# B.E. ELECTRICAL AND INSTRUMENTATION ENGINEERING

## I & II SEMESTERS CURRICULUM AND SYLLABI

### SEMESTER - I

<table>
<thead>
<tr>
<th>CODE NO.</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS9111</td>
<td>Technical English - I</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MA9111</td>
<td>Mathematics - I</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PH9111</td>
<td>Engineering Physics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CY9111</td>
<td>Engineering Chemistry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE9111</td>
<td>Engineering Graphics</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>GE9112</td>
<td>Fundamentals of Computing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH9112</td>
<td>Physics Laboratory</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>CY9112</td>
<td>Chemistry Laboratory</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>GE9113</td>
<td>Engineering Practices Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>GE9114</td>
<td>Computer Practices Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**TOTAL** 17 2 13 27

### SEMESTER II

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS9161</td>
<td>Technical English - II</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>MA9161</td>
<td>Mathematics – II</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PH9167</td>
<td>Physics of Electrical and Electronics Materials</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CY9164</td>
<td>Chemistry for Instrumentation Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE9151</td>
<td>Engineering Mechanics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EE9165</td>
<td>Electric Circuit Theory</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CS9161</td>
<td>Object Oriented Programming</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS9162</td>
<td>Computer Practice – II</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EE9162</td>
<td>Electrical Circuits Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**TOTAL** 20 1 8 26
AIM:

To help students specialising in the field of Engineering and Technology develop their proficiency in oral and written communication in Technical English.

OBJECTIVES:

- To enable students improve their vocabulary and employ the words appropriately in different academic and professional contexts.
- To make students comprehend classroom lectures and technically oriented passages.
- To enable students develop suitable reading strategies that could be adopted while reading science related texts.
- To enable students acquire the ability to speak effectively in English in real life situations and work-related situations.
- To train students in academic and professional writing.

UNIT I

9+3

Vocabulary - using words in context - use of suffixes to form nouns from verbs and adjectives – adjectives, adverbs - matching words with meanings - Active and passive voices – tenses - simple present, present continuous - comparative adjectives – adverbial forms - Reading text: skimming for general information - specific details - note making - cloze reading – Listening and transferring of information from text to graphic forms - bar charts, flow-charts - Paragraph writing - descriptions using descriptive words and phrases - organisating information - Role play - conversational techniques – discussions - oral reporting.

UNIT II

9+3

Vocabulary items - words with prefixes ("multi-", "under-") - Asking and answering questions, error correction - spelling and punctuation - Reading Comprehension - scanning for information – inferring meaning from context - Listening and guided note-taking - paragraph writing - using notes – giving suitable headings / subheadings for paragraphs – Comparing and contrasting using expressions of comparison - Discussion using creative ideas

UNIT III

9+3

Compound nouns - negative prefixes – antonyms – Use of modal verbs – making sentences using phrases – tenses – simple past and present perfect - Reading and guessing meanings in context - Listening and note taking - Channel conversion from text to chart - Writing comparisons - making recommendations - coherence using discourse markers - Discussion - role-play (explaining and convincing)

UNIT IV

9+3

Expanding nominal compounds – words with multiple meanings – Error correction - prepositions - use of the prefix "trans-" - compound adjectives - modal verbs to express probability - simple past and present prefect - Reading – prediction of content - understanding advertisements - scanning the text and comprehension check - Listening
UNIT V  9+3
Formation of nouns, verbs and adjectives from root words – some useful phrases and expressions - cloze exercises - ‘If’ conditional clauses – gerunds (verbal nouns) - Reading for comprehension - intensive reading - Accuracy in listening - listening to discussion on specific issues - Group discussion - role-play (stating, discussing problems and proposing solutions) - Planning a tour - Writing an itinerary - Writing formal letters - letter to the editor

LECTURE – 45  TUTORIAL – 15  TOTAL – 60 PERIODS

TEXTBOOKS

REFERENCES
3. Website: www.uefap.co.uk

MA 9111  MATHEMATICS – I  L  T  P  C
(Common to all branches of B.E. / B.Tech. Programmes) 3  1  0  4

AIM:
To make available the basic concepts of engineering mathematics, to prepare the student for new concepts to be introduced in the subsequent semesters and to provide the necessary mathematical skills that are needed in modeling physical processes by an engineer.

OBJECTIVES:
• To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
• To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling
• To familiarize the student with functions of several variables which is needed in many branches of engineering
• To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications
• To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage
UNIT I  MATRICES  

UNIT II  INFINITE SERIES  

UNIT III  FUNCTIONS OF SEVERAL VARIABLES  

UNIT IV  IMPROPER INTEGRALS  

UNIT V  MULTIPLE INTEGRALS  

L: 45, T: 15, TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES
PH 9111  ENGINEERING PHYSICS  
(Common to ALL Branches of B.E. / B.Tech. Programmes)  

OBJECTIVE: 
To introduce the basic physics concepts relevant to different branches of Engineering and Technology

UNIT I  PROPERTIES OF MATTER  

UNIT II  ACOUSTICS AND ULTRASONICS  

UNIT III  THERMAL PHYSICS  

UNIT IV  APPLIED OPTICS  

UNIT V  SOLID STATE PHYSICS  
Nature of bonding – growth of single crystals (qualitative) - crystal systems - crystal planes and directions – expressions for interplanar distance – coordination number and packing factor for simple structures: SC, BCC, FCC and HCP – structure and significance of NaCl, ZnS, diamond and graphite – crystal imperfections: point defects, dislocations and stacking faults.

TOTAL : 45 PERIODS
TEXT BOOKS:

REFERENCES:

CY9111 ENGINEERING CHEMISTRY
(Common to all branches of Engineering and Technology) 3 0 0 3

AIM:
To gain a sound knowledge of thermodynamics, phase rule, surface chemistry and catalysis, basic organic reaction mechanisms and principles and applications of spectroscopy and nanochemistry.

OBJECTIVES:
To make the student conversant with the
- Applications of second law of thermodynamics.
- Phase rule and various types of alloys
- Surface chemistry and its importance in adsorption and catalysis.
- Basic principles in organic reaction mechanisms and principles and applications of spectroscopy
- Nanochemistry and its applications

UNIT I THERMODYNAMICS 9

UNIT II PHASE RULE 9

UNIT III SURFACE CHEMISTRY AND CATALYSIS 9

UNIT IV ORGANIC REACTIONS AND SPECTROSCOPY 9

UNIT V NANOCHEMISTRY 9

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES
UNIT I FREE HAND SKETCHING OF ENGG OBJECTS AND CONSTRUCTION OF PLANE CURVE 3+9=12
Pictorial representation of engineering objects – representation of three dimensional objects in two dimensional media – need for multiple views – developing visualization skills through free hand sketching of three dimensional objects.

Polygons & curves used in engineering practice– methods of construction– construction of ellipse, parabola and hyperbola by eccentricity method – Cycloidal and involute curves- construction - drawing of tangents to the above curves.

UNIT II ORTHOGRAPHIC PROJECTION: PROJECTION OF POINTS, LINES AND PLANE SURFACES 6+9=15
General principles of orthographic projection – first angle projection – layout of views – projections of points, straight lines located in the first quadrant – determination of true lengths of lines and their inclinations to the planes of projection – traces – projection of polygonal surfaces and circular lamina inclined to both the planes of projection

UNIT-III ORTHOGRAPHIC PROJECTION: PROJECTION OF SOLIDS AND SECTIONS OF SOLIDS 6+9=15
Projection of simple solids like prism, pyramid, cylinder and cone when the axis is inclined to one plane of projection –change of position & auxiliary projection methods-sectioning of above solids in simple vertical positions by cutting plane inclined to one reference plane and perpendicular to the other and above solids in inclined position with cutting planes parallel to one reference plane – true shapes of sections

UNIT IV DEVELOPMENT OF SURFACES AND INTERSECTION OF SOLIDS 6+9=15
Need for development of surfaces – development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones – development of lateral surfaces of the above solids with square and circular cutouts perpendicular to their axes. Intersection of solids and curves of intersection –prism with cylinder, cylinder & cylinder, cone & cylinder with normal intersection of axes and with no offset.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 4+9=13
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones – principles of perspective projections – projection of prisms, pyramids and cylinders by visual ray and vanishing point methods.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) 3
Introduction to computer aided drafting software packages and demonstration of their use.

L=30   P=45 TOTAL: 75 PERIODS

TEXT BOOKS

REFERENCES


Codes from Bureau of Indian Standards

2. IS 9609 (Parts 0 & 1)-2001: Technical Products Documentation – Lettering
4. IS 11669-1986 & SP 46-2003: Dimensioning of Technical Drawings
   IS 15021 (Parts 1 to 4)-2001: Technical Drawings-Projection Methods

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions one from each unit covering all units of the syllabus
2. All questions will carry equal marks of 20 each making a total of 100
3. Answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solutions within A3 size
4. The examination will be conducted in appropriate sessions on the same day

GE 9112 FUNDAMENTALS OF COMPUTING L T P C
(Common to all branches of B.E. / B.Tech. Programmes) 3 0 0 3

AIM:
To introduce the basics of computing and the fundamentals of C programming.

OBJECTIVES:

- To introduce the fundamentals of computing systems.
- To introduce the concepts of internet and WWW.
- To teach programming in C.

UNIT I

UNIT II
UNIT III

UNIT IV

UNIT V
Pointers – Dynamic memory allocation – linked list - Applications

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PH 9112
PHYSICS LABORATORY
(Common to ALL Branches of B.E. / B.Tech. Programmes) 0 0 2 1

1. Torsional Pendulum- Determination of rigidity modulus of wire and moment of Inertia of disc.
2. Non-uniform bending - Determination of Young’s modulus.
3. Lees’ disc- Determination of thermal conductivity of a bad conductor.
4. Potentiometer - Determination of thermo e.m.f of thermocouple
5. Air wedge- Determination of thickness of a thin sheet of paper.
6. i. Optical fibre - Determination of Numerical Aperture and acceptance angle
   ii. Compact disc - Determination of width of the groove using laser.
7. Acoustic grating - Determination of velocity of ultrasonic waves in liquids.
8. Post office box - Determination of Band gap
9. Spectrometer - Determination of wavelength using grating
10. Viscosity of liquid- Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow.

TOTAL: 30 PERIODS
I. WEIGHING AND PREPARATION OF STANDARD SOLUTIONS
   i) Preparation of molar and normal solutions of the following substances oxalic acid, sodium carbonate, sodium hydroxide, and hydrochloric acid.
   ii) Preparation of buffer solutions: borate buffer, phosphate buffer using Henderson equation.

2. WATER ANALYSIS
   i) Determination of total hardness, temporary & permanent hardness of water by EDTA method.
   i) Determination of DO content by Winkler’s method.
   ii) Determination of alkalinity in a water sample.
   iii) Determination of chloride content of water sample by argentometric method.

