscopy
CO2: analyze the samples of matter with IR spectroscopy, flame emission, NMR and ESR
CO3: illustrate the principles of mass spectrometry, chromatography and electrochemical methods
CO4: describe the principles of environmental pollution monitoring instruments and radiation detectors

U14EI704B FIBER SENSORS AND LASER INSTRUMENTATION

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation Engineering

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 of lasing action and types of lasers
LO2: different applications of Lasers
LO3: fundamentals of fiber optics and optoelectronic sources and detectors
LO4: types of fiber sensors and applications

UNIT – I (12)

Laser theory: Einstein coefficients, Light amplification, Threshold condition, Laser rate equations - Two level system, Three level system, Four level system; Properties of laser -Laser beam characteristics, Coherence properties of laser light.

Laser systems: Ruby laser, He-Ne laser, Nd-based lasers, CO_2 laser.

UNIT – II (12)

Laser applications: Measurement of distance - Interferometric methods, Beam modulation telemetry, LIDAR; Principle of holography, Holographic interferomety, Ring laser gyro, Laser doppler velocimetry, Lasers in information storage, Barcode scanner; Interaction of high power laser radiation with materials – laser applications in material processing, Lasers in electronic fabrication.

UNIT – III (12)

Optical fibers: Types of optical fibers, Ray propagation in step index fibers, Ray propagation in graded index fibers, Effect of material dispersion, Single mode and multimode fibers (qualitative only), Fiber materials, Attenuation mechanisms.

Optical sources and detectors: Light emitting diode - Injection luminance, LED materials, Quantum efficiency; Laser Diode - Laser action in Semiconductors; Basic principle of optoelectronic detection, Photo current, Responsivity, Types of photodiodes.

UNIT – IV (12)

Fiber sensors: Advantages of fiber optic sensors, Configuration of fiber-optic sensors, Classification, Intensity modulated sensors - Schlieren/ shutter type, Reflective type, microbend type and their applications; Metal clad waveguide type sensors and their applications, Phase modulated sensors - Mach-Zender interferometric sensor and its applications; Fiber optic gyroscope, Spectrally modulated sensors - Fluorescence Temperature sensor; Fiber Bragg grating sensors, Fiber optic current sensors.

Text Books:

1 Thyagarajan K and Ghatak A.K., "Lasers: Fundamentals and Applications", *Springer Publications*, 2nd edn., 2010. (Chapters 4, 5, 10, 11, 19)

2 R.P. Khare, "Fiber Optics and Optoelectronics", *Oxford Press*, 2004. (Chapters 2, 3, 5, 7, 8, 13)

Reference Books:

1 John F Ready, "Industrial applications of Lasers", *Academic Press*, 1997.

2 J Wilson And JFB Hawkes, "Optoelectronics : An Introduction", 2nd edn, *PHI*, 2000.

3 Bishnu P. Pal, "Fundamentals of Fiber Optics in Telecommunication and Sensor Systems", *Wiley-Blackwell*, 1993.

4 Gerd Keiser, "Optical Fiber Communications", *McGH,* 3rd edn., 1999.

5 Thyagarajan K and Ghatak A.K., "Fiber Optic Essentials", *John Wiley & Sons*, 2007.

Course Learning Outcomes(COs):

Upon completion of the course, the student will be able to…

CO1: explain the basic principles that are involved in the generation of laser light and discuss various types of specific lasers, such as He-Ne laser, the CO2 laser and several other lasers
CO2: discuss a number of important applications of lasers
CO3: describe the fundamentals of optical fibers and operation of various light sources and detectors
CO4: describe the operation and applications of different types of fiber sensors

U14EI704C MICRO ELECTRO MECHANICAL SYSTEMS

Class: B.Tech. VII-Semester

Branch: Electronics & Instrumentation Engineering

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 on/in…

LO1: materials and fabrication techniques for MEMS
LO2: packaging techniques for MEMS and applications of MOEMS
LO3: various magnetic sensors and actuators
LO4: micro fluidic, chemical and bio medical micro systems

UNIT - I (12)

MEMS: Introduction, Materials for MEMS, Metal and its alloys for MEMS, Polymers for MEMS, Overview, Microsensors, Microactuators, Microelectronics fabrication, Micromachining, Types of MEMS- Mechanical, Thermal, MOEMS, Magnetic, RF MEMS; Micro fluidic systems, Bio and Chemical devices.

Micromachining: Introduction, Bulk micromachining of silicon, Surface micromachining of silicon, Wafer bonding for MEMS, LIGA Process, Micromachining of polymeric MEMS, Photolithography, Other lithography methods, Thin films for MEMS and their deposition techniques, Microstereolithography for Polymer MEMS.

UNIT - II (12)

Integration and packaging for MEMS devices: Role of MEMS packages, Types of MEMS packages-Flip-chip assembly, Multichip module packaging, RF MEMS packaging; Reliability issues.

Micro-Opto-Electromechanical systems (MOEMS): Fundamental principle of MOEMS technology, Light modulators, Beams splitter, Microlens, Micromirrors, Digital micromirror device, Light detectors, Grating light valve, Optical switch, Waveguide and Tuning, Shear, Stress measurement.

UNIT - III (12)

Magnetic sensors and actuators: Magnetic materials for MEMS and Properties, Magnetic sensing and Detection, Magnetodiodes, Magnetotransistor, MEMS magnetic sensor, mag MEMS actuator, Bidirectional microactuator.