3. PH-METRY
   To find out the strength of given hydrochloric acid by sodium hydroxide.

4. CONDUCTOMETRY
   i) Conductometric titration of mixture of acids
   ii) Conductometric precipitation titration using BaCl₂- Na₂SO₄

5. POTENTIOMETRY
   i) Redox titration – Iron Vs. dichromate

6. SPECTROPHOTOMETRY
   i) To determine λ_max of a colored solution such as potassium permanganate.
   ii) To determine the iron content of an unknown solution (1,10- phenanthroline/thiocyanate method)

7. FLAME PHOTOMETRY
   i) To determine sodium and potassium in water.

8. VISCOMETRY
   i) Determination of molecular weight of a polymer

9. WATER POLLUTION
   i) COD analysis of a waste water by dichromate method.

10. KINETICS
    i) Determination of reaction rate constant of acid catalyzed hydrolysis of ester.

11. ADSORPTION
    i) Adsorption of acetic acid on activated charcoal.

TOTAL: 30 PERIODS
REFERENCE BOOKS


GE 9113
ENGINEERING PRACTICES LABORATORY

(Common to all Branches of B.E. / B.Tech. Programmes) 0 0 3 2

OBJECTIVE
To provide exposure to the students with hands-on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICE 12

Plumbing
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.

Laying pipe connection to the suction side of a pump – inlet.

Laying pipe connection to the delivery side of a pump – outlet.

Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

Wood Work
Sawing, planning and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint.

Study
Study of joints in door panels, wooden furniture
Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICE 9

Basic household wiring using switches, fuse, indicator – lamp etc.,

Preparation of wiring diagrams
Stair case light wiring
Tube – light wiring
Study of iron-box, fan with regulator, emergency lamp

GROUP – B (MECHANICAL AND ELECTRONICS) 15

3. MECHANICAL ENGINEERING PRACTICE

Welding
Arc welding of butt joints, lap joints, tee joints
Gas welding Practice.
Basic Machining
Simple turning, drilling and tapping operations.
Machine assembly Practice.
Study and assembling the following:
Centrifugal pump, mixies and air conditioners.
Demonstration on
(a) Smithy operations like the production of hexagonal bolt.
(b) Foundry operation like mould preparation for grooved pulley.

4. ELECTRONIC ENGINEERING PRACTICE 9

Soldering simple electronic circuits and checking continuity.
Assembling electronic components on a small PCB and testing.
Study of Telephone, FM radio, low-voltage power supplies.

TOTAL: 45 PERIODS
AIM:
The aim is to teach the use of computer applications related to office automation and to teach implementation of C programs.

OBJECTIVES:

- To introduce office automation software packages.
- To teach the fundamentals in C programming.

1. Simple OS commands and simple editors for file operations.
2. Word processors for more complex operations, like formatting documents, creating tables and so on.
3. Simple data base packages for creating and manipulating databases.
4. Spread sheet packages for data preparation and analysis.
5. Preparation of reports involving mathematical functions (Income Tax Statement, Mark sheets, Payroll etc.,)
6. C Programs using one dimensional arrays.
7. C Programs using multi-dimensional arrays and pointer data types.
8. Programs using structures, nested structures and union.
10. Programs for passing aggregate data types as parameters between functions.
11. Programs for dynamic memory allocation / deallocation.
12. Programs for self-referential structure – Implementing linked list.

TOTAL: 45 PERIODS
AIM:
To help students specialising in the field of Engineering and Technology develop their proficiency in oral and written communication in Technical English.

OBJECTIVES:
- To enable students develop their critical thinking skills.
- To enable students develop higher order reading skills such as interpreting, evaluating and analysing.
- To enable students develop their active listening skills.
- To enable students participate successfully in Group Discussions.

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Identifying problems, their causes and finding solutions using case studies – creative and critical thinking – levels of thinking – thinking strategies – brainstorming - analytical reasoning skills – evaluative essay – decision making – conflict resolution
English Language Lab (30 Periods)

1. Listening: (10)
   Recognising English sounds – accents - listening & answering questions - gap filling -
   listening & note making - listening to telephonic conversations - listening to speeches.

2. Speaking: (10)
   Pronouncing words & sentences correctly - word stress - conversation practice.

3. Reading: (5)
   Cloze test - Reading and answering questions - sequencing of sentences.

4. Writing: (5)
   Correction of errors - Blogging.

TOTAL : 60 PERIODS

TEXTBOOK
1. Department of Humanities & Social Sciences, Anna University. English for Engineers
   2006, Themes 5 to 8 (for Units 1 – 4)
2. Sunita Mishra & C. Muralikrishna, Communication Skills for Engineers, Pearson
   Education, Second Impression, 2007. (for Unit 5)

REFERENCES
   Press, 1997
4. Website: www.englishclub.com

LAB REQUIREMENTS
1. Teacher – Console and systems for students
2. English Language Lab Software
3. Tape Recorders
AIM:

To introduce the effective mathematical tools needed for solving engineering problems and to emphasize the underlying mathematical principles in specific situations confronting practicing engineers.

OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated

UNIT I  DIFFERENTIAL EQUATIONS  9+3
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of Simultaneous linear differential equations with constant coefficients.

UNIT II  VECTOR CALCULUS  9+3
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface Integral and Volume Integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and Application in evaluating line, surface and volume integrals.

UNIT III  ANALYTIC FUNCTION  9+3
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal Mapping – Mapping by functions \( w = z + c, \ a z, \ \frac{1}{z}, \ z^2 \) - Bilinear transformation.

UNIT IV  COMPLEX INTEGRATION  9+3
Line Integral - Cauchy’s theorem and integral formula – Taylor’s and Laurent’s Series – Singularities – Residues – Residue theorem – Application of Residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V  LAPLACE TRANSFORMS  9+3
TEXT BOOKS

REFERENCES

PH9167 PHYSICS OF ELECTRICAL AND ELECTRONIC MATERIALS LT P C (Common to EEE and E & I) 3 0 0 3

OBJECTIVE:
To introduce the essential principles of physics for electrical and related engineering applications.

UNIT I ELECTRICAL PROPERTIES OF METALS

UNIT II SEMICONDUCTORS

UNIT III DIELECTRIC MATERIALS AND INSULATION
Matter polarization and relative permittivity: definition - dipole moment and polarization vector P - polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization – frequency dependence - local field and Clausius-Mossotti equation - dielectric constant and dielectric loss - Gauss’s law and boundary conditions - dielectric strength and insulation breakdown in gases, liquids and solids - capacitor materials - typical capacitor constructions - piezoelectricity, ferroelectricity and pyroelectricity - quartz oscillators and filters - piezo and pyroelectric crystals.
UNIT IV MAGNETIC PROPERTIES AND SUPERCONDUCTIVITY


UNIT V OPTICAL PROPERTIES OF MATERIALS


TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES:

CY9164 CHEMISTRY FOR INSTRUMENTATION ENGINEERING

L T P C
3 0 0 3

AIM

* To gain a sound knowledge of photochemistry, polymer chemistry, corrosion and its control, Energy sources and devices, and dynamic electrochemistry and electrometallurgy.

OBJECTIVES

To make the student conversant with the
- Applications of Photochemistry
- Basic principles of polymerization and applications of polymers
- Causes of corrosion and its prevention.
- Various sources of energy and its storage devices
• Theories of electron transfer reactions and its applications.

UNIT I PHOTOCHEMICAL TECHNOLOGY

UNIT II POLYMER CHEMISTRY

UNIT III CORROSION AND ITS INHIBITION

UNIT IV ENERGY SOURCES AND ENERGY STORING DEVICES

UNIT V DYNAMIC ELECTRO CHEMISTRY AND ELECTRO METALLURGY
Theories of electron transfer in homogeneous and heterogeneous – voltametry – electro-chemical extraction of metals – electro winning process (extraction of aluminium)– Baeyer’s process and Hoope’s process – electro refining of copper – electro-chemical machining – advantages.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES
GE 9151 ENGINEERING MECHANICS L T P C
(Common to Civil, Geoinformatics and Agriculture & Irrigation Engineering) 3 1 0 4

OBJECTIVE:
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, the student should understand the principle of work and energy. The student should be able to comprehend the effect of friction on equilibrium. The student should be able to understand the laws of motion, the kinematics of motion and the interrelationship. The student should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I BASICS & STATICS 12

UNIT II EQUILIBRIUM OF RIGID BODIES 12
Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem - Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples

UNIT III PROPERTIES OF SURFACES AND SOLIDS 12

UNIT IV DYNAMICS OF PARTICLES 12
UNIT V CONTACT FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS


L: 45+T=15 TOTAL : 60 PERIODS

TEXT BOOK

REFERENCES

EE9165 ELECTRIC CIRCUIT THEORY L T P C
3 0 0 3

AIM
To give a complete conceptual knowledge on electrical quantities, elements and circuits.

OBJECTIVES
At the end of this course, student would have exposure to:
- Elementary concept of electric sources, elements and their properties.
- Basic series, parallel and complex circuit configurations, Laws and Theorems governing them.
- Techniques to analyze D.C. and A.C. circuits using mathematical tools.
- Use of standard software’s for problem solving.

PREREQUISITE
Physics

UNIT I D.C. CIRCUIT ANALYSIS
Charge and current, voltage, power, and energy – Ohm’s law – Ideal voltage and current sources – Independent sources – Dependent sources – Circuit elements – Kirchhoff’s Laws – Voltage and Current division in series and parallel circuits, Network reduction – Mesh and Nodal analysis with voltage and current sources – Circuit

UNIT II A.C.CIRCUIT FUNDAMENTALS AND ANALYSIS 10

UNIT III RESONANCE AND COUPLED CIRCUITS 9

UNIT IV THREE-PHASE CIRCUIT ANALYSIS 8

UNIT V TRANSIENT ANALYSIS OF FIRST AND SECOND ORDER LINEAR CIRCUITS 9

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCE S
AIM
To present the concepts of Object Oriented Programming through C++ and Java.

OBJECTIVES
- To study the object oriented programming principles.
- To introduce the classes, objects, constructors and destructors in C++.
- To introduce the operator overloading, inheritance, polymorphism concepts and file operations in C++.
- To introduce classes, objects, methods, arrays and strings in Java.
- To introduce the programming approach in Java like interfaces, packages, multi-threading, managing errors and exceptions and Applet programming.

PREREQUISITE
Fundamentals of Computing

UNIT I OOP CONCEPTS, BASICS OF C++, CLASSES AND OBJECTS

UNIT II CONSTRUCTORS AND OPERATOR OVERLOADING

UNIT III INHERITANCES, POLYMORPHISM, CONSOLE AND FILE OPERATIONS
Different types of inheritances – Virtual and abstract classes - Pointers to objects, derived classes – Virtual functions – C++ streams / classes – Unformatted and formatted console operations – Classes for file stream operations – Files – Opening – Closing – Detecting end of files – File modes – Sequential and random files.

UNIT IV JAVA BASICS, CLASSES, METHODS AND INHERITANCES

UNIT V INTERFACES, PACKAGES, THREADING, EXCEPTIONS AND APPLETS
Defining interfaces – Extending, implementing, accessing interfaces – Java API packages – Defining user defined packages and usage – Creating threads – Extending the thread class – Life cycle of a thread – Thread priority – Synchronization –
Exceptions – Syntax of exception handling code – try, catch and finally statements – Throwing our own exceptions – Preparing to write applets – Applet lifecycle – Executable applet – Designing a web page – Applet tags – Adding applet to HTML file – Running the Applet – Passing parameter to Applets.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CS9162 COMPUTER PRACTICE II
L T P C 0 0 3 2

1. Shell Commands, Wild Cards, Escaping and Redirection.
2. Pipes, Tees and Command Substitution.
4. Shell Programs using Loops.
5. Simple Shell Programs using File I/O.
6. Advanced Shell Programs using File I/O.
7. Directories and i-nodes.
8. Simple programs using classes for understanding objects, member function, constructions and destructors.
9. Programs using operator overloading including unary operators, new and delete
10. Programs using inheritance concepts
11. Programs using virtual functions and dynamic polymorphism
12. Programs using templates.

TOTAL: 45 PERIODS
1. Verification of Kirchhoff’s Laws.
2. Verification of Thevenin’s Theorem and Norton’s Theorem
3. Verification of Super position and Compensation Theorem.
4. Verification of Reciprocity Theorem and Maximum Power Transfer Theorem.
5. Study of CRO and measurement of sinusoidal voltage, frequency and power factor.
7. Study of the characteristics of series and parallel resonance circuits.

TOTAL: 45 PERIODS
UNIVERSITY DEPARTMENTS
ANNA UNIVERSITY :: CHENNAI 600 025
REGULATIONS – 2008
CURRICULUM FROM III TO VIII SEMESTERS FOR
B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING

SEMESTER III

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI9201</td>
<td>Digital Logic Theory</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EE9216</td>
<td>Electrical Machines</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MA9211</td>
<td>Mathematics – III</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EC9211</td>
<td>Electron Devices and Circuits</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME9214</td>
<td>Thermodynamics</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>CE9202</td>
<td>Fluid Mechanics</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

PRACTICAL

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI9202</td>
<td>Analog and Digital Electronics Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EE9217</td>
<td>Electrical Machines Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME9212</td>
<td>Mechanical Science Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

TOTAL 19 1 9 23

SEMESTER IV

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA9264</td>
<td>Linear Algebra and Numerical Methods</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EE9261</td>
<td>Electrical and Electronic Measurements</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9251</td>
<td>Transducers Engineering</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EI9253</td>
<td>Linear Integrated Circuits</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EC9262</td>
<td>Communication Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE9261</td>
<td>Environmental Science and Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

PRACTICAL

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI9252</td>
<td>Transducers and Measurements Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EC9263</td>
<td>Integrated Circuits Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

TOTAL 18 3 6 25

SEMESTER V

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI9301</td>
<td>Industrial Instrumentation – I</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9302</td>
<td>Control Engineering</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>CS9311</td>
<td>Data Structures and Algorithm</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC9313</td>
<td>Microprocessors and Microcontrollers</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9303</td>
<td>Virtual Instrumentation</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

PRACTICAL

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI9304</td>
<td>Programming and Data Structures Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EI9305</td>
<td>Microprocessors and Microcontrollers Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>GE9371</td>
<td>Communication Skills and Soft Skills</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

TOTAL 18 2 8 25
## SEMESTER VI

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI9351</td>
<td>Industrial Instrumentation – II</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9352</td>
<td>Process Control</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EC9361</td>
<td>VLSI Design</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC9362</td>
<td>Digital Signal Processing</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Elective – II</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective – III</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI9353</td>
<td>Process Control Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EI9354</td>
<td>Industrial Instrumentation Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EI9355</td>
<td>Technical Seminar</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td>18</td>
<td>2</td>
<td>8</td>
<td>25</td>
</tr>
</tbody>
</table>

## SEMESTER VII

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI9401</td>
<td>Logic and Distributed Control System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9402</td>
<td>Advanced Process Control</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>EI9403</td>
<td>Analytical Instrumentation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC9411</td>
<td>Real Time Embedded Systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective – IV</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective – V</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI9404</td>
<td>Advanced Process Control</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EI9405</td>
<td>Instrumentation System Design Laboratory</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>EI9406</td>
<td>Comprehension</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td>18</td>
<td>3</td>
<td>6</td>
<td>23</td>
</tr>
</tbody>
</table>

## SEMESTER VIII

<table>
<thead>
<tr>
<th>CODE NO</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective – VI</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective – VII</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI9451</td>
<td>Project Work</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td>6</td>
<td>0</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>
## LIST OF ELECTIVES FOR B.E. ELECTRONICS AND INSTRUMENTATION ENGINEERING

### ELECTIVE I

<table>
<thead>
<tr>
<th>CODE NO.</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE9021</td>
<td>Power Electronic Devices and Circuits</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9021</td>
<td>Fiber Optics and Laser Instrumentation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE9023</td>
<td>Fundamentals of Nanoscience</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>CS9021</td>
<td>Operating System</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE9021</td>
<td>Professional Ethics in Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9028</td>
<td>Computer Architecture</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9022</td>
<td>Biomedical Instrumentation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9023</td>
<td>Power plant Instrumentation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9024</td>
<td>Instrumentation in Petrochemical Industry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9029</td>
<td>Applied Soft Computing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9025</td>
<td>System Identification and Adaptive Control</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EE9050</td>
<td>Industrial Drives and Control</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EC9052</td>
<td>Micro Controller Based System Design</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9032</td>
<td>Advanced Digital Signal Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9033</td>
<td>Digital Image Processing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9026</td>
<td>MEMS</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9030</td>
<td>Computer Networks</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9031</td>
<td>Industrial Data Networks</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE9022</td>
<td>Total Quality Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GE9074</td>
<td>Engineering Economics and Financial Accounting</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>EI9027</td>
<td>Reliability and Safety Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
AIM:
The course is designed to introduce the fundamental concepts and design of digital system.

OBJECTIVES:
- To introduce the basic concept about the number systems, binary codes and combinational circuits.
- To cover the basic postulates of Boolean Algebra and the implementation of circuits using gates.
- To provide an introduction to flip flops and to design a synchronous circuit.
- To introduce the most common digital logic families.

PREREQUISITE
Not Required.

UNIT I  BOOLEAN ALGEBRA
Review of Number Systems – Fixed point and floating point representations – Review of computer codes - Number complements - Signed number addition and subtraction - Boolean Algebra - Demorgan’s theorem - Canonical forms - Simplification of Boolean functions using K-maps and Quine Mclusky methods.

UNIT II  COMBINATIONAL LOGIC DESIGN

UNIT III  SEQUENTIAL LOGIC DESIGN

UNIT IV  COUNTERS AND SHIFT REGISTERS
Asynchronous Counter design and Synchronous Counter design - Up/Down counter - Modulus counter - Shift Registers - Johnson Counter – Ring Counter -Application of Counters and Shift Registers.

UNIT V  INTRODUCTION TO LOGIC FAMILIES
Introduction to logic families: - RTL, DTL, ECL, TTL, NMOS, CMOS - GaAs Building blocks - Operating conditions –Interfacing between different families.

L : 45 : TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To impart basic knowledge on Electrical machines, principles and its behavior.

OBJECTIVES:
At the end of this course, student would have been exposed to:
- Theory of structures, operating principle, characteristics, and applications of D.C and A.C rotating machines and transformers in detail.
- Introductory knowledge on Special Machines.

PREREQUISITE
Physics, Electromagnetics and Electric circuit analysis.

UNIT I    D.C. MACHINES  

UNIT II    TRANSFORMERS  

UNIT III   SYNCHRONOUS MACHINES  
Principle of alternators:- Construction details, Equation of induced EMF and Vector diagram - Synchronous motor:- Starting methods, Torque, V curves, Speed control and Hunting.

UNIT IV    INDUCTION MACHINES  
Induction motor:- Construction and principle of operation, Classification of induction motor, Torque equation, Condition for maximum torque, Equivalent Circuit, Starting methods and Speed control of induction motors.

UNIT V    SPECIAL MACHINES  

L : 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

OBJECTIVES:
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I        FOURIER SERIES 9+3

UNIT II        FOURIER TRANSFORM 9+3

UNIT III       PARTIAL DIFFERENTIAL EQUATIONS 9+3
Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange’s Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3
Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9+3

TEXT BOOK:

REFERENCES:
AIM:
To provide an exposure to various electronic devices and electronic circuits.

OBJECTIVES:
- At the end of the course, students' will have the knowledge about functioning of various types of devices and design of various electronic circuits.

UNIT I  SEMICONDUCTOR DIODE AND BJT  9

UNIT II   FET, UJT and SCR  9
JFET characteristics and parameters – JFET biasing, self bias, voltage divider bias – Q point, stability over temperature – MOSFET D-MOSFET, E-MOSFET – MOSFET characteristics and parameters – MOSFET biasing, zero bias, voltage divider bias method, drain feedback bias circuits – Characteristics and applications of UJT, SCR, DIAC, TRIAC.

UNIT III  AMPLIFIERS  9
CE, CC and CB amplifiers - Small signal low frequency transistor amplifier circuits - h parameter representation of a transistor - Analysis of single stage transistor amplifier using parameters voltage gain, current gain, input impedance and output impedance- frequency response - RC coupled amplifier.
Classification of Power amplifiers:- Class A, B, AB and C Power amplifiers-Push-Pull and Complementary Symmetry Push-Pull amplifiers - Design of power output, efficiency and cross-over distortion.

UNIT IV  FEEDBACK AMPLIFIERS AND OSCILLATORS  9
Advantages of negative feedback - Voltage/current, series/shunt feedback-Positive feedback - Condition for oscillators - Phase shift - Wein Bridge – Hartley - Colpitts and crystal oscillators.

UNIT V  PULSE CIRCUITS AND POWER SUPPLIES  9
RC wave shaping circuits - Diode clammers and clippers – Multivibrators -Schmitt triggers - UJT - Saw tooth oscillators - Single and polyphase rectifiers and analysis of filter circuits - Design of zener and transistor series voltage regulators - Switched mode power supplies.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To study the basic concepts of thermodynamics and apply it to various applications.

OBJECTIVES:
- To integrate the concepts, Laws and Methodologies from Thermodynamics for the analysis of cyclic process.
- To apply the Thermodynamics concepts into various Thermal applications like, IC Engines, Thermal Power Plant, Air Conditioning and Heat transfer.

PREREQUISITE
Not Required

UNIT I  LAWS OF THERMODYNAMICS  6

UNIT II  GAS LAWS, AIR CYCLES AND COMPRESSORS  6
Basic IC Engine and Gas turbine cycles – Single stage and Multistage reciprocating compressors.

UNIT III  STEAM BOILERS  6
Formation of steam - Properties of steam – Rankine cycle – Modern features of high pressure boilers – Mountings and accessories.

UNIT IV  REFRIGERATION  6
Basic Thermodynamics of refrigerators and heat pumps - Various methods of producing refrigerating effects – Vapour compression cycle – P-H and T-S diagrams - Air conditioning.

UNIT V  HEAT TRANSFER  6

L: 30 TOTAL: 30 PERIODS

TEXT BOOK:

REFERENCE:
AIM:
To study the various types of fluid flow, pumps and turbines.

OBJECTIVES:
- This course will give an introduction to the fundamental properties of fluids, dimensional analysis, model analysis, pumps, turbines and their applications.

PREREQUISITE
Not required

UNIT I BASIC CONCEPTS OF FLUID MECHANICS 6
Introduction – Classification – Types of fluids – Properties – Laws of Pressure – Atmospheric Pressure, Gauge Pressure, Absolute Pressure - Pressure measurement:- Manometers and Mechanical gauges.

UNIT II FLOW OF FLUIDS 6

UNIT III DIMENSIONAL AND MODEL ANALYSIS 6

UNIT IV PUMPS 6
Introduction – Reciprocating pump:- Construction details, Co-efficient of discharge, Slip and Power – Centrifugal pump:- Classification, Working principle and Specific speed.