RF MEMS: Review of RF Based communication system, MEMS: Inductors, Varactors, Tuner/filter, Classification of tuner, Filter, and Resonator, MEMS switches.

UNIT - IV (12)

Microfluidic systems: Properties of fluids, Analytical expression for liquid flow in channel, Fluid actuation method, Dielectrophoresis, Electro wetting, Electro thermal flow, Thermo capillary effect, Electroosmosis flow, Optoelectro wetting, Tuning using microfluids, Microfluid dispenser, Microneedle.

Chemical and biomedical micro systems: Sensing mechanism, Chem-Lab-On-A-Chip(CLOC), Chemoresistors, Chemotransistors, Chemocapacitors, Electronic nose, DNA sensor, Mass sensitive Chemosensors, Calorimetric spectroscopy, Surface acoustic wave (SAW) sensors.

CNT and nanotechnology: Nanotechnology materials, Fullerenes, Carbon nanotube(CNT), Development of CNTs and applications.

Text books:

1 N P Mahalik, "MEMS", *Tata McGraw Hill*, 2008, New Delhi. (Chapter 1,2,7 to 12)

2 Vijay K Vardhan, K.J.Vinoy and K A Jose, "RF MEMS & Their Applications", *John Wiley & Son Ltd.*, 2003. (Chapter 3,9)

Reference Books:

1 Julian w. Gardner, Vijay K. Varadan and Osama O. Awadelkarim, "Micro Sensors MEMS and Smart Devices", *John Wiley & Son LTD,* 2002.

2 James J. Allen, "Micro Electro Mechanical System Design", *CRC Press Publisher*, 2005.

3 Nadim Maluf, "An Introduction to Micro Electro Mechanical System Design", *Artech House,* 2000.

4 Nicolae Lobontiu and Ephrahim Garcia, "Mechanics of Microelectromechanical Systems", *Kluwer Academic Publishers, springer*, 2005.

Course Learning Outcomes (COs):

Upon completion of this course, students' will be able to…

CO1: explain materials used for MEMS and lithography techniques for micro systems
CO2: describe packaging techniques for MEMS and applications of MOEMS
CO3: explain various magnetic sensors and actuators
CO4: explain the applications of micro systems for optical and biomedical fields

U14EI709 DATA STRUCTURES

Class: B.Tech. VII-Semester

Branch: Electronics & Instrumentation 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.

Text Books:

1 Ellis Horowitz, Sartaj Sahani, Dinesh Metha, "Fundamentals of Data Structures in C++", *Universities Press*, 2nd edition, 2008.

2 Varsha H.Patil, "Data Structures Using C++", Oxford University Press, 1st edition, 2012. (Chapters 9 & 11)

Reference Books:

1 D. Samanta, "Classic Data Structures", PHI, 2nd edition, 2009.

2 Mark Allen Weiss, "Data Structure & Algorithm Analysis in C++", Pearson Education, 3rd Edition, 2007.

Course Learning Outcomes (COs):

Upon 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

U14EI705 VIRTUAL INSTRUMENTATION LABORATORY

Class: B.Tech. VII-Semester **Branch**: Electronics & Instrumentation 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: LabVIEW Programming
LO2: analysis tools for Process control applications
LO3: interfacing and data acquisition methods

List of Experiments

1 Program to create a simple calculator
2 Program using various data flow in LABVIEW
3 Program with subVIs
4 Program with loops and structures
5 Program with data arrays, clusters and variables
6 Program for plotting data and create a "Virtual Instrument"
7 Program to measure temperature using thermocouple and DAQ
8 Program to measure temperature using RTD and DAQ
9 Program to measure strain using strain gauge and DAQ
10 Program to measure displacement using LVDT and DAQ
11 Program to develop a sequential control using state diagrams and state machines in LabVIEW
12 Program a PID controller with LabVIEW

Laboratory Manual:

1 "Virtual Instrumentation Laboratory Manual" *prepared by Dept of E& I Engg.*

Course Learning Outcomes (COs):

Upon completion of this course, students' will be able to…

CO1: get practical knowledge on LabVIEW programming techniques
CO2: write a program in LabVIEW using various data structures, program structures, plotting the graphs and charts for system monitoring, processing and controlling
CO3: apply data acquisition and interfacing techniques of virtual instrumentation for different process control mechanisms

U14IT710 DATA STRUCTURES LABORATORY

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation 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 Department of IT.*

Text Books:

1. Ellis Horowitz, Sartaj Sahani, Dinesh Metha, "Fundamentals of Data Structures in C++", *Universities Press*, 2nd edition, 2008.
2. Varsha H.Patil, "Data Structures Using C++", *Oxford University Press*, 1st edition, 2012. (Chapters 9 & 11).