UNIT V TURBINES 6
Turbine:- Classification of Turbines and Working Principle.

L: 30 TOTAL: 30 PERIODS

TEXT BOOK:

REFERENCES:
### EI9202  ANALOG AND DIGITAL ELECTRONICS LABORATORY

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Frequency responses of BJT and FET based Amplifiers.</td>
</tr>
<tr>
<td>3.</td>
<td>Characteristic of Transistor under common emitter, common collector and common base configurations.</td>
</tr>
<tr>
<td>5.</td>
<td>Design of Wave Shaping Circuits.</td>
</tr>
<tr>
<td>8.</td>
<td>Study of Shift Registers and Counters.</td>
</tr>
<tr>
<td>10.</td>
<td>Characteristics of FET and UJT.</td>
</tr>
<tr>
<td>11.</td>
<td>Design of BCD to Seven segment Decoder.</td>
</tr>
</tbody>
</table>

**TOTAL: 45 PERIODS**

### EE9217  ELECTRICAL MACHINES LABORATORY

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Open circuit characteristic of DC Shunt Generator.</td>
</tr>
<tr>
<td>2.</td>
<td>Load test on DC Shunt Generator.</td>
</tr>
<tr>
<td>3.</td>
<td>Speed control of DC Shunt Motor.</td>
</tr>
<tr>
<td>4.</td>
<td>Brake test on DC Shunt Motor.</td>
</tr>
<tr>
<td>5.</td>
<td>Brake test on DC Series Motor.</td>
</tr>
<tr>
<td>6.</td>
<td>Regulation characteristic of three - phase Alternator.</td>
</tr>
<tr>
<td>8.</td>
<td>Load test on Single - phase Transformer</td>
</tr>
<tr>
<td>11.</td>
<td>‘V’ curves of Synchronous Motor.</td>
</tr>
</tbody>
</table>

**TOTAL: 45 PERIODS**
1. Tension Test
2. Torsion Test
3. Testing of springs
4. Impact test i) Izod, ii) Charpy
5. Hardness test i) Vickers, ii) Brinell, iii) Rockwell, iv) Shore
6. Deflection of Beams
7. Dye Penetrant Test
8. Performance test on a 4 stroke engine
9. Viscosity determination of the given fluid
10. Moment of inertia of connecting rod
11. Determination of Effectiveness of a parallel and counter flow heat exchangers
12. Valve timing of a 4 stroke engine and port timing of a 2 stroke engine
13. Tensile testing of polymers
14. Flex fatigue test for elastomers
15. Hardness test for rubber and plastics.
16. Injection moulding machine operation

TOTAL: 45 PERIODS

MA9264 LINEAR ALGEBRA AND NUMERICAL METHODS L T P C 3 1 0 4

AIM / OBJECTIVES:
The students would be acquainted with the basic concepts of Linear Algebra and numerical methods and their applications.

UNIT I VECTOR SPACE AND LINEAR TRANSFORMATIONS 9
Vector spaces – Subspaces – Linear spans – Linear independence and Linear dependence – Basis and Dimension – Linear Transformation, Null space and range – Dimension theorem (no proof) – Matrix representation of Linear Transformation.

UNIT II INNER PRODUCT SPACES 9

UNIT III NUMERICAL LINEAR ALGEBRA 9
UNIT IV  INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9
Lagrange’s and Newton’s divided difference interpolation - Newton’s forward and backward difference interpolation – Numerical differentiation by finite differences – Trapezoidal, Simpson’s 1/3 and Gaussian Quadrature formula.

UNIT V  NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:

EE9261  ELECTRICAL AND ELECTRONIC MEASUREMENTS  LT P C
3 0 0 3

AIM:
The course is designed to equip the students to apply all types of common electrical and electronic instruments with the knowledge about the construction and working of the instruments.

OBJECTIVES:
• To introduce the construction and working of different types of ammeters, voltmeters and bridges.
• To introduce different types of power and energy meters.
• To provide an introduction to current and voltage transformers and to explain the advantages of these transformers compared to other measuring devices.
• To introduce digital meters, displays and recorders which help in analysing and displaying the data.

PREREQUISITE
Not Required.

UNIT I  MEASUREMENT OF ELECTRICAL PARAMETERS 9
UNIT II  POWER AND ENERGY MEASUREMENTS  9
Electrodynamic type wattmeter – Theory and its errors – Methods of correction – LPF
wattmeter – Induction type wattmeter – Phantom loading – Induction type kWh meter
– Theory and adjustments – Calibration of wattmeter and energy meters.

UNIT III  POTENTIOMETERS AND INSTRUMENT TRANSFORMERS  9
Student type potentiometer – Precision potentiometer – A.C. Potentiometers:- Polar
and Co-ordinate types – Applications – Instrument Transformer:-Construction and
theory of Current Transformers and Potential Transformers and Phasor diagrams.

UNIT IV  ANALOG AND DIGITAL INSTRUMENTS  10
Wave analyzers – Signal and function generators - Distortion factor meter – Q meter
- Digital voltmeter and multimeter – DMM with auto ranging and self diagnostic
features – Frequency and Time interval measurements.

UNIT V  DISPLAY AND RECORDING DEVICES  8
Cathode ray oscilloscope – Classification - Sampling and storage scopes – Seven
segment and dot matrix displays – X-Y recorders – Magnetic tape recorders – Data
loggers.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS:
New Delhi, 2004.
2. Sawhney A.K, “A course in Electrical and Electronic Measurement and

REFERENCES:
Hall of India, New Delhi, New Delhi, 2003.
1986.

EI 9251  TRANSDUCERS ENGINEERING  L T P C
3 1 0 4

AIM:
To know how physical quantities are measured and how they are converted to
electrical or other forms.

OBJECTIVES:
- This course elaborates the purpose of measurement, the methods of
measurements, errors associated with measurements, the principle of
transduction, classifications and the characteristics of different transducers and
their recent developments and practical applications.

PREREQUISITE
Not Required

UNIT I  SCIENCE OF MEASUREMENT AND TRANSDUCTION  9
Units and standards – Calibration methods – Classification of errors - Error analysis –
Limiting error - Probable error - Propagation of errors- Odds and uncertainty-
Principle of transduction - Classification.

UNIT II  CHARACTERISTICS OF TRANSDUCERS  9
Static characteristics – Mathematical model of transducers:- Zero, first and second
order transducers –Dynamic characteristics of first and second order transducers for
standard test inputs.
UNIT III VARIABLE RESISTANCE TRANSDUCERS

UNIT IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS
Inductive potentiometer – Variable Reluctance transducers:- EI pick up and LVDT – Capacitive transducers:- Variable air gap type, Variable area type and Variable permittivity type – Capacitor microphone.

UNIT V SPECIAL TRANSDUCERS

TEXT BOOKS:

REFERENCES:

EI 9253 LINEAR INTEGRATED CIRCUITS

AIM:
To introduce the concepts for realising functional building blocks in ICs, fabrications & application of ICs.

OBJECTIVES:
- To study the IC fabrication procedure.
- To study characteristics; realize circuits; design for signal analysis using Op-amp ICs.
- To study the applications of Op-amp.
- To study internal functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits, ADCs.

UNIT I FABRICATION OF INTEGRATED CIRCUITS
UNIT II  LINEAR INTEGRATED CIRCUITS  
Introduction to Linear IC – Operational amplifiers – DC characteristics: bias, offset and drift – AC characteristics: bandwidth, slew rate and noise - Inverting and non-inverting amplifiers - Zero crossing detector with hysteresis – Arithmetic Circuits.

UNIT III  APPLICATIONS OF OP-AMP  
Precision rectifiers – Active filters – Butterworth low-pass filter and Butterworth high-pass filter - Waveform generators: - Square, triangular and sine wave – V to I converter and I to V converter - Instrumentation Amplifier - Log and antilog amplifiers.

UNIT IV  TIMER AND PHASE-LOCKED LOOP  
Basic functional block diagram - Characteristics and applications of ICs: 555, 565, 566, LM 723 voltage regulator and current regulator.

UNIT V  SPECIAL FUNCTIONS ICs  
Functional Block diagram of ADC and DAC – Sample and Hold circuit - Successive Approximation ADC - Integrating ADC – Sigma Delta ADC – Study of successive approximation ADC IC – Study of Integrating ADC IC – Study of Sigma Delta ADC IC – Study of 8 bit DAC IC – Temperature Sensor IC - Piezoelectric Pressure Sensor IC – Hall-Effect sensor IC and Level sensor IC.

L: 45 T: 15 TOTAL: 60 PERIODS  

TEXT BOOKS:  

REFERENCES:  

EC9262  COMMUNICATION ENGINEERING  
L T P C  
3 0 0 3  

AIM:  
It provides an idea of different modulation principles and communication systems.

OBJECTIVES:  
- To understand the ways of modulation, methods of data transmission for communication.

UNIT I  AMPLITUDE MODULATION  
Amplitude modulation: Basic principle of AM – Frequency spectrum and Bandwidth, Modulation index, AM power distribution and AM modulator circuits - AM transmitters: Low level transmitters and High level transmitters - AM reception: AM Receivers, TRF, Super heterodyne receivers and Double conversion AM Receivers.
UNIT II ANGLE MODULATION
Angle modulation: FM and PM waveforms, Frequency deviation, Phase Deviation and Modulation index, Frequency spectrum of Angle modulated wave - Phase and Frequency modulator and demodulator, Direct FM Transmitter, Indirect transmitters, Angle modulation versus Amplitude Modulation, FM receivers and Frequency versus Phase Modulation.

UNIT III PULSE COMMUNICATION SYSTEMS
PAM, PPM, PDM, PCM, Delta modulation, Differential PCM, Merit and demerits - Concept of multiplexing: FDM and TDM.

UNIT IV DATA TRANSMISSION
Base band signal receiver: Error probability, Optimum and matched filter techniques and Coherent reception - Digital modulation systems: ASK, FSK and PSK, Comparison of data transmission systems.

UNIT V COMMUNICATION SYSTEMS AND TELEVISION
Optical fibers: Single Mode Fibers, Graded Index fiber structure, Losses in optical Fibers, Fiber optic communication link - Introduction to micro wave communication system, Principle of satellite communication - Television: Scanning methods, B/W and color systems - Camera and Picture tubes, Synchronization, Transmitters and Receivers.

TEXT BOOKS:

REFERENCES:

GE9261 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

AIM:
To create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates.

OBJECTIVE:
At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.
UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Definition, scope and importance of environment – need for public awareness
concept of an ecosystem – structure and function of an ecosystem – producers,
consumers and decomposers – energy flow in the ecosystem – ecological
succession – food chains, food webs and ecological pyramids – Introduction, types,
characteristic features, structure and function of the (a) forest ecosystem (b)
grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams,
lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic,
species and ecosystem diversity – biogeographical classification of India – value of
biodiversity: consumptive use, productive use, social, ethical, aesthetic and option
values – Biodiversity at global, national and local levels – India as a mega-diversity
nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of
wildlife, man-wildlife conflicts – endangered and endemic species of India –
conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II  ENVIRONMENTAL POLLUTION

Definition – causes, effects and control measures of: (a) Air pollution (b) Water
pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution
(g) Nuclear hazards – soil waste management: causes, effects and control measures
of municipal solid wastes – role of an individual in prevention of pollution – pollution
case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation, case studies- 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, dams-benefits and problems – Mineral resources: Use and
exploitation, environmental effects of extracting and using mineral resources, case
studies – Food resources: World food problems, changes caused by agriculture and
overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water
logging, salinity, case studies – Energy resources: Growing energy needs, renewable
and non renewable energy sources, use of alternate energy sources. case studies
– Land resources: Land as a resource, land degradation, man induced landslides, soil
erosion and desertification – role of an individual in conservation of natural resources
– Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland/
hill / mountain.

UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – urban problems related to energy
– water conservation, rain water harvesting, watershed management – resettlement
and rehabilitation of people; its problems and concerns, case studies – role of non-
governmental organization- environmental ethics: Issues and possible solutions –
climate change, global warming, acid rain, ozone layer depletion, nuclear accidents
and holocaust, case studies. – wasteland reclamation – consumerism and waste
products – environment production act – Air (Prevention and Control of Pollution) act
– Water (Prevention and control of Pollution) act – Wildlife protection act – Forest
conservation act – enforcement machinery involved in environmental legislation-
central and state pollution control boards- Public awareness.
UNIT V  HUMAN POPULATION AND THE ENVIRONMENT  


L: 45 TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

EI9252  TRANSDUCERS AND MEASUREMENTS LABORATORY  L T P C
0 0 3 2

2. Dynamic characteristics of various types of Thermocouple with and without Thermowell.
3. Static and Dynamic characteristics of RTD using Transducer Analysis Station.
5. Lead wire compensation for RTD.
7. Temperature compensation for Strain Gauge.
9. Study of Synchro - Transmitter and Synchro – Receiver
10. Wheatstone Bridge and Kelvin’s Bridge for Measurement of Resistance.
15. Calibration of Ammeter and Voltmeter using Student type Potentiometer.

TOTAL: 45 PERIODS
8. Design of Sample and Hold circuit and Schmitt trigger.
10. Regulated power supply using voltage regulator ICs.
11. 555 timer applications.
12. Study of Phase Locked Loop.

TOTAL: 45 PERIODS

AIM:
To provide an exposure to various measuring techniques for force, torque, velocity, acceleration, vibration, density, temperature and pressure.

OBJECTIVES:
• At the end of the course the student will have an insight about different techniques, units and significance of measuring devices.

UNIT I  MEASUREMENT OF FORCE, TORQUE AND VELOCITY  9
Electric balance – Different types of load cells:- Hydraulic, Pneumatic strain gauge, Magneto elastic and Piezo electric load cell – Different methods of torque measurements:- strain gauge and Relative angular twist - Speed measurement:- Capacitive tacho, Dragcup type tacho, D.C. and A.C. Tachogenerators and Stroboscope.

UNIT II  MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY  9
Accelerometers:- LVDT, Piezo-electric, Strain gauge and Variable reluctance type accelerometer – Mechanical type vibration instruments – Seismic instruments as an accelerometer – Vibrometers - Calibration of Vibration pickups - Units of density and specific gravity, Baume scale, and API scale – Density Measurement:- Pressure head type densitometers, Float type densitometers, Ultrasonic densitometer and Bridge type gas densitometer.

UNIT III  PRESSURE MEASUREMENT  9
Units of pressure – Manometers – Types:- Elastic type pressure gauges, Bourdon tube, Bellows and Diaphragms - Electrical methods:- Elastic elements with LVDT and strain gauges, Capacitive type pressure gauge, Piezo-resistive pressure sensor and Resonator pressure sensor - Measurement of vacuum:- McLeod gauge, Thermal conductivity gauges and Ionization gauges:- Cold cathode type and hot cathode type - Testing and calibration of pressure gauges - Dead weight tester.
UNIT IV TEMPERATURE MEASUREMENT
Definitions and standards - Primary and secondary fixed points - Calibration of thermometers - Different types of filled in system thermometers - Sources of errors in filled in systems and their compensation - Bimetallic thermometers - Electrical methods of temperature measurement - Signal conditioning of RTDs and their characteristics - 3 lead and 4 lead RTDs - Thermistors.

UNIT V THERMOCOUPLES AND RADIATION PYROMETERS

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

EI 9302 CONTROL ENGINEERING

AIM: To provide a sound knowledge in the basic concepts of Linear Control Theory and Design.

OBJECTIVES:
- To understand the methods of representation of systems and their transfer function models.
- To provide adequate knowledge in time response of systems and steady state error analysis.
- To give basic knowledge in obtaining the open loop and closed-loop frequency responses of systems.
- To understand the concept of stability of control system and methods of stability analysis.
- To study the three ways of designing compensators for a control system.
UNIT I  SYSTEMS AND THEIR REPRESENTATION  9

UNIT II  TIME RESPONSE ANALYSIS  9

UNIT III  FREQUENCY RESPONSE ANALYSIS  12
Frequency response - Frequency domain specifications - Bode plot- Polar plot - Determination of phase margin and gain margin - Constant M and N circles - Nichols chart - Determination of closed loop response from open loop response - Computer simulation.

UNIT IV  STABILITY OF CONTROL SYSTEM  6

UNIT V  CONTROL SYSTEM DESIGN  9

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:

CS9311  DATA STRUCTURES AND ALGORITHM  L T P C
3 0 0 3

AIM:
To present the concept of different type data structures through algorithm.

OBJECTIVES:
• To introduce the concepts of arrays and its representations.
• To study linked lists, stack and queue structures.
• To study trees, representation of trees, tree traversal and basic operations on trees.
• To study some of the sorting and searching techniques.
• To study the concept of graphs, traversal techniques and minimum spanning tree.
UNIT I  ARRAYS AND LINKED LISTS  8
Linear arrays: Representation of linear array, Traversing linear array and Insertion and deletion in linear arrays - Multidimensional arrays:- Representation of N-dimensional arrays in memory - Linked list:- Representation of linked list in memory, Traversing linked list, Insertions and deletions in linked list, Doubly linked list, Circular linked list and Header linked list - Sorted linked list:- Searching, Insertion and Deletion.

UNIT II  STACKS AND QUEUES  8
Stack:- Representation of stack with array and linked list, Simple applications, Recursions and Implementation of recursive procedures - Queues:- Representation of queue with array and linked list, Priority queue, Representation of priority queue with array and list, Circular queue and Dequeue.

UNIT III  TREES  12
Binary Trees:- Types of binary trees, Representation of binary trees and Traversing binary trees – Binary Search Tree:- Searching, Inserting and Deleting in binary search tree – AVL Search Tree:- Insertion and Deletion in AVL tree – B Trees:- Searching, Inserting and Deleting in B trees – Heap Tree:- Insertion and Deletion in Heap tree – Threading in trees:- Minimum weighted path length tree – General tree to binary tree representation.

UNIT IV  GRAPHS  9

UNIT V  SEARCHING AND SORTING  8
Binary search – Hashing:- Hash function, Collision, Separate chaining, Open addressing, Rehashing and Extendible hashing – Sorting:- Selection, Bubble, Insertion, Merge, Quick, Heap and Radix Sort.

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To expose the students to Architecture and Programming of Microprocessors and Microcontrollers.

OBJECTIVES:
- This course lays an in-depth foundation of 8 bit microprocessor using 8085 family and overview of advanced processors, discusses organization, architecture and operation of popular Intel 8051 family of 8 bit microcontroller and the peripherals, memory interfacing with these devices.

UNIT I 8085 MICROPROCESSOR

UNIT II ADVANCED MICROPROCESSORS

UNIT III PERIPHERAL INTERFACING
PPI (8255) - USART (8251) – Timer (8253) - Programmable DMA Controller (8257) - Programmable Interrupt controller (8259) - Keyboard display controller (8279) - ADC and DAC Interfacing.

UNIT IV MICROCONTROLLERS
Intel 8031 and 8051 Architectures - Special function Registers (SFR) - Instruction set - Addressing modes - Assembly language programming - Timer and Counter Programming - Serial Communication Interrupts programming - External Memory Interfacing.

UNIT V MICROPROCESSOR BASED SYSTEMS DESIGN

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
Focuses on the development of prototype Virtual Instrumentation.

OBJECTIVES:
- To learn the programming, data acquisition hardware and implementing small projects in VI.

UNIT I INTRODUCTION

UNIT II DATA ACQUISITION IN VI
A/D and D/A Converters, plug-in Analog Input/Output cards - Digital Input and Output Cards, Organization of the DAQ VI system - Opto Isolation – Performing analog input and analog output - Scanning multiple analog channels - Issues involved in selection of Data acquisition cards - Data acquisition modules with serial communication - Design of digital voltimeters with transducer input – Timers and Counters.

UNIT III COMMUNICATION NETWORKED MODULES

UNIT IV REAL TIME CONTROL IN VI
Design of ON/OFF controller and Proportional controller for a mathematically described processes using VI software – Modeling and basic control of Level and Reactor Processes – Case studies on development of HMI, SCADA in VI.

UNIT V APPLICATIONS
PC based digital storage oscilloscope - Sensor Technology and Signal Processing - Virtual Laboratory - Spectrum Analyser - Waveform Generator – Data visualization from multiple locations:- Distributed monitoring and control - Vision and Motion Control.

L: 45 P: 15 TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To practice the various Data Structures through Programming Languages like C, C++ and Java.

OBJECTIVES:
- To facilitate the students, to write programs in C, C++ and Java.
- To implement the various data structures as Abstract Data Types.
- To write programs to solve problems using the ADTs.

1. Implementation of Linear and Binary Search Algorithm using C/C++/Java.
2. Implementation of Selection Sort, Bubble Sort, Insertion Sort Algorithm using C/C++/Java.
3. Implementation of Merge sort (array) and Quick Sort (Stack) Algorithm using C/C++/Java.
5. Implementation of Linked List Algorithm (Insertions and Deletions anywhere in the list) Using C/C++/Java.
6. Implementation of Sorted Linked List Algorithm (Searching, Insertions and Deletions) using C/C++/Java.
8. Implementation of Linear Queue with Linked List using C/C++/Java.
10. Queue operations (Priority queue) with priority of items using C/C++/Java.
11. Construction of Binary Search Tree and Traversal (pre, in and post order) using C/C++/Java.
12. Insertions and deletions in Binary Search Tree using C/C++/Java.

TOTAL: 45 PERIODS

1. 8085 Assembly Language Programming Exercises.
2. Interfacing 8255 and 8253 with 8085.
3. Interfacing 8279 and 8251 with 8085.
4. Interfacing 8259 with 8085.
5. Interfacing Stepper motor with 8085.
6. 8051 Assembly Language Programming Exercises.
7. Interfacing ADC with Microprocessor and Microcontroller.
8. Interfacing DAC with Microprocessor and Microcontroller.
11. Microprocessor based PID controller.
12. LCD Display Interface with 8051.

TOTAL: 45 PERIODS
AIM:
To enhance the overall capability of students and to equip them with the necessary Communication Skills and Soft Skills that would help them excel in their profession.

OBJECTIVES:
- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their jobs.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

A. Viewing and discussing audio-visual materials (6 periods)

1. Resume / Report Preparation / Letter Writing: (2)
   Letter writing – Job application with Resume - Project report - Email etiquette.

2. Presentation skills: (1)
   Elements of effective presentation – Structure of presentation - Presentation tools – Body language.

3. Soft Skills: (1)
   Time management – Stress management – Assertiveness – Negotiation strategies.

4. Group Discussion: (1)
   Group discussion as part of selection process, Structure of group discussion – Strategies in group discussion – Mock group discussions.

5. Interview Skills: (1)
   Kinds of interviews – Interview techniques – Corporate culture – Mock interviews.
   (Career Lab Software may be used for this section).

Note: Career Lab software may be used to learn the skills, to be applied in the practice session.

B. Practice session (24 periods)

1. Resume / Report Preparation / Letter writing: Students prepare their own resume and report.
2. Presentation Skills: Students make presentations on given topics.
3. Group Discussion: Students participate in group discussions.
4. Interview Skills: Students participate in Mock Interviews.
REFERENCES:

EI 9351 INDUSTRIAL INSTRUMENTATION – II L T P C
3 0 0 3

AIM:
To provide exposure to various measuring techniques for flow, level, viscosity and moisture.

OBJECTIVES:
- The students are exposed to mechanical flow meters, mass flow meters and electrical type flow meters and different techniques for solid and liquid level measurements, viscosity and humidity measurements.

UNIT I VARIABLE HEAD TYPE FLOWMETERS
Variable head type flow meters:– Orifice plate, Venturi tube, Flow nozzle and Dall tube – Installation of head flow meters – Pitot tube.

UNIT II QUANTITY METERS, AREA FLOW METERS AND MASS FLOW METERS

UNIT III ELECTRICAL TYPE FLOW METER

UNIT IV LEVEL MEASUREMENT
Level measurement:– Float, Displacer type and Bubbler system – Electrical level gauge:– Resistance and Capacitance – Nuclear radiation and Ultrasonic types – Boiler drum level measurement:– Differential Pressure Method and Hydra step method – Solid level measurement.
UNIT V MEASUREMENT OF VISCOSITY, HUMIDITY AND MOISTURE
Viscosity:- Say bolt viscometer and Rotameter type viscometer – Consistency meters – Dry and wet bulb psychrometers – Hot wire electrode type hygrometer, Dew cell and Electrolysis type hygrometer – Commercial type dew point meter – Moisture measurement:- Different methods of moisture measurements and Application of moisture measurement.

TEXT BOOKS:

REFERENCES:
UNIT IV CONTROLLER TUNING
Evaluation criteria – IAE, ISE, ITAE and ¼ decay ratio - Tuning:- Process reaction curve method, Continuous cycling method and Damped oscillation method – Determination of optimum settings for mathematically described processes using time response and frequency response approaches – Auto tuning.

UNIT V MULTILOOP CONTROL

TEXT BOOKS:

REFERENCES:

EC 9361 VLSI DESIGN L T P C
Aim: Emphasis on advanced Digital Logic and VLSI design.

OBJECTIVES:
- To learn the digital techniques, interfacing, PLDs, FPGAs and Principle of VHDL programming for VLSI design.

UNIT I BASIC CIRCUITS FOR DIGITAL SYSTEMS
CMOS Inverter – Design principles – Lay out rules - Construction of multiplexers – Transmission gates – Principles and design considerations of specific PROM, EPROM, SRAM and DRAM.

UNIT II VHDL PROGRAMMING
Introduction to VHDL – Sequential and concurrent descriptions – Signal, port and variable statements – Sequential statements – Block, process, component and generate descriptions – Test bench creations and principle of operation of VHDL simulator – Introduction to Verilog and brief comparison with VHDL.

UNIT III COMBINATIONAL CIRCUITS FOR DIGITAL SYSTEMS
Basics and VHDL programming:- Adder, Fast adder and Multiplier - Synthesis of logic function:- Multiplexers, Decoders, Encoders - Data path circuits.

UNIT IV SEQUENTIAL CIRCUITS FOR DIGITAL SYSTEMS
Basics and VHDL programming of the following sequential circuits:- Flip flops, Registers, Counters and Accumulators.
UNIT V PROGRAMMABLE LOGIC DEVICES

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

EC9362 DIGITAL SIGNAL PROCESSING L T P C
3 1 0 4

AIM:
To introduce the concept of signal processing and design of digital filters

OBJECTIVES:
• Understand basic tradeoffs in digital representation of signals: sampling rate, bandwidth, bit rate, fidelity. Analyze minimum phase, linear phase, and all-pass discrete-time systems and to check the stability of filters.

UNIT I DISCRETE TIME SIGNALS AND SYSTEMS
Sampling of analog signals – Aliasing - Standard discrete time signals – Classification of discrete time systems:– Linear time invariant systems, causality, stability – Convolution sum – Difference equation representation – Correlation of discrete time signal:- cross correlation and autocorrelation sequences.

UNIT II Z – TRANSFORM AND FOURIER TRANSFORM

UNIT III FAST FOURIER TRANSFORM (FFT)
UNIT III  IIR FILTER DESIGN

UNIT V  FIR FILTER DESIGN AND DSP PROCESSORS

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:

EI 9353  PROCESS CONTROL LABORATORY  L T P C
0 0 3 2

1. Study of Process Control Training Plant and Compact Flow Control Unit.
2. Characteristics of Control Valve (with and without Positioner).
3. Level Control and Pressure Control in Process Control Training Plant.
5. Tuning of PID Controller for mathematically described processes
6. PID Implementation issues.
7. PID Enhancements (Cascade and Feed-forward Control Schemes)
8. Analysis of Multi-input Multi-output system (Four-tank System).
10. Design and Implementation of Multivariable Controller (Four-tank System).
11. Study of AC and DC drives.
12. Study pH Control Test Rig.

TOTAL: 45 PERIODS
1. Determination of Discharge coefficient of Orifice plate and Venturi meter.
3. Characteristics of P/I and I/P Converters.
6. Pressure gauge calibration using Dead Weight Tester.
7. Study of UV-Visible Spectrometer.
8. Study of ECG, Audiometer and Spirometer.
9. Study of Smart transmitter and Smart Valve Positioner.
12. Flue-gas analyzer.
13. Determination of Transfer function model of Temperature transducers.
15. Study of IR Thermometers.

TOTAL: 45 PERIODS

**OBJECTIVE:**

During the seminar session each student is expected to prepare and present a topic on Electronics and Instrumentation Engineering, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also. Outside experts also may be invited to deliver state of the art technological innovations.

Students are encouraged to use various teaching aids such as overhead projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.
AIM:
This course is designed to know about different data networks, to know about various PLC languages. It also provides knowledge about Distributed control Systems.

OBJECTIVES:
- To provide idea about various Data Networks.
- To get an exposure to SCADA.
- To learn about different PLC languages.
- To study about Industrial DCS.
- To have an exposure to HART and Fieldbus.

UNIT I DATA NETWORK FUNDAMENTALS

UNIT II PLC AND SCADA
Evolutions of PLCs – Sequential and Programmable Controllers – Architecture – Comparative study of Industrial PLCs. – SCADA: Hardware and software, Remote terminal units, Master station, Communication architectures and Open SCADA protocols.

UNIT III PLC PROGRAMMING
PLC Programming: Ladder logic, Functional block programming, Sequential function chart, Instruction list and Structured text programming.

UNIT IV DISTRIBUTED CONTROL SYSTEMS
Evolution - Different architectures - Local control unit - Operator Interface - Displays - Engineering interface - Study of any one DCS available in market - Factors to be considered in selecting DCS – Case studies in DCS.

UNIT V HART AND FIELDBUS

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM: The course is designed to introduce advanced topics in Process Control.

OBJECTIVES:
- To represent the Linear System in State Space form.
- To design Digital Controller.
- To analyze nonlinear systems.
- To identify the unknown parameters of the transfer function model using Process Identification Techniques.
- Optimal Controller Design.

UNIT I DISCRETE STATE-VARIABLE TECHNIQUE
State equation of discrete data system with sample and hold – State transition equation – Methods of computing the state transition matrix – Decomposition of discrete data transfer functions – State diagrams of discrete data systems – System with zero-order hold – Controllability and observability of linear time invariant discrete data system – Stability tests of discrete-data system.

UNIT II NONLINEAR SYSTEMS

UNIT III DIGITAL CONTROLLER DESIGN

UNIT IV SYSTEM IDENTIFICATION

UNIT V OPTIMAL CONTROL SYSTEMS

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
The course is designed to equip the students with adequate knowledge of a number of analytical tools which are useful for Industrial analysis, drugs and pharmaceutical labs and above all for environmental pollution monitoring.

OBJECTIVES:
- To provide various techniques and methods of analysis which occur in the various regions of the spectrum.
- To study important methods of analysis of industrial gases.
- To provide the important radio chemical methods of analysis.

UNIT I  SPECTRO PHOTOMETERS  12
Spectral methods of analysis: UV, Visible, IR, FTIR, atomic absorption - Flame emission mass spectrophotometers – Sources - Detectors – Applications.

UNIT II ION CONDUCTIVITY AND DISSOLVED COMPONENT ANALYSER  6

UNIT I II GAS ANALYZER  9

UNIT IV CHROMATOGRAPHY  9

UNIT V NMR, X-RAY AND MASS SPECTROMETRIC TECHNIQUES  9

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To expose the students to Architecture and Programming of Real Time Embedded Systems.

OBJECTIVES:
- This course discusses organization, architecture, design and development and applications of real-time embedded systems.

UNIT I  INTRODUCTION TO EMBEDDED SYSTEMS
Brief overview of real time systems and embedded systems - Classification of embedded systems - Embedded system definitions - Functional and nonfunctional requirements - Architectures and standards - Typical applications.

UNIT II  EMBEDDED SYSTEM COMPONENTS AND INTERFACE
Device choices - Selection criteria and characteristics of Processors and memory systems for embedded applications - Interface and Peripherals - Power sources and management.

UNIT III  EMBEDDED SYSTEM DESIGN AND DEVELOPMENT
Design methods and techniques - Classification of need - Need analysis - Requirement and specification - Conceptual design - Models and languages - State machine model - State machine tables - Verification – Validation - Simulation and emulation.

UNIT IV  REAL TIME SYSTEMS AND MODELS
Characteristics and classification of real time systems - Real time specifications and Design techniques - Event based - Process based and graph based models - Real time kernel - Hierarchy services and design strategy - Real time system performance and analysis - Typical real time systems - Their languages and features.

UNIT V  CASE STUDIES
Case studies of safety-critical and time-critical embedded systems with reference to Aerospace, Automobile, Medical and Industrial applications.

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
EI 9404  ADVANCED PROCESS CONTROL LABORATORY  

1. Simulation of Lumped Parameter System.  
2. Identification of Linear Dynamic model (Black Box) of a Process using Parametric Methods.  
4. PC based Control of Heat Exchanger.  
6. Design of Deadbeat and Dahlin’s Controllers for first order process with dead time.  
7. Study of Distributed Control System (Delta V and CS 3000).  
8. Implementation of Discrete Control Sequence using PLC.  
10. On-line Control using Distributed Control System.  
11. Design of Fuzzy Logic Controller for the pH process.  

TOTAL: 45 PERIODS

EI 9405  INSTRUMENTATION SYSTEM DESIGN LABORATORY  

1. Design of square root extractor.  
2. Design of linearizing circuit for thermocouples.  
3. Design of ON/OFF and PID Controllers (using Operational Amplifier, Microprocessor and Microcontroller).  
4. Design of Thyristor Power Controller.  
5. Design of RTD based 2-wire/4-wire Temperature Transmitters.  
6. Design of Capacitance based Level Transmitter.  
8. Control valve sizing.  
9. Orifice sizing and Rotameter design.  
10. Piping and Instrumentation Diagram – Case Study.  
12. Preparation of Project Scheduling, Installation Procedure and Safety Regulations.  