Course Learning Outcomes (COs):

Upon 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

U14MH706 MAJOR PROJECT WORK *PHASE-I*

Class: B.Tech. VII-Semester **Branch:** Electronics & Instrumentation 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 to 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):

Upon 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
CO2: 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 – 506015

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION AND EVALUATION

VIII-SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & INSTRUMENTATION ENGINEERING

S. No.	Course Category	Course Code	Course Name	Periods/week			Credits (C)	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	OE	U14OE801	Open Elective-II	4	-	-	4	15	25	40	60	100
2.	PC	U14EI802	Bio-Medical Signal Processing	3	1	-	4	15	25	40	60	100
3.	PE	U14EI803	Professional Elective-IV	4	-	-	4	15	25	40	60	100
4.	PE	U14EI804	Professional Elective-V	4	-	-	4	15	25	40	60	100
5.	PC	U14EI805	Process Control Laboratory	-	-	3	2	40	-	40	60	100
6.	PC	U14EI806	Bio Medical Instrumentation Laboratory	-	-	3	2	40	-	40	60	100
7.	PR	U14EI807	Major Project Work *Phase-II*	-	-	13	7	40	-	40	60	100
			Total	**15**	**1**	**19**	**27**	**180**	**100**	**280**	**420**	**700**

Open Elective-II

U14OE 801A:	Operations Research
U14OE 801B:	Management Information Systems
U14OE 801C:	Entrepreneurship Development
U14OE 801D:	Forex And Foreign Trade

Professional Elective-IV

U14EI 803A:	PC Based Instrumentation
U14EI 803B:	Advanced Digital Signal Processing
U14EI 803C:	Internet of Things
U14EI 803D:	CPLD and FPGA Architectures

Professional Elective-V

U14EI 804A:	Industrial Electronics
U14EI 804B:	Data Base Management Systems
U14EI 804C:	Digital Control Systems
U14EI 804D:	Automotive Instrumentation

Student Contact Hours/Week : 35
Total Credits : 27

U14OE801A OPEARTIONS RESEARCH

Class: B.Tech. VIII-Semester **Branch:** E&I, EEE, IT and ECE

Teaching Scheme:

L	T	P	C
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.

Text Books:

1. Kanti swarp,P.K.Gupta, Man Mohan, "Operations Research", *S. Chand & Sons*, New Delhi. 16th edn., 2013. (*Unit I,II,IV*)

2. S.S. Rao, "Optimization Techniques", *New Age International*, New Delhi, 3rd edn., 2013. (*Unit III*)

Reference Books:

1. Hamdy. A. Taha, Operations Research, *Prentice Hall of India Ltd,* New Delhi, 7th edn., 2002.

2. J.C. Pant, "Introduction to Optimization", *Jain Brothers*, New Delhi, 7th edn., 2012.

Course Learning Outcomes (COs):

Upon 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:** E&I EEE, ECE and IT

Teaching Scheme:

L	T	P	C
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.

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):

Upon 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, ECE and IT

Teaching Scheme:

L	T	P	C
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.

Text Books:

1. Robert D.Hisrich, Michael P. Peters, "Entrepreneurship", *Tata McGraw-Hill*, 5th Edition 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):

Upon 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:** E&I, EEE, IT and ECE

Teaching Scheme:

L	T	P	C
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.

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):

Upon 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

U14EI802 BIOMEDICAL SIGNAL PROCESSING

Class: B.Tech. VIII-Semester

Branch: Electronics & Instrumentation 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 on/in…

LO1: techniques required for Time / Frequency domain analysis and synthesis of Biomedical Signals
LO2: ECG morphology, Signal detection and Data Reduction in Cardiac Signal processing
LO3: analysis and use of adaptive filters for elimination of various ECG Artifacts
LO4: EEG morphology, Data segmentation, transient detection and elimination in Neurological signal processing

UNIT - I (9+3)

Introduction to Computers in Medicine: Characteristics of medical data , Medical instrumentation system , Medical care system ,Microcomputer based medical instrument.
Signal Conversion: Sampling basics , Simple signal conversion system , Conversion requirements for Bio medical signals
Signal Averaging: Basics of signal averaging , signal averaging as a digital filter, typical averager, limitations of signal averaging
Time and Frequency Domain Techniques: Fourier transform, Correlation, Convolution , Power spectrum estimation

UNIT -II (9+3)

Cardiological Signal Processing: Review of ECG, ECG data acquisition, ECG parameters for analysis, ECG QRS detection techniques -Template matching technique and Matched filter technique , Pan Tompkins algorithm , Arrhythmia detection and analysis
ECG Data Reduction Techniques: Direct data compression techniques: TP algorithm, AZTEC algorithm, CORTES algorithm & FAN algorithm, K-L Transform based compression technique , Entropy coding based compression technique , Comparison of ECG data compression techniques

UNIT -III (9+3)

Adaptive Techniques for Signal Analysis: Review of Adaptive filter theory , LMS Adaptive filter , Wiener filter , Adaptive implementation of Wiener filter , Steepest Descent algorithm , Widrow Hoff LMS algorithm
Applications of Adaptive Noise Canceller (Block Diagram approach)**:** Cancellation of PLI noise in ECG ,Cancellation of ECG from EMG signal , Cancellation of Maternal ECG in fetal ECG , Cancellation of high frequency noise in Electro surgery

UNIT - IV (9+3)

Neurological Signal Processing : Review of EEG signal and its characteristics, Sleep EEG classification and Epilepsy, EEG Analysis- Time and Frequency domain methods , Parametric model of EEG , EEG data segmentation using Auto regressive (AR) method , Levinson Algorithm , Adaptive Segmentation Algorithm, Transient Detection and Elimination in case of Epileptic patient , Least Squares Prony method , Clinical applications of Prony's method -Modeling of evoked potentials

Text Books:

1. Willis. J. Tompkins, "Biomedical Digital Signal Processing", *PHI*, 5/e, 2003. *(Chapters 1 to 3 and 8 to 13)*
2. D.C. Reddy, "Biomedical Signal Processing: Principles and Techniques", *Tata McGraw Hill*, 1/e, 2005. *(Chapters 4 to 9)*

Reference Books:

1. RangaRaj. M. Rangayyan, "Biomedical Signal Analysis: A Case,study Approach", *John Wiley & sons Inc., 1/e,* 2002.
2. Metin Akay, "Biomedical Signal Processing", *Academic Press Inc.*, USA, 1/e, 1994.
3. Eugene. N. Bruce, "Biomedical Signal Processing and Signal Modeling", *John Wiley India Edn., 1/e,* 2009.
5. Juan Manuel Górriz, Elmar W. Lang and Javier Ramírez, "Recent Advances in Biomedical Signal Processing", *Bentham Science Publishers, 1/e,* 2011.

Course Learning Outcomes (COs):

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

CO1. illustrate basic techniques employed for biomedical signal analysis
CO2. interpret & analyze various ECG detection techniques and summarize compression algorithms employed for ECG signal analysis
CO3. explain adaptive techniques employed for detection and reduction of artifacts in corrupted ECG
CO4. describe various modeling and segmentation techniques used for EEG signal analysis

U14EI803A PC BASED INSTRUMENTATION

Class: B.Tech. VIII-Semester

Branch: Electronics & Instrumentation Engineering

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 on/in…

LO1: PC motherboard components, control logic and basics of writing device drivers
LO2: structure of various expansion Buses, ports and various application boards
LO3: general purpose and PCI Plug in DAQ board through serial and USB buses
LO4: different types of Network data communication such as LAN, WAN and protocols such as TCP/IP, MODBUS and PROFIBUS

UNIT - I (12)

Hardware Organization of IBM PC: Motherboard components, system resources, system and peripheral control chips, expansion buses and I/O ports, peripherals, BIOS services.

UNIT - II (12)

Interfacing to IBM PC: Expansion buses, ISA bus, EISA bus, PCI bus, Parallel port (Standard and Enhanced), Plug in boards, ADC board, DAC board, Digital I/O board, Timing I/O board.

UNIT - III (12)

Plug in Data Acquisition: General purpose plug in DAQ board, PCI plug in DAQ board, PC serial port, internal blocks, registers, system resources for serial port, serial port programming, interfacing to PC serial port ; USB , features, system, transfer, descriptors, Microcontrollers.

UNIT - IV (12)

Network Data Acquisition: Network data communication, LAN, OSI Model, LAN characteristics, LAN types, TCP/IP, Network devices, Wireless LAN; HART Communication, HART Network Communication, Communication modes, protocol layer, device description; Field buses , MODBUS, PROFIBUS.

Text Books:

1 N. Mathivanan, "PC Based Instrumentation", *PHI*, New Delhi, 2007 (Chapters 5, 6, 7, 9 & 10)

Reference Books:

1 Mike Tooley, "PC Based Instrumentation and Control", *3rd Edn.*, Elsevier Butterworth-Heinemann (ROUTLEDGE) 2005.

2 A L Dextar, "Microcomputer Bus Structures and Bus Interface Design", *Taylor & Francis,* 1986.

Course Learning Outcomes (COs):
Upon completion of this course, students will be able to…

CO1: explain PC motherboard components, control logic and basic device drivers
CO2: explain the structure of various expansion buses, ports and design various application boards
CO3: design General purpose and PCI Plug in DAQ boards through serial and USB buses
CO4: explain different types of Network data communication such as LAN, WAN and protocols like TCP/IP,MODBUS and PROFIBUS

U14EI803B ADVANCED DIGITAL SIGNAL PROCESSING

Class: B.Tech. VIII-Semester **Branch:** Electronics & Instrumentation Engineering

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 on /in…

LO1: Non - Parametric methods for PSD estimation and their computational requirements
LO2: Parametric methods for PSD estimation using process modeling
LO3: structure and analysis of uniform DFT and QMF Filter banks and their applications
LO4: limitations of FT and development of CWT and DWT

UNIT – I (12)

Non-Parametric Methods of Power Spectral Estimation: Estimation of Spectra from finite duration observations of a signal, the Periodogram, use of DFT in Power spectral estimation, Bartlett -Welch and Blackman-Tukey methods, comparison of performance of Non-Parametric Power spectrum estimation methods

UNIT – II (12)

Parametric Methods of Power Spectrum Estimation: Autocorrelation and its Properties, Relation between Auto correlation and Model parameters, AR Models - Yule-Walker, Least squares and Burg Methods; MA and ARMA models for power spectrum estimation

UNIT – III (12)

Multirate Filter Banks : Introduction to Multirate techniques, Multistage design of decimator and interpolator, FIR structures based on the polyphase decomposition, Implementation of Digital Filter Banks- DFT filter bank, ploy phase implementation; QMF filter banks- structure and analysis; Applications- Subband Coding of Speech Signals, Trans-multiplexers

UNIT – IV (12)

Wavelet Transforms: Fourier Transform and its Limitations , Short Time Fourier Transform , The Gabor Transform , Continuous Wavelet Transform(CWT) , computation of CWT, Inverse Wavelet Transforms; Discrete Wavelet Transforms, computation of DWT , Subband coding

Text Books:

1 J.G.Proakis & D. G.Manolakis , "Digital Signal Processing, Principles, Algorithms & Applications", 3rd edn., *Pearson India,* 1996.(Chapters 10 and 12)

2 Jaideva C Goswami, Andrew K Chan, "Fundamentals of Wavelets: Theory, Algorithms & Applications", 2nd edn., *John Wiley & Sons, India*, 2010. (Chapters 3 to 5)

Reference Books:

1 Dimitris G. Manolakis,Vinay K. Ingle,Stephen M. Kogon ,"Statistical and Adaptive Signal Processing", *Artech house* London, 2005

2 Sanjit .K. Mitra ,"Digital Signal Processing –A computer based approach", 4th edn., McGraw Hill, 2010

3 P.P.Vaidyanathan ,"Multi Rate Systems and Filter Banks",2nd edn. , Pearson Education,2008

4 E. Mallat, "A Wavelet Tour of Signal Processing", 2nd edn. , Elsevier, Indian edn.

Course Learning Outcomes(COs):

Upon completion of this course, students will be able to

CO1: estimate the PSD using non - parametric methods and compare the techniques in terms of the computations required.

CO2: estimate the PSD using parametric methods using process models

CO3: analyze DFT and QMF filter banks and illustrate simple applications of multirate filter banks

CO4: outline the limitations of FTs and develop CWT / DWT for time / frequency analysis

U14EI803C INTERNET OF THINGS

Class: B.Tech. VIII-Semester
Branch: Electronics & Instrumentation Engineering

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 on/in…

LO1: basic concepts, components and cloud computing of internet of things (IoT)
LO2: popular cloud computing techniques and the Arduino platform used in IoT
LO3: various applications based on sensors & actuators and their interfacing through Arduino for IoT
LO4: principles and practices in internet based IoT

UNIT – I (12)

Internet of things (IoT): Introduction, Basic concepts, Interaction with the internet, Major components if IoT devices, Control units, Sensors, Communication modules, Power sources.
Communication technologies: RFID, Bluetooth, ZigBee, WiFi, RF links, Mobile internet, Wired communication.
Cloud computing: Introduction, Basic services and architectures, Cloud computing components, Cloud computing models and architectures, Benefits of cloud computing, Communicating with the cloud using web services. SOAP and RESTful web services.

UNIT – II (12)

Cloud Computing and IoT: Most popular open cloud computing services for sensor management, Pachube service for internet of things, Nimbits data logging cloud server, Thing speak internet of things, The iDigi device cloud, Sensor cloud.

The Arduino Microcontroller Platform: Microcontrollers, Programming microcontrollers, The Arduino Platform, The Boards, The Anatomy of an Arduino board, The development environment, IDE, Writing Arduino software, The Arduino sketch.

UNIT – III (12)

Arduino for IoT: Arduino emulator, Extending Arduino, The Arduino libraries, Programming Arduino for the internet of things, Using timers, Using threads, Adding security to sensor readings, Authenticating Arduino, Encrypting data.
Reading From Sensors : Sensing the world, Reading from analog sensors, Digital sensors, Sensors with on/off Sates, Using the serial protocol, The Software serial library, Using the I2C protocol, Communicating with a digital pressure sensor, Talking I2C through the Code, Read data from other Arduino board, The SPI protocol, Talking to android phone with Arduino: Connecting Arduino with a mobile device, The Android mobile OS, Communicating using Bluetooth: Hardware, Configure a Bluetooth serial modem, Control a relay switch by texting a phone.

UNIT – IV (9+3)

Connecting Arduino to internet: The Basics of the internet, TCP/IP, IP/MAC addresses, DNS and DHCP, Network sockets, HTTP, Connect Arduino using the ethernet, Arduino ethernet library, A Simple ethernet client example, A Simple ethernet Server Example, Connect Arduino using the Wi-Fi, WiShield library, WiFly shield library, Connect Arduino using a GSM network, Other ways to 'Internetize' Arduino, Using PC as an internet gateway, Java–Processing code, Using the Arduino library for processing, Publish/subscribe notion, Web sockets, The MQTT protocol, Send Arduino data to a cloud application, Google app engine, Building a J2EE web app for Google app engine, Using the ethernet shield.

Text Books:

1 Charalampos Doukas, "Building internet of things with the Arduino", *Create Space Independent Publishing Platform,* 2012. (Chapter 1 to 7)

Reference Books:

1 Adrian McEwen,Hakim Cassimally , "Designing the Internet of Things", *John Wiley and Sons, Ltd.,* 2014.

2 Cuno Pfister, "Getting started with the Internet of Things", *O'Reilly Media, Inc.,* 2011.

Course Learning Outcomes(Cos):

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

CO1: explain basic concepts, components and cloud computing of internet of things (IoT)
CO2: utilize different cloud computing techniques and the Arduino platform used in IoT
CO3: describe various applications based on sensors & actuators and their interfacing through Arduino for IoT
CO4: explain the interfacing of Arduino to internet for IoT

U14EI803D CPLD and FPGA ARCHITECTURES

Class: B.Tech. VIII-Semester
Branch: Electronics & Instrumentation Engineering

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: architectures and comparison of various PLDs
LO2: features of FPGAs and their case studies
LO3: Finite State Machine design
LO4: front end tools for FPGAs and ASICs

UNIT - I (12)

Programmable Logic: Read Only Memory (ROM), Programmable Logic Array (PLA)/Programmable Array Logic (PAL), Sequential Programmable Logic Devices (PLDs), Programmable Gate Arrays (PGAs) , Features, Programming and applications using Complex Programmable Logic Devices (CPLDs) , Altera series , Max 5000/7000 Series and ALTERA FLEX Logic , 10000 Series CPLDs. AMD's , CPLD (Mach 1 to 5); Cypres FLASH 370 Device Technology, Lattice pLSI's Architectures , 3000 Series , Speed Performance and in system programmability

UNIT - II (12)

Finite State Machines (FSM):Top down Design , State Transition Table, state assignments for FPGAs, Problem of initial state assignment for one- hot encoding. Derivations of state machine charts, Realization of state machine charts with a PAL, alternative realization for state machine chart using microprogramming, Linked state machines, one - hot state machine, Petrinetes for state machines , basic concepts, properties, extended petrinetes for parallel controllers, Finite state machine , Case Study, Meta stability, synchronization, HDL Simulation using VHDL/Verilog , Different descriptions, Simulation cycles, Process, Loops, Delay models, Library functions, Procedures, Synthesis, Test bench.

UNIT - III (12)

FSM Architectures and Systems Level Design: Architectures centered around non registered PLDs, State machine designs centered around shift registers, one - hot design method, use of ASMs in one -hot design; application of one - hot method; System level design , controller, data path and functional partition; PLD- SPLDs, Programming, applications , Case studies using MAX 7000, Design flow, Timing, Place and Root (PAR)

UNIT -IV (12)

Front End Digital Design Tools for FPGAs and ASICs: Mentor Graphics EDA Tool, Design flow using FPGAs , Guidelines and Case studies of parallel adder cell, parallel adder , sequential circuits, counters, multiplexers and parallel controllers

Text Book:

1. S. Trimberger, "Field Programmable Gate Array Technology", *Kluwer Academic Publications*, 2nd edn., 2009.(chapters 1 to 4).

Reference Books:

1. P.K. Chan, S. Mourad, "Digital Design Using Field Programmable Gate Array", *PHI*, 1994.
2. "The Programmable Logic Data Books, Xilinx, 1994.
3. "PLDs & FPGAs" from Xilinx, Altera, AMD.

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to….

CO1: explain the architectural features of various PLDs
CO2: design the FSMs using VHDL/ Verilog HDL
CO3: outline FPGAs by their performance comparison
CO4: use front end tools for simulation and synthesis of digital circuits with FPGAs and ASICs

U14EE804A INDUSTRIAL ELECTRONICS

Class: B.Tech. VIII-Semester

Branch: Electronics & Instrumentation Engineering

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 : characteristics and applications of basic power semiconductor switches
LO2 : performance of controlled rectifiers.
LO3 : performance of chopper, inverter operation
LO4 : AC voltage controllers & Cyclo converter operation and power electronic applications in industry

UNIT – I (12)

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.
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 (12)

Phase controlled Rectifiers: Phase Angle control Single phase three phase, halfwave, full wave, Half controlled and Fully controlled with and without free wheeling diodes for resistive and inductive loads, effect of source inductance, Dual converters, Power factor improvements.

UNIT – III (12)

Choppers: Basic circuit, step-up step-down, classification of choppers on the basis of various quadrants, chopper commutation, Jones and Morgan chopper.
Inverters: Series inverter, parallel inverter, voltage source inverters, and current source inverters, 1-phase and 3-Phase bridge inverters.

UNIT – IV (12)

AC Voltage Controllers: Single Phase AC Controllers with R and RL loads, Three Phase AC Voltage Controllers with Star and Delta connected loads.
Cyclo converters: Principle and operation of Single phase to single phase, single phase to 3-phase, 3-phase to 1-phase Cyclo converters.
Industrial Applications: Battery charger, Uninterruptible power supply, Switched mode power supply, DC and AC drives.

Text Books:

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

Reference Books:

1 M.H. Rashid, "Power Electronics, Circuits, Devices & Applications", *PHI* , 3/e, New Delhi.

2 P.C. Sen, "Power Electronics", *Tata McGraw Hill*, New Delhi.

3 Ned Mohan Tore M. Undeland, "Power Electronics: Converters, Applications, and Design", *John Wiley & Sons*, 3/e , 2007

4 M.D. Singh & K.B. Kanchandani, Power Electronics, 2/e, *Tata McGraw Hill*, New Delhi.

Course Learning Outcomes (COs):

Upon 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

U14EE804B DATABASE MANAGEMENT SYSTEM

Class: B.Tech. VIII-Semester **Branch:** Electronics & Instrumentation Engineering

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. basic concepts of database system and Conceptual design using Entity Relationship model.
LO2. enhanced Entity Relationship model, relational data model, Structured Query Language, relational algebra and relational calculus.
LO3. normalization of database, rules for database design and query optimization techniques.
LO4. transaction processing concepts like concurrency control, database recovery and security.

UNIT - I (12)

Databases and Database Users: Introduction, Characteristics of the Database approach, Actors on the scene, Workers behind the scene, Advantages of using a DBMS, Implications of the Database Approach, When not to use a DBMS.
Database System Concepts and Architecture: Data models, Schemas, and Instances, DBMS Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Classification of Database Management Systems.
Data modeling using the Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, Entity Types, Entity sets, Attributes, and Keys, Relationships, Relationship Types, Roles, and Structural Constraints, Weak Entity types, ER diagrams.

UNIT - II (12)

Enhanced Entity-Relationship and Object Modeling: Subclasses, Super classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization, Modeling UNION Types Using Categories, Formal Definitions for the EER model, Relationship Types of Degree Higher than Two.
The Relational Data Model, Relational Constraints and the Relational Algebra: Relational Model Concepts, Relational Constraints and the Relational Database Schemas, Update Operations and Dealing with Constraint Violations, Basic Relational Algebra Operations, Examples of Queries in Relational Algebra.
SQL: Data Definition, Constraints, Data manipulation, Transaction control, SQL Queries, Additional Features of SQL.
ER and EER to Relational Mapping and Other Relational Languages:
Relational Database Design Using ER-to-Relational Mapping, Mapping EER model Concepts to Relations, The Tuple Relational Calculus, The Domain Relational calculus, Overview of the QBE Language.

UNIT - III (12)

Database Design Theory and Methodology: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal form, Algorithms for Relational Database Schema Design, Multivalued Dependencies and Fourth Normal Form , Join Dependencies and Fifth Normal form, Inclusion Dependencies, Other Dependencies and Normal Forms, EF-Codd rules.

Query Processing and Optimization: Translating SQL Queries into Relational Algebra, Using Heuristics in Query Optimization, Using Selectivity and Cost Estimates in Query Optimization, Overview of Query Optimization in ORACLE, Semantic Query Optimization

UNIT - IV (12)

Transaction Processing Concepts: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Schedules and Recoverability, Serializability of Schedules.

Concurrency Control Techniques: Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering.

Database Recovery Techniques: Recovery Concepts, Recovery Techniques based on Deferred Update, Recovery Techniques based on Immediate Update, Shadow Paging.

Database Security and Authorization: Introduction to Database Security Issues, Discretionary Access control based on Granting/Revoking of Privileges, Mandatory Access Control for Multilevel Security.

Text Book:

1 Ramez Elmasri and Shamkanth B. Navathe, "Fundamentals of Database Systems", *Pearson Education*, 3rd edition, 2003.

Reference Books:

1 Thomas Connolly and Carolyn Begg , "Database Systems", Pearson Education, 3rd edition , 2003.

2 Abraham Silberschatz , Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw-Hill Education, 3rd edition, 1997.

Course learning outcomes(Cos):

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

CO1. design entity-relationship model graphically to represent logical relationships of entities in order to create a database.

CO2. design the database using Enhanced Entity Relationship model and evaluate queries using relational algebra and relational calculus.

CO3. apply Normalization to reduce redundancy and improve the performance of queries using optimization techniques.

CO4. execute transactions in an interleaved fashion and manage multi-level security and control access over database by various users.

U14EE804C DIGITAL CONTROL SYSTEMS

Class: B.Tech. VIII-Semester

Branch: Electronics & Instrumentation Engineering

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. basic representation and applications of Digital Control Systems
LO2. reconstruction of original signal from sampled sequence
LO3. state variables to describe a system by a set of first-order differential/ 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 of elementary functions, Properties, Inverse z-transforms, z-transform method for solving difference equations.
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, Realization of Digital Controllers and Digital filters.

UNIT – II (12)

Discrete Time System Analysis: Reconstruction- Sub-multiple sampling method, Modified z-Transform method, Pulse transfer function of DTS with ZOH device, Open and closed loop responses of DTS with ZOH device, Sample signal flow graph.
Control Algorithms: Digital PID Control Algorithm, Dead beat Algorithms, Dahlin's Algorithm, Kalman's Algorithm.

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 System: 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.

Text Books:

1 Ogata, "Discrete-Time Control System", 2nd edition, Prentice Hall International, Inc., 1995.

2 Benjamin C. Kuo, "Digital Control System", 2nd edition, Oxford University Press, India, 2014

Reference Books:

1 M. Gopal, "Digital Control and State Variable Methods", 2nd edition, Tata McGraw Hill, New Delhi, 2003

Course Learning Outcomes(Cos):

Upon 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 digital system using root locus and bode plots & Solve Problems

U14EI804D AUTOMOTIVE INSTRUMENTATION

Class: B.Tech. VIII-Semester **Branch:** Electronics & Instrumentation Engineering

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 on/in....	
LO1:	*review of systems & control and basic measurement systems & signal processing*
LO2:	*microcomputer instrumentation & control and functionality of electronic engine control*
LO3:	*automotive control system applications of sensors and actuators*
LO4:	*modern automotive instrumentation, telemetrics and diagnostics*

UNIT – I (12)

Systems approach to control and Instrumentation: Concept of system, Block diagram of a system, Analog systems; Review of linear systems - first order and second order systems; Review of Control theory - Open loop control, Closed loop control; Stability of control system - Root locus technique; Closed loop limit cycle control; Basic measurement systems - Sensors, Random errors, Signal processing; Discrete time control - Discrete time system, Digital subsystem, Discrete time control system, Example of discrete time control system.

UNIT – II (12)

Microcomputer instrumentation and Control: Micro computer hardware, Microcomputer applications in automotive systems, Instrumentation applications of microcomputer, Micro computers in control systems**.**

Basics of electronic engine control: Motivation for electronic engine control, Exhaust emissions, Fuel economy; concept of electronic engine control system - inputs to controller, outputs from controller; Metrics for engine performance-torque, power, fuel consumption, engine overall efficiency, calibration, engine mapping, effect of air/fuel ratio on performance, effect of spark timing on performance, effect of exhaust gas recirculation on performance; Exhaust catalytic converters, Electronic fuel control systems, Analysis of manifold pressure, Idle speed control, Electronic ignition.

UNIT – III (12)

Sensors and Actuators: Automotive control system applications of sensors and actuators, Variables to be measured, Airflow rate sensor, Pressure measurements, Engine crankshaft angular position sensor, Hall effect position sensor, Optical crankshaft position sensor, Sensors for feedback control, Automotive engine control actuators, Fuel injection, Exhaust gas recirculation actuator, Electric motor actuators, Ignition system.

UNIT – IV (12)

Automotive instrumentation and Telematics: Modern automotive instrumentation, Input and output signal conversion, Advantages of computer based instrumentation, Display devices (LED-LCD- VFD-flat panel display), Fuel quantity measurement, Coolant temperature measurement, Oil pressure measurement, Vehicle speed measurement, High speed digital communications (CAN), Telematics, GPS navigation, GPS system structure.

Diagnostics: Automotive diagnostics, Electronic control system diagnostics, Model based sensor failure detection, Model based misfire detection system.

Text Books:

1 William Ribbens, "Understanding Automotive Electronics", *Butterworth-Heinemann publications*, USA, 7/e, 2012.

Reference Books:

1 Ronald K. Jurgen, "Automotive Electronics Handbook", *McGraw-Hill publications*, 2/e, 1999.

2 V.A.W. Hiller, "Fundamentals of Automotive Electronics" *Stanley thomes publications* , 2/e, 2001.

Course Learning Outcomes (COs):

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

CO1:	*explain the relative benefits and limitations of automotive electronic systems*
CO2:	*evaluate the metrics of engine performance and describe the working of electronic engine control*
CO3:	*identify and describe the use of sensors & actuators employed for automotive control system applications*
CO4:	*summarize & analyze the issues related to automotive instrumentation, telemetrics and diagnostics*

U14EI805 PROCESS CONTROL LABORATORY

Class: B.Tech. VIII-Semester

Branch: Electronics & Instrumentation 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 on /in…

LO1: *process control loops*
LO2: *process design and simulation of advanced controllers*
LO3: *real time scenarios in Instrumentation industries.*

LIST OF EXPERIMENTS

1. Study of temperature process controller
2. Study of pressure process controller
3. Study of flow process controller
4. Study of level process controller
5. Study of cascade control scheme
6. Study of split range control scheme
7. Study of feed forward control scheme
8. Study of control valve characteristics
9. Determination of time constant for interacting and non interacting systems
10. Simulation of various control actions using process control simulator
11. Implementation of logical and control actions using PLC
12. Study of DCS simulator

Laboratory Manual:

1 "Process Control Laboratory Manual" *prepared by Dept of E& I Engg.*

Text books:

1 Surekha Bhanot, "Process Control: Principles And Applications", *Oxford University Press,* 6/e, 2011. *(Chapters 7, 13 to 16)*

Course Learning Outcomes (COs):

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

CO1: *analyze single and multiloop controller actions for various processes*
CO2: *write ladder diagram programs for various control schemes*
CO3: *apply advanced control theory for process control engineering*

U14EI806 BIOMEDICAL INSTRUMENTATION LABORATORY

Class: B.Tech. VIII-Semester **Branch**: Electronics & Instrumentation 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: measurement and instrumentation for recording/monitoring of various biopotentials
LO2: design of various signal conditioning circuits for biomedical signal recording equipment
LO3: artifact removal from biomedical signals using MATLAB / LAB VIEW programs

LIST OF EXPERMENTS

1 Verification of Beer-Lambert Law for determining percentage transmittance, absorbance and concentration of a solution using spectrophotometer
2 Study of characteristics of ECG
3 Study of characteristics of PPG
4 Study of characteristics of EEG
5 Recording of Respiratory Signal using Spirometer
6 MATLAB / LabVIEW program for removal of PLI noise from ECG
7 MATLAB / LabVIEW program for removal of BLW noise from ECG
8 MATLAB / LabVIEW program for removal of EMG noise from ECG
9 MATLAB / LabVIEW program for QRS detection in ECG
10 MATLAB / LabVIEW program for compression of ECG
11 MATLAB / LabVIEW program for motion artifact (MA) reduction from PPG
12 MATLAB / LabVIEW program for frequency component analysis of EEG

Laboratory Manual:

1 "Bio Medical Instrumentation Laboratory Manual" *prepared by Dept of E& I Engg.*

Text books:

1 Willis. J. Tompkins, "Biomedical Digital Signal Processing", *PHI*, 5/e, 2003

Course Learning Outcomes (COs):

Upon completion of this laboratory course, students will be able to…

CO1: design and build front end circuits for recording of biomedical signals
CO2: identify and remove the artifacts from physiological signals by developing suitable algorithm in MATLAB / LAB VIEW environment
CO3: apply modern engineering hardware and software to collect, analyze and interpret biological signals

U14EI807 MAJOR PROJECT WORK *Phase-II*

Class: B.Tech. VIII-Semester **Branch:** Electronics & Instrumentation 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):

Upon 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
CO2: 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