TOTAL: 45 PERIODS

EI 9406  COMPREHENSION  

AIM:  
To encourage the students to comprehend the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.
AIM:
To give a comprehensive knowledge on Power Electronic Devices and Circuits.

OBJECTIVES:
The course would expose the student to:
• various power electronic devices, their characteristics and protection.
• Detailed operations of commonly used circuit topologies like Controlled Rectifiers, Inverters, Choppers and A.C Controllers.
• Introduction to popular applications.

UNIT I  POWER SEMICONDUCTOR DEVICES AND CHARACTERISTICS  8

UNIT II  CONVERTERS  10

UNIT II  INVERTERS  10

UNIT IV  CHOPPERS  9
Step up and Step down Chopper – Chopper classification – Switching mode Regulators - Buck, Boost, Buck-Boost, and Cuk Regulators - A.C. Choppers.

UNIT V  APPLICATION  8
Introduction to A.C and D.C drives – Closed loop control – Stepper and Switched Reluctance motor drive – Uninterrupted power supply – Switched mode power supply.

L: 45: TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To provide an exposure to various Fiber optic and Laser sensors.

OBJECTIVES:
- To provide an introduction to the characteristics, losses and fabrication of optical fibers. The use of optical fiber as a sensor for different applications is discussed in detail. An introduction about the characteristics, generation and the use of laser for various measurements are also discussed.

UNIT I  OPTICAL FIBRES AND THEIR PROPERTIES  12

UNIT II  INDUSTRIAL APPLICATION OF OPTICAL FIBRES  9

UNIT III  LASER FUNDAMENTALS  9

UNIT IV  INDUSTRIAL APPLICATION OF LASER  6
Laser for measurement of distance, length, velocity, acceleration, current, voltage, and atmospheric effect - Material processing - Laser heating, welding, melting and trimming materials, removal and vaporization.

UNIT V  HOLOGRAM AND MEDICAL APPLICATION  9

TEXT BOOKS:

REFERENCES:
AIM:
To make the students understand the importance, relevance, and potentialities of this emerging field of study.

OBJECTIVES:
- Study the basic nano technology and nano science.
- Understand interdisciplinary nature of this field.
- Understand the important role of physics, chemistry, biology.
- Recognize that the rules of nano science are fundamentally different than those we experience.
- Study the basic fabrication strategies of nano science.

UNIT I  INTRODUCTION  10
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II  PREPARATION METHODS  10
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III  PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES  5
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma/reactive ion) etching, Etch resists-dip pen lithography

UNIT IV  PREPARATION ENVIRONMENTS  10
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working Practices, Sample cleaning, Chemical Purification, Chemical and Biological contamination, Safety Issues, Flammable and Toxic Hazards, Biohazards.

UNIT V  CHARACTERISATION TECHNIQUES  10
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM:
To introduce the basic concepts of operating systems, process management, scheduling, process synchronization, deadlocks, memory management, storage management and about distributed systems.

OBJECTIVES:
- To study the basic concepts of operating systems, processes and CPU scheduling.
- To study about process synchronization and deadlocks.
- To study about memory management and storage management.
- To study about distributed system structures, distributed file systems and distributed coordination.

UNIT I  BASICS OF OPERATING SYSTEMS, PROCESSES AND CPU SCHEDULING

UNIT II  PROCESS SYNCHRONIZATION AND DEADLOCKS

UNIT III  MEMORY MANAGEMENT

UNIT IV  STORAGE MANAGEMENT

UNIT V  DISTRIBUTED SYSTEMS

L: 45 TOTAL: 45 PERIODS

TEXT BOOK:
REFERENCES:

GE9021 PROFESSIONAL ETHICS IN ENGINEERING

AIM:
To sensitize the engineering students on blending both technical and ethical responsibilities.

OBJECTIVES:
- Identify the core values that shape the ethical behavior of an engineer.
- Utilize opportunities to explore one’s own values in ethical issues.
- Become aware of ethical concerns and conflicts.
- Enhance familiarity with codes of conduct.
- Increase the ability to recognize and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as Responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER’S RESPONSIBILITY FOR SAFETY

UNIT IV RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

EI9028 COMPUTER ARCHITECTURE L T P C 3 0 0 3

AIM:
To introduce the basic operation and architecture of computer.

OBJECTIVES:
• To study about various arithmetic units like Adder, Subtractor, Multiplier and Divider.
• To discuss about the issues involved in the design of control units.
• To learn the various organization of memory and I/O.

UNIT I BASIC STRUCTURE OF COMPUTERS 10
Functional units - Basic Operational Concepts, Bus Structures, Software Performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and Queues.

UNIT II ARITHMETIC 8
Addition and subtraction of signed numbers – Design of fast adders – multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

UNIT III BASIC PROCESSING UNIT 9

UNIT IV MEMORY SYSTEM 9
Basic concepts – Semiconductor RAMs, ROMs – Speed, size and cost – cache memories - Performance consideration – Virtual memory - Memory management requirements – Secondary storage.
UNIT V  I/O ORGANIZATION

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

EI9022  BIOMEDICAL INSTRUMENTATION  L T P C
3 0 0 3

AIM:
To provide exposure to various physiological signal measurements and various assisting devices.

OBJECTIVE:
• The students will be exposed to electrical and non-electrical physiological measurements apart from assisting and therapeutical devices.

UNIT I  ANATOMY, PHYSIOLOGY AND TRANSDUCER
Review of human anatomy and physiology of heart, lungs, eye and nervous systems - Introduction to different types of bioelectric potentials - Action and resting potentials - Propagation of action potentials - Components of biomedical instrumentation system - Different type of electrodes, sensors used in biomedicine - Selection criteria for transducer and electrodes.

UNIT II  ELECTRO- PHYSIOLOGICAL MEASUREMENT
ECG, EEG, EMG, ERG – Lead systems and recording methods - Typical waveforms.

UNIT III  NON ELECTRICAL PARAMETER MEASUREMENT
Measurement of blood pressure - Ultra sound blood flow meter - Blood flow cardiac output - Heart rate, heart sound, measurement of gas volume, flow rate of CO₂ and O₂ in exhaust air, pH of blood.

UNIT IV  MEDICAL IMAGING AND TELEMETRY
X-ray machine - Computer tomography - Magnetic resonance imaging system - Positron emission tomography and endoscopy - Introduction to telemetry systems - Different types of telemetry systems.

UNIT V  ASSISTING AND THERAPUTIC DEVICES

L: 45 TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

EI9023 POWER PLANT INSTRUMENTATION L T P C
3 0 0 3

AIM:
To provide a detailed insight about the operation and control in thermal power plant.

OBJECTIVES:
• The students will be exposed to a detailed study about different measuring instruments and analyzers used in thermal power plants. The different control schemes for boilers and turbine are also discussed.

UNIT I OVERVIEW OF POWER GENERATION 9

UNIT II MEASUREMENTS IN POWER PLANTS 9

UNIT III ANALYZERS IN POWER PLANTS 9

UNIT IV CONTROL LOOPS IN BOILER 9
Combustion control – Air/fuel ratio control – Furnace draft control – Drum level control – Main steam and reheat steam temperature control – Super heater control – Attemperator – Deaerator control – Distributed control system in power plants - Interlocks in boiler operation.

UNIT V TURBINE-MONITORING AND CONTROL 9
Speed, Vibration, shell temperature monitoring and control - Steam pressure control – Lubricant oil temperature control – Cooling system.
TEXT BOOKS:

REFERENCES:

EI9024 INSTRUMENTATION IN PETRO CHEMICAL INDUSTRY LT P C
3 0 0 3

AIM:
The course is designed to equip the students to understand the operations of petrochemical industries.

OBJECTIVES:
- To introduce unit operations in petroleum industries.
- To introduce the process involved in purifying petroleum products.
- An exposure to the chemicals and useful products present in petroleum.
- To provides information about the measurement of various parameters.
- To help the students in identifying different loops and the techniques to control the loops in order to increase the final product in more economical manner.

UNIT I PETROLEUM PROCESSING 9

UNIT II UNIT OPERATIONS IN PETROLEUM INDUSTRY 9
Thermal cracking – Catalytic cracking – Catalytic reforming – polymerisation – Alkylation – Isomerization – Production of ethylene, acetylene and propylene from petroleum.

UNIT III CHEMICALS FROM PETROLEUM PRODUCTS 9
Chemical from petroleum – Methane derivatives – Acetylene derivatives – Ethylene derivatives – Propylene derivatives – Other products.

UNIT IV MEASUREMENTS IN PETROCHEMICAL INDUSTRY 6
Parameters to be measured in refinery and petrochemical industry – Selection and maintenance of measuring instruments – Protection types for instruments.

UNIT V CONTROL LOOPS IN PETROCHEMICAL INDUSTRY 12
Process control in refinery and petrochemical industry – Control of distillation column – Control of catalytic crackers and pyrolysis unit – Automatic control of polyethylene production – Control of vinyl chloride and PVC production.

L: 45 TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

EI9029 Applied Soft Computing

AIM:
To understand neural network and Fuzzy logic controllers.

OBJECTIVE:
• This course introduces the basics of neural network, fuzzy logic and its applications in control.

UNIT I INTRODUCTION AND DIFFERENT ARCHITECTURES OF NEURAL NETWORKS

UNIT II NEURAL NETWORKS FOR CONTROL

UNIT III INTRODUCTION TO FUZZY LOGIC

UNIT IV FUZZY LOGIC CONTROL SYSTEM

UNIT V HYBRID CONTROL SCHEMES

TEXT BOOKS:
REFERENCES:

EI9025 SYSTEM IDENTIFICATION AND ADAPTIVE CONTROL

AIM:
The aim of the course is to introduce various system identification and adaptive control techniques.

OBJECTIVES:
At the end of this course student will be exposed to:
- Non parametric approaches based system identification.
- Non recursive and recursive parametric identification approaches.
- Design of Adaptive Controllers

UNIT I NON PARAMETRIC METHODS
Nonparametric methods:- Transient analysis - frequency analysis - Correlation analysis - Spectral analysis.

UNIT II PARAMETRIC METHODS
Linear Regression:- The Least square estimate - Best linear unbiased estimation under linear constraints - Updating the Parameter estimates for linear regression models - Prediction error methods:- Description of Prediction error methods - Optimal Prediction – Relationships between prediction error methods and other identification methods - theoretical analysis.
Instrumental variable methods:- Description of Instrumental variable methods - Theoretical analysis - covariance matrix of IV estimates - Comparison of optimal IV and prediction error methods.

UNIT III RECURSIVE IDENTIFICATION METHODS
The recursive least squares method - Recursive Instrumental variable method-the recursive prediction error method-model validation and model structure determination.
Identification of systems operating in closed loop:- Identifiability considerations - Direct identification - Indirect identification - Joint input – Output identification.
UNIT IV ADAPTIVE CONTROL SCHEMES

UNIT V ISSUES IN ADAPTIVE CONTROL AND APPLICATIONS
Stability – Convergence – Robustness – Application of adaptive control.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

EE9050 INDUSTRIAL DRIVES AND CONTROL

AIM:
To give a sound knowledge in the field of electric drives.

OBJECTIVES:
• In this course students are exposed to concepts of different types of DC and C motor drives, their closed loop control and introduction to advanced Concepts such as dynamic and adaptive control of AC drives.

UNIT I INTRODUCTION TO DC AND AC MOTORS

UNIT II CONTROL OF DC DRIVES
Analysis of series and separately excited DC motor with single phase and three phase converters operating in different modes and configuration - Problems on DC machines fed by converter supplies CLC and TRC strategies. - Analysis of series and separately excited DC motors fed from different choppers, effect saturation series motors – CLC and TRC strategies – Closed loop control schemes.

UNIT III CONTROL OF AC DRIVES
Operation of Induction motor with non - sinusoidal supply wave forms, variable frequency operation of three phase Induction motors, constant flux operation, current fed operations. Dynamic and regenerative braking of CSI and VSI fed drives. Types of rotor choppers, torque equations, constant torque operations, TRC strategies, combined stator voltage control and rotor resistance control, principle of vector control – Direct and indirect FOC.
UNIT IV SPECIAL MACHINES
Modeling and control schemes for PMSM, PMBLDC, stepper motor and switched reluctance motor.

UNIT V CASE STUDY
Investigation on intelligent adaptive control strategies.

TEXT BOOKS:

REFERENCES:

EC9052 MICRO CONTROLLER BASED SYSTEM DESIGN L T P C
3 0 0 3

AIM:
Emphasis on advanced Microcontrollers such as PIC and ARM.

OBJECTIVES:
- To learn the architecture and programming of popular microcontrollers such as PIC and ARM.

UNIT I PIC INTRODUCTION
Introduction to PIC Microcontroller - PIC 16C6x and PIC 16C7x Architectures - PIC 16Cxx Instruction Set – Simple Operations.

UNIT II INTERRUPTS AND TIMER
PIC microcontroller Interrupts – Timers – I/O Port Expansion – Front Panel I/O.

UNIT III PERIPHERALS AND INTERFACING
I²C Bus Peripheral Chip Access – Analog to Digital Converter – UART.

UNIT IV ARM INTRODUCTION
UNIT V  ARM ORGANIZATION
3-Stage Pipeline ARM Organization – 5-Stage Pipeline ARM Organization – ARM Implementation – ARM Instruction Set.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCE:

EI9032  ADVANCED DIGITAL SIGNAL PROCESSING  L T P C 3 0 0 3

AIM:
To introduce the concept of Multi-rate signal processing and Random Signal Processing.

OBJECTIVES:
• It gives the idea of Random signals behavior, manipulation and their processing.

UNIT I  DISCRETE RANDOM SIGNAL PROCESSING

UNIT II  SPECTRUM ESTIMATION

UNIT III  LINEAR ESTIMATION AND PREDICTION

UNIT IV  ADAPTIVE FILTERS
UNIT V  MULTIRATE DIGITAL SIGNAL PROCESSING  9
Mathematical description of change of sampling rate - Interpolation and Decimation -
continuous time model - Direct digital domain approach - Decimation by an integer
factor - Interpolation by an integer factor – Single and multistage realization - Poly
phase realization - Application to sub band coding - Wavelet transform and filter bank
implementation of wavelet expansion of signals.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
India, 1995.

<table>
<thead>
<tr>
<th>EI9033</th>
<th>DIGITAL IMAGE PROCESSING</th>
<th>L T P C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3 0 0 3</td>
</tr>
</tbody>
</table>

AIM:
It provides an introduction to image processing and focuses on the computation
aspect of the subject

OBJECTIVES:
- Introduce the student to analytical tools and methods which are currently used in
digital image processing as applied to image information for human viewing.

UNIT I  DIGITAL IMAGE FUNDAMENTALS  9
Elements of Digital Image Processing systems – Digital image representation -
elements of visual perception- Image sampling and quantization - Imaging geometry
- Discrete Image transforms - Properties.

UNIT II  PREPROCESSING AND ENHANCEMENT  9
Point Processing methods – Contrast stretching - Gray level slicing- Histogram
modification techniques-Spatial filtering - Enhancement in the frequency domain.

UNIT III  RESTORATION AND SEGMENTATION  9
Image restoration – Degradation model – Unconstrained and Constrained
restoration- Inverse filtering – Wiener filter - Restoration in spatial domain-
Segmentation - Detection of discontinuities - Edge linking - Boundary detection -
Thresholding - Region oriented segmentation.

UNIT IV  REGISTRATION AND COMPRESSION  9
Image registration - Translational misregistration detection - Statistical correlation
function, two state methods Image fusion. Fundamentals of Image Compression -
Lossy versus Lossless coding techniques, pixel coding, predictive techniques,
transform coding, algorithm and case studies.

UNIT V  APPLICATIONS OF DIGITAL IMAGE PROCESSING  9
Applications in medicine, manufacturing, measurement - Case studies.

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

EI9026 MICRO ELECTRO MECHANICAL SYSTEMS (MEMS) L T P C
3 0 0 3

AIM:
Introduction to microelectromechanical devices, with an emphasis on their manufacturing and mechanical behavior. Materials properties, microfabrication technology, mechanical behavior of microstructures, design, and packaging. Case studies on sensors, wireless communications, fluidic systems, microengines, and biological devices.

OBJECTIVES:
- This course is an introduction to MEMS. The course covers materials properties, fabrication techniques, basic structure mechanics, sensing and actuation principles, circuit and system issues, packaging, calibration and testing. Interdisciplinary applications will be explored.

UNIT I INTRODUCTION TO MEMS 9

UNIT II MECHANICS FOR MEMS DESIGN 9
Elasticity, stress, strain and material properties, Bending of thin plates, Spring configurations, torsional deflection, Mechanical vibration, Resonance - Thermo mechanics – Actuators, force and response time, Fracture and thin film mechanics, material, Physical Vapor Deposition (PVD), Chemical Mechanical Polishing (CMP).

UNIT III ELECTROSTATIC DESIGN 9
Electrostatics:- basic theory, electro static instability, Surface tension, gap and finger pull up - Electro static actuators - Comb generators - Gap closers - Rotary motors - Inch worms - Electromagnetic actuators - Bistable actuators.

UNIT IV CIRCUIT MODELING OF MEMS 9
UNIT V  CASE STUDIES  9
Microbridge gas sensors – Piezoelectric rate gyroscope – Capacitive Accelerometer
– Piezoresistive Pressure Sensor – Thermal Sensors:- Radiation Sensors,
Mechanical Sensors and Bio-Chemical Sensors.
TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
3. Hsu, T.R., “MEMS and Micro systems Design and Manufacture” Tata McGraw-
Hill, New Delhi, 2002.
Sensors MEMS and Smart Devices”, John Wiley and son LTD, 2002
2005.

EI9030  COMPUTER NETWORKS  L T PC
3 0 0 3

AIM:
To introduce the concepts, terminologies and technologies used in modern days data
communication and computer networking.

OBJECTIVES:
• To understand the concepts of data communications.
• To study the functions of different layers.
• To introduce IEEE standards employed in computer networking.
• To make the students to get familiarized with different protocols and network
components.

UNIT I  PHYSICAL LAYER  9
Computer Networks:- Introduction, Network hardware, Network software, Reference
models, Example of networks and Network standardization.
The Physical layer:- The theoretical basis for data communication – Guided
Transmission media - Wireless transmission – PSTN - Mobile telephone – Satellite
Communication.

UNIT II  DATA LINK LAYER  9
The Data Link Layer:- Data link layer design issues - Error detection and correction -
Elementary data link protocols - Sliding window protocols - Example of data link
protocols - ETHERNET – 802.11, 802.16, Bluetooth- Data link layer Switching.

UNIT III  NETWORK LAYER  9
The Network Layer:- Network layer design issues - Routing algorithms - Congestion
control algorithms – Internetworking - Network layer in Internet.
UNIT IV TRANSPORT LAYER 9
The Transport Layer:- Transport layer design issues - Transport layer protocols - Simple transport protocol - Internet transport protocols – UDP and TCP/IP.

UNIT V APPLICATION LAYER 9

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:

EI9031 INDUSTRIAL DATA NETWORKS L T P C 3 0 0 3
AIM:
To introduce the concepts, terminologies and technologies associated with industrial Data Networks.

OBJECTIVES:
• To make the students to get familiarized with different Buses such as Profibus, Modbus, Fieldbus, AS-I interface and Devicenet.

UNIT I RS – 232 AND RS – 485 9

UNIT II MODBUS, DATA HIGHWAY (PLUS) AND HART PROTOCOLS 9

UNIT III AS – INTERFACE (AS-I) AND DEVICENET 9
AS interface:- Introduction, Physical layer, Data link layer and Operating characteristics. Devicenet:- Introduction, Physical layer, Data link layer and Application layer.

UNIT IV PROFIBUS PA/DP/FMS AND FF 9
Profibus:- Introduction, Profibus protocol stack, Profibus communication model, Communication objects, System operation and Troubleshooting – Foundation fieldbus versus Profibus.

UNIT V INDUSTRIAL ETHERNET AND WIRELESS COMMUNICATION 9
Industrial Ethernet:- Introduction, 10Mbps Ethernet and 100Mbps Ethernet - Radio and wireless communication:- Introduction, Components of radio link, the radio spectrum and frequency allocation and Radio modems – Comparison between various industrial networks.

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

GE9022 TOTAL QUALITY MANAGEMENT

AIM:
To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES:
- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems.

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Leadership – Strategic quality planning, Quality statements - Customer focus Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV TQM TOOLS & TECHNIQUES II

UNIT V QUALITY SYSTEMS

TOTAL: 45 PERIODS
TEXT BOOK:

REFERENCES:

GE9074  ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING  L T P C
3 0 0 3

UNIT I  MANAGERIAL ECONOMICS  9
Relationship with other disciplines – Firm: types & Objectives – Managerial decisions. Analysis methods.

UNIT II  DEMAND & SUPPLY ANALYSIS  9

UNIT III  PRODUCTION AND COST ANALYSIS  9

UNIT IV  PRICING  9
Determinants of price – Pricing under different objectives – Pricing under different market structures – price discrimination – pricing methods in practice.

UNIT V  FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT)  9

CAPITAL BUDGETING (ELEMENTARY TREATMENT)
Investments – Risks and return evaluation of investment – Net present value – Internal rate of return.

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

EI9027 RELIABILITY AND SAFETY ENGINEERING L T P C
3 0 0 3

AIM:
To introduce the student to the basic concepts of reliability and safety engineering.

OBJECTIVES:
- To learn the concepts of Reliability, Failure modes, Maintainability and safety aspects.

UNIT I RELIABILITY

UNIT II CONCEPTS OF REDUNDANCY AND MAINTENANCE
Use of redundancy and system reliability improvement methods - Maintenance:- Objectives, types of maintenance, preventive, condition-based and reliability centered maintenance - Terotechnology, Total Productive Maintenance (TPM).

UNIT III MAINTAINABILITY
Maintainability:- Definition, basic concepts, relationship between reliability, maintainability and availability, corrective maintenance time distributions and maintainability demonstration - Design considerations for maintainability – Availability and reliability relationship.

UNIT IV RELIABILITY TESTS
Introduction to life-testing, destructive and non-destructive tests, estimation of parameters for exponential and Weibull distributions, component reliability and MIL standards.

UNIT V SAFETY

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES: