I SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S239	English – I	4		3	25	75	100
2	S132	Applied Mathematics - I	4+1		3	25	75	100
3	S238	Engineering Physics	4		3	25	75	100
4	S156	Circuit Theory	4		3	25	75	100
5	S170	Computer Programming	4+1		3	25	75	100
6	L142	Engineering Physics Lab		3	2	25	50	75
7	L143	Engineering Workshop		3	2	25	50	75
8	L126	Computer Programming Lab		3	2	25	50	75
9	L123	Computer Aided Engineering Drawing		3	2	25	50	75
		Total			**23**	**225**	**575**	**800**

II SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S240	English – II	4		3	25	75	100
2	S133	Applied Mathematics – II	4+1		3	25	75	100
3	S232	Engineering Chemistry	4+1		3	25	75	100
4	S178	Data Structures	4+1		3	25	75	100
5	S224	Electronic Devices and Circuits	4+1		3	25	75	100
6	L144	English Communication Lab.		3	2	25	50	75
7	L140	Engineering Chemistry Lab.		3	2	25	50	75
8	L139	Electronic Devices and Circuits Lab.		3	2	25	50	75
9	L128	Data Structures Lab.		3	2	25	50	75
		Total			**23**	**225**	**575**	**800**

III SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S134	Applied Mathematics – III	4+1		3	25	75	100
2	S220	Electrical Technology	4+1		3	25	75	100
3	S378	Signals and Systems	4+1		3	25	75	100
4	S126	Analog Electronic Circuits	4+1		3	25	75	100
5	S206	Electric and Magnetic Fields	4+1		3	25	75	100
6	S189	Digital Electronic Circuits	4+1		3	25	75	100
7	**S355**	Professional Ethics and Human Values	3		--	25	75	100
8	L107	Analog Electronic Circuits Lab.		3	2	25	50	75
9	L138	Electrical Technology Lab.		3	2	25	50	75
		Total			**22**	**225**	**625**	**850**

Note: The Subject with Code S355 is Mandatory Course

IV SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S410	Transducers in Instrumentation	4+1		3	25	75	100
2	S361	Pulse and Switching Circuits	4+1		3	25	75	100
3	T148	Control Systems	4+1		3	25	75	100
4	S169	Computer Organization	4+1		3	25	75	100
5	S295	Managerial Economics and Financial Analysis	4+1		3	25	75	100
6	S207	Electrical and Electronic Measurements	4+1		3	25	75	100
7	**S243**	Environmental Studies			--	25	75	100
8	L182	Transducers and Measurements Lab.		3	2	25	50	75
9	L174	Pulse and Digital Circuits Lab.		3	2	25	50	75
		Total			**22**	**225**	**625**	**850**

Note : The Subject with Code S243 is Mandatory Course

V SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S162	Communication Systems	4+1		3	25	75	100
2	S277	Integrated Circuits and Applications	4+1		3	25	75	100
3	S352	Process Control Instrumentation	4+1		3	25	75	100
4	S269	Industrial Instrumentation	4+1		3	25	75	100
5	S168	Computer Networks	4+1		3	25	75	100
6	S192	Digital Signal Processing	4+1		3	25	75	100
7	L152	Integrated Circuits and Applications Lab		3	2	25	50	75
8	L171	Process Control Lab		3	2	25	50	75
9	L176	Seminar			2	75	--	75
		Total			**24**	**275**	**550**	**825**

VI SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S333	Opto Electronics and Laser Instrumentation	4+1		3	25	75	100
2	S325	Object Oriented Programming using Java	4+1		3	25	75	100
3	S129	Analytical Instrumentation	4+1		3	25	75	100
4	S334	P. C. Based Instrumentation	4+1		3	25	75	100
5		**Program Elective-I**	4+1		3	25	75	100
	S188	Digital Control Systems						
	S416	Virtual Instrumentation						
	S368	Reliability in Instrumentation						
	S274	Instrumentation and Control in Petro chemicals Industries						
6		**Program Elective-II**	4+1		3	25	75	100
	S139	Automation Industrial Process						
	S190	Digital Image Processing						
	S279	Intelligent Instrumentation						
	S374	Safety Instrumentation						
7	L109	Analytical and PC based Instrumentation Lab		3	2	25	50	75
8	L119	Communication and Presentation skills lab		3	2	25	50	75
9	L164	Mini Project			2	25	50	75
		Total			**24**	**225**	**600**	**825**

VII SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S313	Micro Processors and Microcontrollers	4+1		3	25	75	100
2	S419	VLSI Design	4+1		3	25	75	100
3	S148	Bio Medical Instrumentation	4+1		3	25	75	100
4		**Program Elective-III**	4+1		3	25	75	100
	S344	Power Plant Instrumentation						
	S202	DSP Processors and Architectures						
	S236	Engineering Materials						
	S373	Robotics and Automation						
5		**Open Elective-I**	4+1		3	25	75	100
	S319	Nano Technology						
	S388	Space Sciences						
	S332	Optimization Techniques						
	S270	Industrial Management						
6	S340	PLC and SCADA	4+1		3	25	75	100
7	L161	Micro Processors and Microcontrollers Lab		3	2	25	50	75
8	L168	PLC and Bio Medical Instrumentation Lab		3	2	25	50	75
9	L153	Internship			2	75	--	75
		Total			**24**	**275**	**550**	**825**

VIII SEMESTER

S. No.	Subject code	Name of the Subject	Contact hours/week		Credits	Scheme of Valuation		Total Marks
			L+T	P		Internal (CIE)	External (SEE)	
1	S311	Micro Electro Mechanical Systems	4+1		3	25	75	100
2		**Program Elective-IV**	4+1		3	25	75	100
	S229	Embedded Systems Design						
	S107	Advanced Sensors						
	S399	Telemetry and Tele Medicine						
	S380	Soft Computing Techniques						
3		**Open Elective-II**	4+1		3	25	75	100
	S370	Renewable Energy Sources						
	S196	Disaster Management						
	S157	Cloud Computing						
	S180	Data Base Management Systems						
4	L157	Main Project		3	9	50	150	200
5	L121	Comprehensive Viva-voce			2	75	--	75
		Total	**15**	**3**	**20**	**200**	**375**	**575**

Note: A few course as notified in the respective departments are offered to the students on electives under Massive Open Online Courses (MOOCs).

I SEMESTER

S239 - ENGLISH – I

(Common to all branches)

Prerequisite: None

Course Educational Objectives

In this course, the students will learn

1. The standard vocabulary along with the meaning and usage of the words
2. The concepts of functional grammar and syntax for better writing and speaking skills
3. The concepts of skimming, scanning and critical reading for better comprehension abilities.
4. The effective pronunciation, language usage through extensive reading
5. The concepts of writing reports, resume, statement of purpose, memos and e-mails etc.

Course Outcomes

After the completion of this course, students will have the ability to

1. Read, write and understand what ever is written and spoken in English
2. Speak fluently with acceptable pronunciation and write using appropriate words, spellings, grammar and syntax
3. Read the lines, between lines and beyond lines excelling in comprehension skills
4. Speak grammatically error free English
5. Draft reports, memos, mails & letters as part of their work.

UNIT – I

Astronomy (Learning English)
Grammar: Parts of Speech
Vocabulary: Antonyms
Analytical Writing: Unscrambling words in a sentence; Un-jumbling the sentences into a paragraph; Types of sentences; Paragraph writing

UNIT – II

Travel and Transport (Learning English)
The Trailblazers - **Jagadis Chandra Bose**(Masterminds)
Grammar: prepositions; word plurals; sentence completion
Vocabulary: Synonyms
Analytical Writing: Drafting E-Mails; Letter writing (Formal & Informal)

UNIT - III

Humour (Learning English)
The Trailblazers – **Prafulla Chandra Ray** (Masterminds)
Grammar: Active & Passive Voices
Vocabulary: Pre-fixes & Suffixes
Analytical Writing: Note-making

UNIT - IV

Health and Medicine (Learning English)
The Trailblazers – **Srinivasa Ramanujam** (Masterminds)
Grammar: Tenses
Vocabulary: Deriving words
Analytical Writing: Abstract writing/Synopsis writing

UNIT - V

The World of Figures and Physics – **Chandra Sekhara Venkata Raman** (Masterminds)
Grammar: Articles
Vocabulary: One-Word substitutes
Analytical Writing: Essay writing; Dialogue writing (Formal & Informal)

TEXT BOOKS

1 "Learning English", Orient Longman Private Limited, JNTU edition, 2008
2 Enakshi Chatterjee, "Masterminds", Orient Longman Private Limited. 2002 (Reprint)

REFERENCES

1. Andrea J Rutherford, "Basic Communication Skills for Technology", Pearson Education, New Delhi,1st edition, 2009
2. Murphy, "English Grammar with CD", Cambridge University Press, New Delhi, 2004
3. Rizvi & M. Ashraf, "Effective Technical Communication", Tata McGraw Hill, New Delhi, 2008.
4. Blum Rosen, "Word Power", Cambridge University Press, New Delhi, 2009.

I SEMESTER

S132 - APPLIED MATHEMATICS – I

(Common to AE, CE, CSE, EEE, EIE, IT, ME)

Prerequisite: None

Course Educational Objectives

In this course, the students will learn about

1. The concepts of Differential Equations and solving the first order and the first degree differential equations.
2. The concepts of Higher Order Differential Equations and solving such equations with constant and variable coefficients.
3. The concepts of theory of Matrices which are used to solve linear simultaneous equations.
4. The concept of Eigen Values and Eigen Vectors and solving an Eigen Value Problem.
5. The concepts of partial differentiation and formation of partial differential equations

Course Outcomes

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

1. Know fundamental mathematical skills required to form a necessary base to analyze first order differential equations.
2. Know the Higher Order Differential Equations, Procedures to solve them and their physical applications.
3. Find the solutions of System of Homogeneous and Non Homogeneous Linear equations using matrices for different physical applications.
4. Find Eigen values and Eigen vectors, higher powers and inverse of a given matrix, and can apply it in the concept of free vibrations of two- mass systems.
5. Find the solutions of linear partial differential equations.

UNIT – I

Differential Equations of First Order and First Degree

Differential equations of first order and first degree – Exact, Linear and Bernoulli. Applications to Orthogonal trajectories, applications to LCR circuits.

UNIT – II

Higher Order Differential Equations

Linear differential equations of second and higher order with constant coefficients and with variable coefficients, method of variation of parameters , Linear differential equations of second and higher order with variable coefficients – Cauchy's Equation and Legendre's Equations.

UNIT – III

Functions of Several variables

Generalized Mean Value Theorem(without proof), Maclaurin's series, Functions of several variables, Jacobians (polar, cylindrical, spherical coordinates), Functional dependence , , Maxima and Minima of functions of two variables with constraints and without constraints – Lagrangian Multiplier Method. Formation of Partial Differential Equations by the elimination of arbitrary constants and arbitrary functions. Solution of first order and first degree linear partial differential equation – Lagranze's method

UNIT –IV

System of Linear Equations.

Matrices - Rank- Echelon form, Normal form , PAQ form– Solution of Linear Systems – Homogeneous system of equations and Non Homogeneous System of Equations, Gauss Elimination, Gauss - Seidal and Jacobi Methods.

UNIT – V

Eigen Values and Eigen Vectors

Eigen values – Eigen Vectors – Properties – Cayley Hamilton Theorem – Inverse and Powers of a matrix by using Cayley Hamilton Theorem.

TEXT BOOKS

1. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition,2012.
2. Dr. B. V. Ramana, "Higher Engineering Mathematics", TMGH Publications, 1st Edition,2010.

REFERENCES

1. M. D. Greenberg, "Advanced Engineering Mathematics", TMGH Publications, 2nd Edition, 2011.
2. Erwin Krezig, "Advanced Engineering Mathematics", John Wiley & Sons, 8th Edition, 2011.
3. W. E. Boyce and R. C. Diprima, " Elementary Differential equations", John Wiley & sons, 7th Edition, 2001.

I SEMESTER

S238 - ENGINEERING PHYSICS
(Common to all branches)

Pre-requisite course: NONE

Course Educational Objectives:

In this course student will learn about

- The basic concepts of Optics such as Interference, Diffraction and Polarization.
- The principle of quantum mechanics,dual nature of matter waves.
- The principle and working of different Lasers.
- The principle and classification of optical fibers
- classification of magnetic materials and their properties.
- Concept of Superconductivity, types and their applications

Course Outcomes:

At the end of this course student will be able to

CO1: Understand the nature of polarization, Diffraction and interference.

CO2: Understand the dual nature of particle and significance of the wave function .

CO3: Understand the principle of LASER and optical fibers. Types of lasers and optical fibers and their applications.

CO4: Understand the different types of magnetic materials and their uses.

CO5: Understand the phenomenon of superconductivity, critical parameters, types of super conductors and their applications

UNIT – I

INTERFERENCE, DIFFRACTION, POLARIZATION

INTERFERENCE: Introduction, super position principle, coherent sources, thin films, Newton's rings (in reflected system only).

DIFFRACTION:

Introduction, Fresnel and Fraunhofer diffractions – comparsion between Fresnel's and fraunhofer's diffraction-Difference between interference and diffraction-Fraunhofer diffraction at single slit - Fraunhofer diffraction at Double slit –Diffraction Grating- Grating spectrum.

POLARIZATION:

Introduction-plane of vibration and plane of polarization -Polarization by reflection Brewster's law –geometry of calcite crystal- Double refraction -nicol prism construction ,Quarter wave plate- Half wave plate.

UNIT - II

PRINCIPLES OF QUANTUM MECHANICS:

De Broglie hypothesis- Matter waves- Davison and Germer experiment- GP Thomson experiment , Heisenberg Uncertainty principle-Schrodinger time independent wave equation-Physical significance of the wave function-particle in a box.

UNIT – III

LASERS AND FIBER OPTICS

LASERS:

Introduction – Characteristics of Lasers- Principle of laser (Absorption, Spontaneous and stimulated emission of Radiation), Population Inversion- Einstein Coefficients ,three and four level pumping schemes, block diagram of laser. Ruby Laser- Helium Neon Laser, Applications of Lasers.

FIBER OPTICS

Introduction- Principle of optical Fiber- Acceptance angle and Acceptance cone- Numerical aperture – Types of optical fibers-refractive index profile- Application of optical fibers.

UNIT – IV

MAGNETIC MATERIALS:

Magnetic properties -Origin of magnetic moments-Classification of magnetic materials- Dia, Para, Ferro magnetic , Antiferromagnetic , Ferrimagnetic materials- Domain theory of ferromagnetism(qualitative), Hysteresis curve- Soft and Hard magnetic materials. Applications of magnetic materials.

UNIT – V

SUPER CONDUCTORS

Phenomenon, critical parameters, Meissner effect, Type-I, Type-II Super conductors, BCS theory of super conductivity,Flux Quantization,London Eqs., Penetration depth, Josephson Effects- Applications of Super conductors.

TEXT BOOKS

1. V. Rajendran, Engineering Physics by Tata McGrahill,2008.
2. P K Palani Samy,Engineering Physics by Scitech Publications,2009.

REFERENCES

1. M.R. Srinivasan, Engineering Physics by New Age International, 2014.
2. M.N. Avadhanulu and P.G. Kshirsaga, Engineering Physics, S.Chand Publications, New Delhi, 2005.
3. R.K. Gaur, S.L. Gupta, Engineering Physics, Dhanpat Rai Publication, 2008.
4. P. Srinivasa Rao, Dr. K. Muralidhar, Basic Engineering Physics by Dr.Himalaya Publishing House, 2008.

I SEMESTER

S156 - CIRCUIT THEORY

Prerequisite: None

Course Educational Objectives:

In this course, the student will learn about

1. Analyze the circuits in time and frequency domain.
2. Study network functions, inter relationship among various circuit parameters, solve more complex network using these parameters.
3. Analyze and synthesize circuits and to become familiar with the propagation of signals/wave through transmission lines.
4. Analyze single phase a.c circuits
5. Design different steps of networks

Course Outcome:

At the end of the course student will be able to

1. Apply their knowledge in solving complex circuits, Through test and laboratory exercises,
2. Evaluate the time and frequency response which is useful in understanding behavior of electronic circuits and control system.
3. Understand how the power or information in terms of electromagnetic energy is transmitted through the transmission lines and importance of impedance matching.
4. Calculate Q-factor by various single phase a.c circuits.
5. Solve various networks using Theorems.

UNIT – I

INTRODUCTION TO ELECTRICAL CIRCUITS

Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements – Kirchhoff's laws-KCL-KVL – network reduction techniques – series, parallel, series parallel, star-to-delta or delta-to-star transformation.

UNIT – II

NETWORK TOPOLOGY

Definitions – Graph – Tree, Basic cut-set and Basic Tie-set matrices for planar networks – Tie - set and cut - set analysis of Networks with independent voltage and current sources - Duality & Dual networks

UNIT – III

MAGNETIC CIRCUITS

Magnetic Circuits – Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuits. Hysteresis and eddy currents

UNIT – IV

SINGLE PHASE A.C CIRCUITS

R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – concept of power factor, Real and Reactive powers – J-notation, Complex and Polar forms of representation, Complex power. Resonance – series, parallel circuits, concept of band width and Q factor. Locus diagrams- Series R-L, R-C, R-L-C and parallel combination with variation of various parameters

UNIT – V

NETWORK THEOREMS (BOTH AC & DC NETWORKS)

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Milliman's and Compensation and Tellegen's theorems- Statements of theorems and steps for solving networks.

TEXT BOOKS

1. William Hayt and Jack E. Kimmerly,Engineering circuit analysis,TataMcGrawHill Company, 6th edition,1971.

REFERENCES

1. Vanvalkenburg, Network Analysis, PHI, 1974.
2. N.C. Jagan & C. Lakshminarayana, Network Theory, B.S Publications, 2006.
3. N. N. Parker Smith, Problems in Electrical Engineering, 9th edition, 2004.

I SEMESTER

S170 - COMPUTER PROGRAMMING

(Common to all branches)

Course Educational Objectives:

The Students will learn

1. The basic elements C programming structures like data types, expressions, control statements, various I/O functions and how to solve simple mathematical problems using control structures.
2. Modular programming using functions.
3. The derived data types like arrays, strings, various operations and Memory management using pointers.
4. User defined structures and various operations on it.
5. The basics of files and its i/o operations.

Course Outcomes:

After undergoing the training in this course the students will acquire the ability to:

- Identify basic elements of C programming structures like datatypes, expressions, control statements, various I/O functions and Evaluation of simple mathematical problems using control structures.
- Implementation of derived data types like arrays, strings and various operations.
- Understanding of memory management using pointers and designing of modular programming.
- Construct user defined structures and implements various applications.
- Create text & binary type files and understanding of various file I/O operations.

Pre Requisite: The students should have basic knowledge in Maths & computers

UNIT – I

Algorithm / pseudo code, flowchart, example flow charts, structure of C program, identifiers, basic data types and sizes, Constants, variables, Input-output statements, A sample c program, operators: arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence of operators and order of evaluation. Conditional statements: if, ifelse, else if ladder and switch statements, continue, go to and labels. Loops: while, do-while and for statements, break, programming examples.

UNIT – II

Arrays- one dimensional arrays-concept, declaration, definition, accessing elements, storing elements, two dimensional and multi-dimensional arrays. **Character Strings:** declaration, initialization, reading, writing strings, arithmetic operations on characters, string handling functions programming examples

UNIT – III

Pointers- concepts, declaring &initialization of pointer variables, pointer expressions, address arithmetic, pointers and arrays, pointers and character strings, pointers to pointers, Pre-processor Directives and macros. **Functions:** basics, category of functions, parameter passing techniques, recursive functions, Functions with arrays, storage classes- extern, auto, and register, static, scope rules, Standard library functions., dynamic memory management functions, command line arguments, c program examples.

UNIT – IV

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, C program examples.

UNIT - V

Files – Concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling, C-Program examples.

TEXT BOOKS

1. B.W.Kernighan, Dennis M. Ritchie, C Programming Language, PHI/Pearson Education, 2009.
2. N.B. Venkateswarlu and E.V. Prasad, C and Data Structures, S Chand Publications, 2009.

REFERENCES

1. Reema Thareja, Programming in C - Oxford Publications, 2012.
2. Stephen G. Kochan, Programming in C –, 3rd Edition, Pearson Education, 2011.
3. Pradeep Dey, Programming in C, Oxford Publications, 2011.

I SEMESTER

L142 - ENGINEERING PHYSICS LAB

(Common to all branches)

Pre-requisite course: NONE

Course Educational Objectives:

In this course student will learn about

- The scientific method of experiments in the laboratory.
- The procedures and observational skills for appropriate use of simple and complex apparatus.
- Analytical techniques, statistical analysis and graphical analysis.
- The theoretical ideas and concepts covered in lecture by completing a host of experiments.
- The radius of curvature of a Plano-convex lens by forming Newton's rings.

Course Outcomes:

At the end of this course, student will be able to

CO1: Understand to calculate the radius of curvature of a plano-convex lens by forming Newton's Rings.

CO2: Understand the concept of diffraction and also find wavelengths of different spectral lines of the grating.

CO3: Estimate the wavelength of layer radiation.

CO4 : Study the magnetic field along the axis of a current carrying coil and to verify Biot –savart's law .

CO5 : Estimate the Refractions index of the given prism

CO6 : Find the thickness of a thin material using a wedge shaped film.

CO7 : Estimate the width of the slit by forming diffraction pattern.

CO8 : Understand the phenomenon of optical – activity

CO9 : Study the characteristics of LCR circuit

CO10: Understand the Phenomenon of resonance

CO11: Determine the rigidity modules of given material

CO12 : Understand the longitudinal and transverse vibrations of tuning fork.

List of Experiments: (Any 8 Experiments)

1. Determine the Radius of Curvature of Plano - Convex lens by forming Newton's Rings.
2. Determine the Wavelengths of various spectral lines using grating with the normal incidence method.
3. Determination of wavelength of laser radiation.
4. Study the magnetic field along the axis of a current carrying coil and to verify Biot – Savart's law.
5. Determine the Refractive index of a given prism.
6. Determine the thickness of a thin material using wedge shaped film.
7. Determine the width of the slit by using laser source by forming diffraction pattern.
8. Determine the specific rotation of an optically active substance.
9. Study the characteristics of L.C.R Circuit.
10. Determine the frequency of AC supply by using Sonometer.
11. Determine the rigidity modulus of a given material using Torsional pendulum.
12. Determine the frequency of vibrating bar or electrical tuning fork using Meldy's apparatus.

Reference Books:

Lab Manual prepared by the LBRCE.

I SEMESTER

L143 - ENGINEERING WORKSHOP
(Common to AE, CE, ECE, EEE, EIE & ME)

Prerequisite: none

Course Educational Objectives:

In this course the students will learn about

1. The skill or craft in every trade they practice in the mechanical Engineering workshop.
2. The terminology / specification and the purpose and usage of different tools used in different trades.

Course outcomes:

At the end of the course, the student will be able to

1. Recognize the different tools with their specifications used in the Mechanical Engineering workshops while practicing the different trades.
2. Use the tools perfectly and well informed how to be careful about every tool they use for the years to come in workshops.
3. Know the safety pre-cautions to be followed in the workshops, while working with the different tools.

At least **four trades** with **two exercises** from each trade:

1. Carpentry
2. Fitting
3. House – Wiring
4. Plumbing
5 Tin - Smithy
6. Black - Smithy

REFERENCE BOOK

1. P. Kannaiah, K.L. Narayana, Workshop Manual, SciTech Publications, India Pvt Ltd,2004.

I SEMESTER

L126 - COMPUTER PROGRAMMING LAB
(Common to all branches)

Prerequisite: none

Course Educational Objectives:

The students will learn about

1. The fundamentals of ANSI C programming and the standard C libraries
2. To Get a solid understanding of C functions and data structures
3. To Become familiar with the basic concepts of object-oriented programming
4. To write programs using the C language.
5. To Gain skills in C Programming Language.

Course Outcomes:

After completion of the course, students will able to

1. Write programs in C language.
2. Use loops effectively in programming.
3. Use files concept in programming.
4. Gain skills in C programming.

Recommended Systems/Software Requirements:

1. Intel based desktop PC, ANSI C Compiler with Supporting Editors, IDE's such as Turbo C.
2. Linux with gcc compiler.

LIST OF LAB PROGRAMS:

I) Write a programme in 'C' language to cover the following problems.

a) Example program which shows the usage of various preliminary Data types available in C Language.

b) Example program which shows the usage of various Operators available in C Language.

c) Example programs to illustrate the *order of evaluation*.

II) WRITE EXAMPLE PROGRAMS:

a) To check whether the given year is leap year (or) not

b) Roots of Quadratic Equation.

c) Finding smallest& biggest number from the given set of 4 numbers using 'if' statement.

d) Calculate the student grade in the examination – assume suitable constraints.

e) Prepare electricity bill for the consumed units – assume suitable Constraints.

f) Converting given two digit number into words using switch statement

g) To illustrate the usage of 'go to' statement.

III) EXAMPLE PROGRAMS:

a) To Display first N natural numbers

b) To find whether the given number is Armstrong (or) not

c) To find reverse of the given number and to check whether it is palindrome (or) not.

d) To find whether given number is strong number (or) not.

e) To check whether given number is Prime (or) not

f) To display prime numbers with in the given range(Nesting of Loops).

g) To display the following structure(Nesting of Loops)

i)
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

ii)
```
5 4 3 2
4 3 2 1
3 2 1
2 1
1
```

IV) Write example programs in C Language to perform following operations:
a) Finding the sum and average of given numbers using Arrays.
b) To display elements of array in reverse order
c) To search whether the given element is in the array (or) not using linear search & binary search.
d) Write a C program to perform the following operations
i) Addition, subtraction and multiplication of Matrices
ii) Transpose of given matrix
(The above operations are to be exercised using functions also by passing arguments)
e) Write a C program to find whether the given string is palindrome (or) not.
f) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
g) Write an example program to illustrate the use of any 5 string handling functions.

V) a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.
b) Write an example program to describe the usage of *call by reference*.
c) Write a program to find sum of the elements of the array using functions.

VI) Write example programs in C Language:
a) To find factorial of a given number using functions.
b) Swap two numbers using functions.
c) To find GCD of two numbers using recursion
d) Write a recursive function to solve Towers of Honai problem.
e) Write an example program to illustrate use of external & static storage classes.
f) Write an example program to illustrate the usage of command line arguments.
g) Program to illustrate the usage of dynamic memory management functions.

VII) a) Write an example program using structures to process the student record. Assume suitable fields for student structures (Different kinds of initialization of structure variables are to be exercised)
b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program).
c) Write a program to handle a structure variable using pointers and implement self referential structure(i.e. A structure variable having a pointer to itself)

VIII) Write an example program on file to perform following operations:
a) Accessing content from files and writing content in to it.
(Exercise different file operation modes)
b) Copy the contents of one file into another (Exercise different file operation modes)

I SEMESTER

L123 - COMPUTER AIDED ENGINEERING DRAWING LAB
(Common to CSE, ECE, EEE, EIE & IT)

Prerequisite: None

Course Educational Objectives:

In this course student will learn about to

1. The basic commands necessary for professional 2D drawings, design, and drafting using AutoCAD essentials.
2. Develop orthographic projections and isometric drawings using Auto-CAD.
3. Draw the solids by developing the surfaces without any complexity.

Course Outcomes:

After completion of the course students are able to:

1. Understand the Auto-CAD basics and apply to solve practical problems used in industries where the speed and accuracy can be achieved.
2. Apply this idea and make design and modifications as required.
3. Draw 2-dimensional drawings of conventional engineering objects using Auto-CAD

At least 10 Exercises are to be conducted using Auto Cad software:

BASIC AUTO CAD COMMANDS:

1. Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).
2. Edit commands (copy, move, erase, zoom).
3. Array commands (polar array, rectangular array, P-edit, divide aline, offset).
4. Hatching &line commands (hatching with different angles& different types of lines).
5. Mirror & trim commands (mirror an object, trim, extend a line, chamfer &fillet, explode).
6. Dimensioning & text commands (linear, angular, radius, diameter& text).

PROJECTION OF POINTS AND LINES:

1. Projection of points (I, II, III, & IV quadrants).
2. Projection of lines parallel to both reference planes.
3. Projection of lines parallel to one reference plane & inclined to other reference plane.

ORTHOGRAPHIC PROJECTIONS:

1. Conversion of plane figures.
2. Conversion of circular figures.
3. Conversion of both combination of plane figures and circular figures.

ISOMETRIC PROJECTIONS:

1. Conversion of plane figures.
2. Conversion of circular figures.
3. Conversion of both combination of plane figures and circular figures.

REFERENCES:

1. M. Kulkarni, A.P Rastogi, and A.K. Sarkar, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
2. Bethune, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi, 2009.
3. N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, Charotar Publishers, 2012.

II SEMESTER

S240 - ENGLISH – II

(Common to all branches)

Prerequisite: ENGLISH-I

Course Educational Objectives

In this course, the students will learn

1. English with emphasis on LSRW skills.
2. To make decisions, while thinking logically analyzing situations carefully.
3. To read speedily and meaningfully.
4. Both active and passive vocabulary.
5. To write letters and reports effectively in formal and professional situations.

Course Outcomes

After the completion of this course, prospective engineers will have the ability to

1. Use English language effectively.
2. Express right ideas in right context
3. Manage the situation and negotiate business with good English communication
4. Think and analyze the situations and make good presentations of their work and decisions
5. prepare themselves to face interviews and also to participate in group discussions

UNIT - I

Environment (Learning English)
The World of Figures and Physics – **Satyendranath Bose** (Master Minds)
Grammar: Correction of sentences
Analytical Writing: Report Writing

UNIT - II

Inspiration (Learning English)
The Institution Builders– **Santi Swarup Bhatnagar** (Masterminds)
Grammar: If-clause; Question tags
Vocabulary: Idioms and Phrases
Analytical Writing: Resume'; Statement of Purpose

UNIT - III

Human Interest (Learning English)
The institution builders – **Meghanadh Saha** (Master Minds)
Grammar: Direct & Indirect Speeches
Vocabulary: Phrasal Verbs
Analytical Writing: Memo Drafting

UNIT – IV

Media (Learning English)
The New Age – **Homi Jehangir Bhabha** (Master Minds)
Grammar: Concord
Vocabulary: Analogy
Analytical Writing: Information Transfer/ Data Interpretation (Tables, Pie charts, Bar graphs, Tree diagrams, Pictograms, etc.)

UNIT – V

The New Age – **Vikram Sarabhai** (Master Minds)

Grammar: Gerunds & Infinitives; Correction of Sentences
Vocabulary: Words often confused
Analytical writing – Comprehension, Expansions (of a given topic/ proverbs)

TEXT BOOKS

1. "Learning English", Orient Longman Private Limited.JNTU edition,2008
2. EnakshiChatterjee, "Masterminds", Orient Longman Private Limited ,Reprint-2002

REFERENCES

1. Koneru Aruna, "Professional Communication", Tata McGraw-Hill, New Delhi, 2007.
2. Rizvi, "Effective Technical Communication", Tata McGraw-Hills, New Delhi, 2009.
3. Andrea J. Rutherford, "Basic Communication Skills for Technology", Pearson Education., 1st edition, 2009
4. Kaplan and Baron's, "GRE and TOEFL', Latest editions, 2008.

II SEMESTER

S133 - APPLIED MATHEMATICS – II

(Common to AE, CE, CSE, EEE, EIE, IT, ME)

Prerequisite: None

Course Educational Objectives:

In this course student will learn about

1. The basic concepts of Laplace Transforms and their applications in solving the Differential Equations.
2. The expansion of function in an infinite series of sine and cosines.
3. Fourier Integral Theorem, Fourier Integral Transforms along with their properties and applications.
4. Z-transform and its role in discrete analysis and in solving Difference equations.
5. The concepts of multiple integrals and changing of order of integration

Course outcomes:

At the end of this course student will be able to

1. Understand the importance of mathematics and its techniques to solve real life problems.
2. Apply the concepts of Laplace Transforms on Operational Calculus and solve Differential Equations of any order.
3. Express most of the single valued functions in the form of Fourier series and extend the ideas and techniques to non-periodic functions also.
4. Express a function as a continuous frequency resolution using Fourier Transforms.
5. Understand the analogy between Laplace Transform and Z-Transform and apply it wherever necessary & apply Multiple Integrals in various coordinate systems.

UNIT – I

Laplace Transforms

Laplace transforms of standard functions –Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function. Inverse Laplace transforms– Convolution theorem Applications of Laplace transforms to ordinary differential equations.

UNIT – II

Fourier Series

Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series

UNIT – III

Fourier Transforms

Fourier integral theorem (only statement) – Fourier sine and cosine integrals – Fouriertransform – sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT – IV

Z-Transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse Z –transform - Convolution theorem – Solution of difference equation by z-transforms.

UNIT – V

Multiple Integrals

Multiple integrals - double and triple integrals (Cartesian, polar, spherical coordinates) – Changing of order of Integration and applications to areas and volumes.

TEXT BOOKS

1. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers,42nd Edition, 2012.
2. Dr. B. V. Ramana, "Higher Engineering Mathematics", The McGraw Hill Companies, 1stEdition, 2010.

REFERNCES

1. Michael D. Greenberg , "Advanced Engineering Mathematics", The McGraw Hill Companies, 2nd Edition, 2011.
2. Erwin Krezig, "Advanced Engineering Mathematics", John Wiley & sons, 8thEdition, 2011.

II SEMESTER

S232 - ENGINEERING CHEMISTRY

(Common to all branches)

Prerequisite: None

Course Educational Objectives:

Through this course the student will learn

1. The concept of water technology with special focus on hardness & softness of water, methods of softening and desalination of brackish water.
2. The concept of conventional and alternative fuels and working of petrol and diesel engines.
3. The concept of corrosion and control measures.
4. The concept of polymers and polymerization.
5. The concept of green chemistry and applications of liquid crystals.

Course Outcomes:

After completion of the course the students will acquire the ability to:

1. Analyze the quality of water and its maintenance for industrial purposes.
2. Analyze issues related to fuels and their synthesis and able to understand working of IC and Diesel engines.
3. Realize the principles of corrosion and make use of the principles for maintenance of various equipments more effectively.
4. Get hands on experience in various processes like polymerization, preparation, properties and applications of plastics and rubbers.
5. Realize the use of liquid crystals in various technological applications.

UNIT - I

WATER TECHNOLOGY: Sources of water and quality. Hardness of Water - Temporary and Permanent hardness. Units and their interrelation. Problems on Temporary and Permanent hardness. Disadvantages of hard water in various industries.

Boiler troubles – scale & sludge formation, Caustic Embrittlement, boiler corrosion, priming & foaming (carryover).

Internal Treatment–Colloidal Phosphate, Calgon, Carbonate, Sodium aluminate Conditioning of Water.

External Treatment - Lime-Soda Process, Zeolite process , Ion- Exchange Process merits and demerits. (Note-Problems on lime-soda process are not included)

Desalination of brackish water-Electrodialysis, reverse osmosis

UNIT - II

Fuel Technology: Definition and classification of Fuels, merits and demerits of solid liquid and gaseous fuels. Gross and net calorific values – (definition only).

Solid fuels- coal - analysis, Proximate and ultimate analyses of coal – significances.

Liquid Fuels – petroleum-origin and refining of petroleum- cracking- fixed bed and moving bed methods, synthetic petrol – Bergius and Fischer Tropsch's methods.

Working of I.C and C.I engines –Knocking in I.C and C.I engines, antiknocking agents Octane number , Cetane number(Definitions only)

Gaseous fuels- Natural gas, CNG Advantages of CNG, Flue gas analysis – Orsat's apparatus.

UNIT - III

CORROSION: Definition, Examples.

Dry Corrosion (Direct Chemical corrosion), Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule, corrosion by other gases, liquid metal corrosion.

Wet Corrosion (Electro Chemical corrosion) Mechanism- Oxygen absorption Hydrogen evolution type, Types of wet corrosion, Galvanic Corrosion, passivity, Galvanic Series Concentration Cell Corrosion, intergranular corrosion, stress corrosion, Soil corrosion.

Factors Influencing Corrosion- Nature of metal and nature of environment.

Control of Corrosion - Proper Design, Use of pure metals and metal alloys, Cathodic Protection - Sacrificial anode and Impressed Current, Modifying the Environment and use of Inhibitors.

UNIT - IV

Polymer Science and Technology: Definition, classification of polymers, Functionality, Types of polymerization-addition, condensation, copolymerization

Plastics preparation, properties and engineering applications of, PVC, Teflon, Bakelite ,PMMA.

Conducting polymers: Polyacetylene, Polyaniline, conduction, doping, application.

Rubbers Natural rubber and it's processing, disadvantages of Natural rubber , Vulcanization and significance.

Elastomers- preparation, properties and engineering applications of Buna S, Buna N, Thiokol.

Fibers- preparation, properties and engineering applications of Polyester, fiber reinforced plastics (FRP).

UNIT – V

(a) **Green chemistry-**Goals and significance of green chemistry. Basic components (alternative starting materials, reagents, reaction conditions, final products) of green chemistry research.

(b) **Liquid crystals –**Classification of liquid crystals (Thermo tropic, lyotropic) and applications.

TEXT BOOKS

1. Jain & Jain, A text book of Engineering Chemistry by DhanpatRai Publishing Company, New Delhi (15th Edition) 2006.
2. Dr. S.S Dara, Dr.S.S Umare A Text book of Engineering Chemistry by S.Chand Publications, 12th Edition, 2010.
3 . ShashiChawla, A Text book of Engineering Chemistry by DhanpatRai Publishing Company, Third Edition, 2003.

REFERENCES

1. Dr. Y. Bharathi Kumari and Dr. JyotsnaCherukuri, A Text book of Engineering Chemistry by VGS Publications, First Edition, 2009
2. R.V. Gadag, A.Nityananda Shetty, I.K. International publishing house 1st edition 2006
3. Dr. M. R. Senapati, Advanced Engineering Chemistry by University Science Press (Impart from Laxmi Publications), 3rd Edition 2009.

II SEMESTER

S178 - DATA STRUCTURES

(Common to EIE, CSE, EEE, IT)

Course Educational Objectives:

To make a student familiar with :

- Write algorithms to implement operations involved in different data structures
- Implement stack and queue using arrays as well as linked list
- Apply stack and queue to write some complex algorithms
- Implement different types of trees and their application
- Implement various searching and sorting techniques
- Use Hash Tables to handle large amount of data

Course Outcomes:

At the end of the course a student is able to:

CO1: Analyze worst-case running times of algorithms using asymptotic analysis and implement various data structures like linked lists.

CO2: Understand and implement stacks and queues using arrays and linked lists.

CO3: Analyze and implement various searching and sorting algorithms.

CO4: Build various tree structures like Binary Trees, Binary Search Trees and AVL Trees.

CO5: Design and implement appropriate hash function and collision-resolution algorithms.

Pre requisite: Students should have a good knowledge in C Programming Language

UNIT – I

Algorithm Analysis:

Mathematical Background, Model, Analysis and Run Time Calculations, **Lists:** Abstract Data Types, List using arrays and pointers, Singly Linked, Doubly Linked, Circular Linked Lists, Polynomial ADT.

UNIT – II

Stacks: The Stack: Definition, operations, implementation using arrays, linked list and **Stack applications:** Infix to postfix expression conversion, Evaluation of Postfix expressions, balancing the symbols.**Queue:** definition, operations, implementation using arrays, linked list&it'sApplications.**Circular queue**: definition&its operations, implementation, **De queue**: definition & its types, implementation.

UNIT – III

Searching: Linear and Binary Searching. **Sorting:** Insertion Sort, Selection sort, Shell Sort, Heap Sort, Merge Sort, Quick Sort, and Bucket Sort.

UNIT – IV

Trees: Terminology, **BinaryTrees:** definition, types of binary trees, Representation, Implementation (linked list), **Tree traversals**: Recursive techniques, Expression Tress, **Search Tree:** Binary Search Tree-search, insert, Delete, **Balanced Tree** –Introduction to AVL tree and Rotations.

UNIT – V

Graphs: Fundamentals, Representation of graphs,**Graph Traversals:** BFS, DFS, **Minimum cost spanning tree:** Definition, Prim's Algorithm, Kruskal's algorithm.

Hashing: Hash Table, Hash Function, Collison resolution Techniques- separate Chaining, open addressing, rehashing, extendible hashing.

TEXT BOOK

W1. Mark Allen Weiss,"Data Structures and Algorithm Analysis in C", 2nd edition,Pearson Education,2004.
2. ReemaThareja ,Data Structures using C , Oxford Publications,2011.
3. N.B.Venkateswarlu and E.V.Prasad ,C and Data Structures,S Chand Publications,2010.

REFERENCES

1. Langson, Augenstein &Tenenbaum, Data Structures using C and C++, 2nd ed, PHI, 2010.
2. Robert L.Kruse, Leung and Tando, Data Structures and Program Design in C, 2nd ed, PHI, 2003.
3. D Samantha, Classic Data Structures, PHI Learning, 2004.

II SEMESTER

S224 - ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE, EIE, IT)

Prerequisite: Circuit Theory

Course Educational Objectives:

In this subject student will learn about

1. The Basics of semiconductor physics and its properties.
2. The PN junction formation, operation, characteristics and about special diodes.
3. Bipolar Junction Transistors (BJT), Field Effect Transistors (FET) and Metal Oxide Semiconductor FETs (MOSFET), their construction, operation and characteristics.
4. Need for Biasing a transistor, BJT & FET Biasing and different types of biasing techniques.
5. Different types of Diode Rectifiers and their properties, different filters and about voltage Regulators.

Course Outcomes:

At the end of this course student will be able to

1. Understand the concept Fermi level, mobility, conductivity, continuity equation and Hall Effect.
2. Understand the operation, characteristics and applications of different diodes like PN, Zener, Tunnel, Varactor and Photo diode.
3. Understand the operation and applications of different types of BJTs, FETs and MOSFETs.
4. Analyze and design the different types of Biasing circuits for BJTs and FETs.
5. Understand how Rectifiers and Filters are useful in converting AC to DC and the design of basic regulator circuits.

UNIT – I

Semiconductor Physics: Charged particles, Energy band theory of crystals, Insulators, Conductors, Semiconductors, Mobility and Conductivity, Energy distribution of electronics, Electrons and Holes in an Intrinsic Semiconductors, Conductivity of a semiconductor, Carrier concentration in an intrinsic Semiconductors, Donor and Acceptor Impurities, Mass Action Law, Charge densities in semiconductor, Fermilevel in a semiconductor having impurities, Diffusion, Carrier Lifetime, Continuity Equation, Hall Effect.

UNIT – II

Junction Diode: Qualitative theory of PN Junction, Band Structure of an open circuited PN junction, Current components in a PN Diode, Qualitative theory of the PN diode currents-Diode current equation, Law of the junction, Forward currents, Reverse Saturation Current, PN Junction diode operation in Forward bias and Reverse bias, Volt Ampere Characteristics of Diode, Temperature dependence of Diode, Diode Resistance, Diode Capacitance-Transition Capacitance, Diffusion Capacitance and their derivations.

Special Diodes: Operation, characteristics and applications of Zener Diode, Tunnel Diode, Varactor Diode, Photo Diode, LED, Liquid crystal diode and Photo diode.

UNIT – III

Bipolar Junction Transistors: Introduction to Three terminal Devices, PNP and NPN Transistors, Transistor Current components-Emitter Efficiency, Transport Factor, Large Signal Current Gain; Input and Output characteristics of Transistor in Common Base, Common Emitter and Common Collector configurations, Relation between α and β, Base width modulation, Ebers-Moll Model.

Field Effect Transistors: Comparison between FET and BJT, JFET Construction, Operation, Classification, Drain and Transfer Characteristics of JFET, MOSFET Characteristics- Enhancement and Depletion Mode.
Optical and Power Electronic Devices: Photo Transistor, Silicon Controlled Rectifier, Unijunction Transistor, UJT relaxation oscillator.

UNIT – IV
BJT Biasing: Transistor Biasing and Stability- DC load line, Operating Point, AC load line, Thermal Instability, Stability factors S,S^{I},S^{II}, Bias Stabilization Techniques- Fixed Bias, Collector to Base Bias and Self Bias, Thermal Concepts- Thermal Runaway, Thermal Resistance, Thermal Stability, Condition to avoid Thermal Runaway, Bias Compensation Techniques- Diode Compensation for V_{BE}, Diode Compensation for I_{CO}.
FET Biasing: Different FET biasing methods.

UNIT – V
Rectifiers: Half Wave Rectifier, Full Wave Rectifier with center tap transformer, Full Wave Rectifier with Bridge circuit, derivation for DC, RMS Currents and Voltages, Ripple Factor, Rectifier Efficiency, Peak Inverse Voltage, Transformer Utilization Factor, Percentage of Regulation, Comparison of Rectifiers, Harmonic components in a Rectifier circuit.
Filters: Inductor Filter, Capacitor Filter, L-Section Filter, π-Section Filter, Multiple L- Section and Pi-Section Filters.
Regulators: Voltage Regulation using Zener diode, design of a Zener regulator.

TEXT BOOK
Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, Publishers, New Delhi, 1991.

REFERENCES
1. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson/Prentice Hall Publishers, 1999.
2. Thomas L.Floyd, Electronic Devices, Pearson Education Publishers, 2008.
3. Ben Streetman and Sanjay Banerjee, "Solid State Electronic Devices", Prentice Hall Publishers, 2005.
4. Allen Mottershed, "Electronic Devices and Circuits", PHI Publishers, 1973.
5. B.Visvesvara Rao et.al., "Electronic Devices and Circuits", Pearson Education Publishers, 2005.
6. P.John Paul, "Electronic Devices and Circuits", New Age International Publishers, 2009.

II SEMESTER

L144 - ENGLISH COMMUNICATION LAB

(Common to all branches)

Prerequisite: English-I

Course Educational Objectives

In this course, the students will learn to

1. Better pronunciation through emphasis on word accent.
2. Use language effectively to face interviews, group discussions and public Speaking
3. Possess Positive attitude and inculcate group behavior
4. Negotiate well with inter personal skills and intra personal skills
5. Speak spontaneously on any topic given

Course Outcomes

After the completion of this course, students will have the ability to

1. Withstand the global competition in the job market with proficiency in English communication.
2. Articulate English with good pronunciation.
3. Face competitive exams like GRE, TOEFL, IELTS etc.
4. Face interviews and skillfully manage themselves in group discussions
5. Communicate with the people effectively.

The following course content is prescribed for English Language Communication Skills Laboratory sessions:

1. Introduction to English Phonemes; Phonetic Transcription, Stress.
2. JAM
3. Role Play
4. Information Transfer
5. Group Discussions

SUGGESTED SOFTWARE

1. Digital Mentor: Globarena,Hyderabad,2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
4. Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley,USA,2001
5. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
6. Oxford Talking Dictionary, The Learning Company, USA, 2002
7. Learning to Speak English - 4 CDs. The Learning Company,USA,2002
8. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press, New Delhi, 2008

II SEMESTER

L140 - ENGINEERINIG CHEMISTRY LAB

(Common to all branches)

Prerequisite: None

Course Educational Objectives:

Through this course the student will learn

1. To analyze water for its quality and to determine the important parameters like alkalinity and hardness.
2. To distinguish types of titrations used in volumetric analysis.
3. To gain hands on experience in practical aspects of preparation of polymers.

Course Outcomes:

After undergoing the training in this course the students will acquire the ability to:

1. Assess quality of water based on the procedures given.
2. Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus**.**
3. Acquire practical knowledge related to preparation of polymers.
4. Exhibit skills in performing experiments based on theoretical fundamentals.

Model experiment

1. Estimation of sodium hydroxide by using hydrochloric acid.

Water analysis

2. Determination of alkalinity of water sample
3. Determination of total Hardness of water by EDTA method
4. Determination of permanent hardness of water by EDTA method.
5. Determination of Dissolved Oxygen (D.O) content by Winkler's method

Preparation of polymers

6. Preparation of Urea formaldehyde resin.
7. Preparation of Phenol formaldehyde resin.

Redox titrations

8. Determination of amount of potassium dichromate in given solution by using sodium thiosulphate.

9. Determination of the amount of Oxalic acid and Sulphuric acid in 1 liter solution by Using given standard Sodium Hydroxide and Potassium Permanganate solution.
10. Estimation of Mohr's salt by using potassium permanganate.
11. Estimation of Mohr's salt by using potassium dichromate.
12. Estimation of Mohr's salt by using Oxalic acid.

Estimation of Vitamin content

13. Estimation of Vitamin-C

REFERENCES

Lab manual

II SEMESTER

L139 - ELECTRONIC DEVICES AND CIRCUITS LAB

(Common to ECE, EIE)

Prerequisites: Circuit theory

Course Educational Objectives:

In this laboratory course student will learn about

1. The Operation of CRO, PN diode and Zener diodes.
2. The characteristics of Bipolar Junction Transistors (BJT) in different configurations, Field Effect Transistors (FET) and Uni junction transistor.
3. Operation of Half Wave and Full Wave rectifiers with different filters.

Course Outcomes:

At the end of this course student will be able to

1. Calculate the time period and frequency of signals and the concept of depletion layer and cut-in voltage.
2. Understand the Active, Saturation and cut-off regions and calculate the parameters of BJT, FET and UJT.
3. Understand the concept of ripple factor, efficiency, regulation and TUF of rectifiers.

LIST OF EXPERIMENTS

(The following experiments are to be simulated using PSPICE/MULTISIM software and verified by Bread board)

1. Study of CRO.
2. PN Junction diode Characteristics.
3. Zener diode Characteristics.
4. Transistor Characteristics under CB Configuration.
5. Transistor Characteristics under CE Configuration.
6. Transistor Characteristics under CC Configuration.
7. Drain Characteristics of Field Effect Transistor.
8. Transfer Characteristics of Field Effect Transistor.
9. Unijunction Transistor Characteristics
10. Half wave rectifier with and without inductive filter.
11. Half wave rectifier with and without capacitive filter.
12. Full wave rectifier with and without inductive filter.
13. Full wave rectifier with and without capacitive filter.

II SEMESTER

L128 - DATA STRUCTURES LAB

(Common to EIE, CSE, EEE, IT

Prerequisites: Computer Programming

Course Educational Objectives:

In this course, students will learn about:

1. The specification, representation and implementation of data types and data structures
2. The analysis of various algorithms for time and space complexity
3. Applications of data structures
4. Various operations on algorithms

Course Outcomes:

Students who complete this course will be able to:

1. Decide the appropriate data type and data structure for a given problem
2. Compare the algorithms with respect to time and space complexity
3. Select the best algorithm to solve a problem by considering various problem characteristics such as size of the data, the type of operation etc.,
4. Write the algorithms for various operations on queues, stack, linked lists, trees, graphs, searching and sorting.

LIST OF EXPERIMENTS

Implement the following programs using C language.

1. Implement Linear and Binary Search mechanisms.
2. Sort the given list of numbers using a) Selection Sort b) Bubble Sort c) Insertion Sort d) Merge sort e) Quick sort
3. Implement PUSH and POP operations on Stacks using Arrays. Handle the OVERFLOW and UNDERFLOW problems also.
4. Implement Insertion and Deletion operations on Queues using Arrays. Handle the OVERFLOW and UNDERFLOW problems also.
5. Perform various operations on Circular Queue using Arrays
6. Perform various operations on DEQueue using Arrays
7. To convert infix notation to postfix notation
8. Create a single linked list and implement the following operations:
   a) Insert a node at specific position
   b) Delete a node from a specific position
   c) Counting the nodes
   d) Reversing the linked list
9. Implement PUSH and POP operations on Stacks using Linked List. Handle the OVERFLOW and UNDERFLOW problems also.
10. Implement Insertion and Deletion operations on Queues Linked List. Handle the OVERFLOW and UNDERFLOW problems also.
11. Create a Double linked list and implement the following operations:
    a) Insert a node at specific position
    b) Delete a node from a specific position
    c) Counting the nodes
    d) Reversing the linked list
12. To implement Heap Sort
13. Write program to perform various operations on BST.
14. Write a program to find the Path Matrix of a graph using Wars hall's algorithm.
15. Implement BFS and DFS traversal techniques on a given graph.
16. Write a program to find the All Pairs Shortest Path matrix using Floyd's

III SEMESTER

S134 - APPLIED MATHEMATICS – III

(Common to AE, CE, CSE, EEE, EIE, IT, ME)

Prerequisite: Applied Mathematics-II, Applied Mathematics-II

Course Educational Objectives:

In this course student will learn about

1. The methodology of interpolation and extrapolation to common problems using different formulae
2. The application of Numerical Techniques in Integration; solving the algebraic and transcendental equations.
3. Solving Differential equations by using Numerical Methods..
4. The concepts of Vector Calculus Vector Differentiation and Conservative Fields.
5. The concepts of line integrals, surface and volume integrals, vector integral theorems and their applications

Course outcomes:

At the end of this course student will be able to

1. Apply the knowledge acquired to identify, formulate and solve problems in engineering using Numerical Techniques.
2. Apply the techniques of numerical interpolation and approximation of functions with ease.
3. Perform integration of functions when the actual function is not given and solve algebraic and transcendental equations.
4. Solve Ordinary Differential Equations with given initial conditions.
5. Apply Integration to find length, area and volume of any given surface.

UNIT – I

Solution of Algebraic and Transcendental Equations and Numerical Integration

Solutions of Algebraic and Transcendental Equations – Regula False Position method and Newtons Raphson Method in one variable. Numerical Integration – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule.

UNIT – II

Interpolation and Finite Differences

Interpolation: Introduction – Finite differences- Forward Differences- Backward Differences- Central differences – Symbolic relations and separation of symbols-Differences of a polynomial- Newton's formulae for interpolation – Lagrange's Interpolation formula.

UNIT – III

Numerical solution of Ordinary Differential Equations

Numerical solution of Ordinary Differential equations, Solution by Taylor's series - Picard's Method of successive Approximations - Euler's Method - Runge- Kutta Methods.

UNIT – IV

Vector Differentiation

Vector Differentiation: Gradient- Directional Derivatives -Divergence – Solenoidal fields- Curl –Irrotation fields-potential surfaces - Laplacian and second order operators and related properties of sums and products

UNIT – V

Vector Integration

Vector Integration - Line integral – work done –area - surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

TEXT BOOKS

1. S. S. Sastry, "Introductory Methods of Numerical Analysis". Prentice Hall of India, 5th Edition,2005.
2. Dr. B. V. Ramana, "Higher Engineering Mathematics", The McGraw Hill Companies, 1st Edition,2010.

REFERNCES

1. Dr. B.S. Grewal , "Higher Engineering Mathematics", Khanna Publishers, 42ndEdition,2012.
2. Steven .C. Chopra and Ra. P. Canale, "Numerical Methods for Engineers with programming and software application", The McGraw Hill Companies, 4th Edition,2002.
3. M. K. Jain, S. R. K. Iyengar, R.K. Jain, "Numerical Methods for Scientific and Engineering Computation", New Age International Publishers., 5th Edition,2007.

III SEMESTER

S220 - ELECTRICAL TECHNOLOGY

Prerequisite: Circuit Theory

Course Educational Objectives:

In this course student will learn about

1. Construction, Operation, Performance of DC Machines
2. Working of transformer, testing and its performance
3. Construction, Operation of Poly-Phase Induction Motor
4. The performance and starting methods of various Induction Motors
5. Construction and working of various electrical apparatus.

Course Outcomes:

At the end of the course, the student will be able to

1. Understand the performance and voltage build of DC Generator.
2. Understand the necessity of starter, power stages, back emf of DC Motors
3. The performance, operation of transformer for different load, The equivalent circuit parameters of transformer.
4. Understand the performance, Operation and necessity of starting Methods of Single Phase Induction Motors and three induction motors
5. Know how the current and voltages measures in measuring instruments

UNIT – I
DC MACHINES

DC Generator: Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators. D.C. Motors: DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT – II
TRANSFORMERS

Principle of operation of single phase transformer – types – constructional features – Phasor diagram on No- Load and Load – Equivalent circuit. Performance of Transformers : Losses and Efficiency, Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT – III
INDUCTION MOTORS

Principle of operation of three-phase Induction motors –Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods. SINGLE PHASE INDUCTION MOTORS: Principle of operation – Double Field Revolving Theory- Shaded pole motors – Capacitor motors.

UNIT – IV
ALTERNATORS

Alternators – Constructional features – Principle of operation – Types - EMF Equation – Definitions of Distribution and Coil span factors

UNIT – V
MEASURING INSTRUMENTS

Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments – Ammeter, Voltmeter and Wattmeter.

TEXT BOOKS

1. M.S Naidu and S. Kamakshaiah, Introduction to Electrical Engineering –TMH Pub,2012.
2. V.K Mehta, Principles of Electrical Engineering, S.Chand Publications,2006.

REFERENCES

1. M.S Naidu and S. Kamakshaiah, Introduction to Electrical Engineering, TMH Pub, 2011.
2. I.J. Nagarath amd D.P Kothari, Theory and Problems of basic electrical engineering, PHI Publications, 1998.
3. Basic Electrical Engineering - T.K. Nagasarkar and M.S.Sukhija, Oxford University Press, 2005.

III SEMESTER

S378 - SIGNALS AND SYSTEMS

(Common to ECE, EIE)

Prerequisites: Applied Mathematics - II

Course Educational Objectives

In this course student will learn about

1. The various types of signals
2. Fundamental characteristics of signals and systems.
3. Frequency domain representation of Signals using Fourier series and Fourier transform.
4. Sampling processes and Reconstruction of signals.
5. Properties of Systems and Filter Characteristics & various types of signals and systems

Course Outcomes

At the end of this course student will be able to

1. Differentiate various signals with their properties.
2. Analyze the spectral characteristics of various signals.
3. Understand the process of sampling and the effects of various sampling methods.
4. Classify the Systems and observe the response of various filters.
5. Apply the Laplace Transforms for analysis of continuous time signals and systems.

UNIT-I

Signal Analysis: Concept of Signal, Classification of Signals-Continuous Time and Analog Signals, Discrete Time and Digital Signals; Representation of Signals- Impulse, Unit Step, Unit Ramp, Signum, Decaying Exponential, Raising Exponential, Double Exponential, Gate and Rectangular, Sinc and Sampling Signals; Operations on Signals– Time Shifting, Time Scaling, Time Reversal (Folding), Amplitude Scaling, Convolution; Graphical Method of Convolution, Properties of Signals- Even and Odd, Causal and Non Causal, Bounded and Unbounded, Periodic and Aperiodic, Energy and Power, Deterministic and Random Signals.

UNIT-II

Signal Approximation: Approximation of a Signal by another signal-Mean square error, Condition for orthogonal signals, Approximation of a Signal by a set of mutually orthogonal signals-Evaluation of Mean square error, Gibbs Phenomena, Orthogonality in complex signals-Approximation of a complex signal by another complex signal, Approximation of a complex signal by a set of mutually orthogonal complex signals.

Fourier Series: Concept of Fourier Series, Trigonometric Fourier Series, Exponential Fourier Series, Relations among coefficients of Trigonometric Fourier Series and Exponential Fourier Series, Representation of Periodic signal by Fourier series over the entire interval, Existence of Fourier Series, Symmetry conditions of Fourier Series, Parsevalls Theorem, Complex Fourier Spectrum-Line and Power Spectrum.

UNIT-III

Fourier Transforms: Need of Transform, Deriving Fourier Transform from Fourier Series, Existence of Fourier Transform, Properties of Fourier Transform- Symmetry, Linearity, Scaling, Time Reversal, Time Shifting, Frequency Shifting, Time Differentiation, Time Integration, Frequency Differentiation, Frequency Integration, Time Convolution, Frequency Convolution and Parsevalls Theorem; Fourier Transform of Aperiodic Signals, Fourier Transform of Periodic Signals.

Sampling Theorem: Representation of continuous time signals by its samples, Graphical and analytical proof of sampling theorem for Band Limited Signals, impulse sampling, Reconstruction of signal from its samples, effect of under sampling- Aliasing.

UNIT-IV

Signal Transmission Through Linear Systems: Definition of System, Classification of Systems, Properties of Systems- Linear and Non Linear, Time Invariant and Variant, Causal and Non Causal, Stable and Unstable; Signal and System Bandwidth, Response of Linear Systems-Transfer Function, Impulse Response, Response of Linear Systems with an arbitrary input, Distortion less Transmission through a system, Filter Characteristics of Linear System, Ideal Filter characteristics of LPF, HPF, BPF and BEF, Physically Realizable System and Poly-Wiener Criterion.

Correlation Functions and Spectral Densities: Autocorrelation Function and Properties, Energy Spectral Density, Power Spectral Density, Cross Correlation Function and Properties.

UNIT-V

Laplace Transforms: Concept of Laplace Transform on Non-Causal, Causal and Anti-Causal Signals, Relation between Laplace Transform and Fourier Transform, Existence of Laplace Transform; Properties of Laplace Transform- Linearity, Time Scaling, Time shifting, Shifting in S domain, Conjugate, Differentiation in time domain, Integration in time domain, Differentiation in S-domain, Integration in S-domain, Convolution in time domain, Convolution in S-domain, Initial value and Final value theorems. Laplace Transform of various classes of Signals, Concept of Region of Convergence and Properties, Inverse Laplace Transform using Partial Fractions Method. Applications of Laplace Transform- Causality of a System, Stability of a System, Solving of Differential Equations and Analysis of RLC Circuits.

TEXT BOOKS

1. A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/Pearson publishers, 2003.
2. B P Lathi, Signals, Systems and Communications, BSP, 2003

REFERENCES

1. Simon Haykin, Signals and Systems, John Wiley, 2004
2. HWEI P.HSU, Signals and Systems, Schaum's Outlines, Tata Mc Graw Hill, 2004.
3. Michel J. Robert, Fundamentals of Signals and Systems, McGraw Hill Publishers, 2008.
4. Narayana Iyer, Signals and Systems, Cengage Learning Publishers, 2011.
5. P. Ramesh Babu, Signals and Systems, Scitech Publications Pvt Ltd, Chennai, March 2013
6. A.Anand Kumar, Signals and Systems, 2nd Edition, PHI, 2012.
7. K.Raja Rajeshwari and B.Visveswararao, Signals and Systems, PHI Publishers, 2014.

III SEMESTER

S126 - ANALOG ELECTRONIC CIRCUITS

(Common to ECE, EIE)

Prerequisite: Electronic Devices Circuits

Course Educational Objectives:

In this course student will learn about

1. Analysis of transistor amplifier at different frequencies.
2. Frequency response of single stage and multistage amplifiers.
3. Different power amplifiers and tuned amplifiers.
4. Concept of feedback in amplifiers.
5. Operation, types and stability of Oscillators.

Course Outcomes:

At the end of the course student will be able to

1. Design transistor amplifier at different frequencies.
2. Understand the effect of capacitances on single stage and multistage amplifiers
3. Calculate frequency response & Understand the applications of power and tuned amplifiers
4. Know the importance of feedback in amplifiers.
5. Design sinusoidal oscillator for different frequencies.

UNIT-I

Small Signal Low Frequency Transistor Amplifiers: Hybrid parameter model of a Two Port Network, h parameter model for Transistor in CE, CB and CC Configurations, typical h parameter values, h parameter conversion from one configuration to another configuration, Analysis of CE, CB and CC Amplifiers using h parameter model, CE Amplifier with emitter resistance.

Transistor at High Frequencies: The hybrid π Common Emitter Transistor model; Hybrid π conductance in terms of low frequency h parameters- Transconductance, Input Impedance, Feedback conductance, Base spreading resistance, output conductance and hybrid π capacitances; The CE short circuit current gain obtained with the hybrid-π model- Bandwidth f_β and parameter f_T, Current gain with resistive load, Transistor amplifier response with source resistance-Gain Bandwidth product.

UNIT-II

Multistage Amplifiers: Cascade Amplifier (RC Coupled Amplifier), Cascode Amplifier, Darlington Pair and their analysis.

FET Amplifiers: Analysis of CG, CS, CD FET amplifiers at Low frequency and at High frequency.

Frequency Response of Amplifiers: Frequency response of Single stage and double stage BJT amplifiers, Determination of High and Low cut off frequencies, Bandwidth, Effect of coupling capacitor and emitter bypass capacitor on frequency response; Frequency response of Single stage and double stage FET amplifiers, Determination of High and Low cut off frequencies, Bandwidth.

UNIT-III

Power Amplifiers: Classification of large signal Amplifiers, Distortion in Amplifiers- Second harmonic Distortion and Higher order harmonic distortion, Class A power amplifier- Direct coupled and Transformer Coupled Power Amplifier, Class B power amplifier- Push Pull and Complementary Symmetry power Amplifier, Class AB power amplifier, Class C power amplifier, Class D and S power Amplifiers.

Tuned amplifiers: Single tuned amplifier, Double tuned amplifier and their analysis.

UNIT-IV

Feedback Amplifiers: Open loop Amplifiers- Voltage Amplifier, Current Amplifier, Transresistance Amplifier and Transconductance Amplifier, Closed loop Amplifiers- Block Diagram, Concept of negative feedback, Concept of positive feedback; Characteristics of Negative feedback Amplifiers, Classification of Negative feedback Amplifiers-Voltage Series feedback Amplifier, Voltage Shunt feedback Amplifier, Current Series feedback Amplifier, Current Shunt feedback Amplifier and their analysis.

UNIT-V

Sinusoidal Oscillators: Barkhausen Criterion, Classification of Oscillators; Hartley Oscillator, Colpitts Oscillator; RC Phase shift Oscillator using BJT and JFET; Wein Bridge Oscillator, Crystal Oscillator, Frequency and Amplitude Stability of Oscillators.

TEXT BOOKS

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, Publishers, New Delhi, 2007.
2. Donald A.Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill Publishers, 2006.

REFERENCES

1. P.John Paul, "Electronic Devices and Circuits", New Age International Publishers, 2014.
2. Adel S. Sedra and Kenneth Carless Smith, "Microelectronic Circuits", Oxford University Press, 1998.
3. M.H.Rashid, "Microelectronic Circuits: Analysis and Design", PWS Publishing Company, 1998.
4. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson education Publishers, 2006.
5. T.F. Bogart Jr., J.S.Beasley and G.Rico, Electronic Devices and Circuits, Pearson education Publishers, 2004.
6. David A. Bell, Electronic Devices and Circuits, Oxford University Press, 2009.
7. B.Visvesvara Rao et. al., "Electronic Circuit Analysis", Pearson Education Publishers, 2012.

III SEMESTER

S206 - ELECTRIC AND MAGNETIC FIELDS

(Common to EEE, EIE)

Prerequisite: Engineering Physics

Course Educational Objectives:

In this subject student will learn about

1. The coordinate systems, Basics of electrostatics such as Electric Field Intensity, Electric flux, Electric potential and Maxwell's first equation.
2. The Properties of Conductors, Dielectrics and Capacitance.
3. The Basics of magneto statics such as Magnetic Field Intensity, Magnetic flux and Maxwell's second and third equations.
4. Force in magnetic fields, Magnetic potential and Poisson's equation.
5. Maxwell's fourth equation, Maxwell's equations for time varying fields, its integral and differential forms and about Pointing theorem.

Course Outcomes:

At the end of this course student will be able to

1. Understand the different coordinate systems used in EMF, Calculate the Electric Field Intensity, Electric flux and Electric potential.
2. Understand the Ohm's law in point form, polarization and Laplace's and Poison equations.
3. Calculate the Magnetic Field Intensity due to circular, square and Infinite sheet, and calculate Magnetic flux.
4. Calculate the Force, Torque, scalar and vector magnetic potential, self and mutual inductance.
5. Understand the faraday's laws of electromagnetic induction and calculate the statically and dynamically induced EMFs.

UNIT – I

ELECTRO STATICS

Introduction to Coordinate systems, Divergence and Strokes theorem, Electrostatic Fields-Coulomb's Law ,Electric Field, Electric Field Intensity (EFI) –Electric Fields due to continuous charge distributions-Volume charge, surface charge, line charge. EFI due to a line and a surface charge –Electric Flux, Electric Flux density, Gauss's law, Application of Guass's Law, Maxwell's first law. Work done in moving a point charge in an electrostatic field,– Electric Potential – Properties of potential function – Potential gradient, Electric dipole – Dipole moment , potential and EFI due to an electric dipole. Energy stored and energy density in a static electric field.

UNIT – II

CONDUCTORS, DIELECTRICS AND CAPACITANCE

Conductors -Current, Current density, Equation of continuity, Conduction Current, Ohm's law in point form, behaviour of conductors in an electric field. Dielectrics – polarization, Displacement and Convection current, Electric field inside a dielectric material, Conductor-Free space and Dielectric- Dielectric boundary conditions. Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics. Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

UNIT – III

MAGNETO STATICS

Static magnetic fields – Biot-Savart's law – Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation. Ampere's circuital law and its applications- MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation.

UNIT – IV

FORCE IN MAGNETIC FIELDS

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element– Force on a straight and a long current carrying conductor– Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop. Magnetic Potential - Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations. Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid ,energy stored and density in a magnetic field.

UNIT – V

ELECTRODYNAMIC FIELDS

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms –Maxwell's fourth equation,– Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

TEXT BOOKS

1. William .H.Hayt, 'Engineering Electromagnetics', Tata McGraw Hill edition, 2001.
2. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 1999.

REFERENCES

1. Joseph. A.Edminister, 'Theory and Problems of Electromagnetics', Second edition, Schaum Series, Tata McGraw Hill, 1993.
2. Mathew N. O. SADIKU, 'Elements of Electromagnetics', Oxford University press Inc. First India edition, 2007.

III SEMESTER

S189 - DIGITAL ELECTRONIC CIRCUITS

(Common to ECE, EEE, EIE)

Prerequisite: Circuit Theory

Course Educational Objectives (CEOs):

In this course, student will learn about

1. The basic concepts of number systems and Boolean Algebra.
2. Logic gates and realization of Boolean expressions using logic gates.
3. The design procedure of combinational logic circuits.
4. Various flip flops, registers and counters.
5. Concepts of Finite State Machines and Asynchronous Sequential Machines.

Course Outcomes (COs):

At the end the student will be able to learn

1. Various conversions using number systems and Boolean algebra concepts.
2. How to implement Boolean expressions using logic gates.
3. How to design combinational logic circuits using gates.
4. Various flip flops, their realization and operations of registers, counters.
5. Finite State Machines and Asynchronous Sequential Machines.

UNIT – I

Number Systems: Number system, complements, signed Binary numbers. Binary Arithmetic, Binary codes –BCD, Excess 3 code, Gray code, Error detecting and correcting code – Hamming code, conversion from one code to another.

Boolean Algebra: Boolean postulates –De-Morgan's Theorem, Principle of Duality, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS)- Minterm and Maxterm, Canonical forms – Conversion into canonical form–Karnaugh map Minimization (up to 5 variables)- Don't care conditions.

UNIT – II

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive –OR and Exclusive – NOR, positive logic and negative logic, Realization of Boolean Functions using logic gates (Multi level gate implementations- AND -OR, OR - AND, NAND -NAND, NOR -NOR, NAND-NOR & NOR - NAND realizations. AND, OR, NOT, NAND and NOR gates using Resistors, Diodes and Transistor.

UNIT – III

Combinational Logic Circuits: Design procedure, Adders and Subtractors – Serial adder/ Subtractor, Parallel adder/ Subtractor- Carry look ahead adder, BCD adder, Magnitude Comparator, Decoder, encoder, Multiplexer, Demultiplexer, Parity checker, code converters.

Memories- Read Only memory and types of ROM, Random access Memory and types of RAM; Programmable Logic Devices–Programmable Logic Array, Programmable Array Logic. Implementation of combinational logic using MUX, PROM, PAL and PLA.

UNIT – IV

Sequential Logic Circuits: Latches, Flip flops-SR, JK, T, D and Master slave – Characteristic and excitation tables, characteristic equations. Modes of triggering – Edge and Level Triggering, Realization of one flip flop using other flip flops, Registers and their operation, synchronous and Asynchronous counters, modulo – n counters, Race around condition, Hazards: Static ,Dynamic, Essential –Hazards elimination.

UNIT – V

Asynchronous Sequential Circuits: Sequence detector. Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines.

Algorothimic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations.

TEXTBOOKS

1. Morris Mano, "Digital Design", PHI Publishers,1995.
2. Zvi Kohavi, Switching & Finite Automata theory, TMH Publishers,1978.

REFERENCES

1. Charles H. Roth, Fundamentals of Logic Design, Cengage learning Publishers, 2013.
2. M.Subramanyam,"Switching Theory and Logic Design", University Science Press Publishers, 2013.
3. John M. Yarbrough, "Digital Logic: Applications and Design", Thomson Publications, 2006.
4. Dr.Anandakumar,"Switching Theory and Logic Design", PHI Publishers, 2009.

III SEMESTER

S355 - PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to all branches)

Perquisite: None

Course Educational Objectives:

In this course, student will learn about

1. To create an awareness on engineering ethics and human values.
2. To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.
3. To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth.
4. To explicate the professional and societal responsibilities of the engineers.
5. To make the student realize the sensitiveness associated with experimentation process

Course Outcomes:

At the end of the course, the student

1. Acquires the basic concepts of Professional ethics and human values & Students also gain the connotations of ethical theories.
2. Knows the duties and rights towards the society in an engineering profession
3. Would realize the importance and necessity of intellectual property rights.
4. Can take all the necessary precautions while conducting the experiments, which may reduce the risk.
5. Understands the importance of risk evacuation system in reality and takes the utmost responsibility while handling the risky situations.

UNIT - I

ETHICS

Senses of 'Engineering Ethics' -Variety of moral issues - Types of inquiry -Moral dilemmas Moral autonomy -Kohlberg's theory Gilligan's theory -Consensus and controversy – Models of Professional Roles -Theories about right action- Self interest - Customs and religion -Uses of Ethical theories.

UNIT - II

HUMAN VALUES

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning - Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing - Honesty – Courage– Valuing Time - Cooperation – Commitment – Empathy – Self Confidence – Character – Spirituality

UNIT – III

ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation - Engineering Projects VS. Standard Experiments - Engineers as responsible experimenters – Codes of ethics - Industrial Standards - A balanced outlook on law- The challenger case study.

UNIT - IV

SAFETY, RESPONSIBILITIES AND RIGHTS

Safety and risk- Assessment of safety and risk- Risk benefit analysis and reducing risk- Three Mile Island and Chernobyl case study - Collegiality and loyalty -Respect for authority - Collective bargaining – Confidentiality- Conflicts of interest - Occupational crime - Professional Rights- Employee rights- Intellectual Property Rights (IPR) discrimination.

UNIT - V

GLOBAL ISSUES

Multinational Corporation's -Environmental ethics-computer ethics -weapons development Engineers as managers - consulting engineers-engineers as expert witnesses and advisors Moral leadership - sample code of Ethics (Specific to a particular Engineering Discipline).

TEXT BOOKS

1. R.S.Nagarajan, a Textbook on "Professional Ethics and Human Values", New Age Publishers – 2006.
2. Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.

REFERENCES

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, " Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
2. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)
3. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available).
4. John R Boatright, "Ethics and the conduct of business", Pearson Education, New Delhi,2003.
5. Edmund G Seebauer and Robert L Barry, "Fundamentals of ethics for scientists and engineers", Oxford University Press, Oxford, 2001.

III SEMESTER

L107 - ANALOG ELECTRONIC CIRCUITS LAB

(Common to ECE, EIE)

Prerequisite: Electronic Devices & Circuits Theory

Course Educational Objectives:

In this course student will learn about

1. Frequency response of single stage and multi stage amplifiers.
2. Frequency response of FET amplifier.
3. Variation of frequency response by applying negative feedback on amplifiers.
4. Sinusoidal signal generation at different frequencies
5. The significance of various power amplifiers.

Course Outcomes:

At the end of the course student will be able to

1. Understand the effect of capacitors on frequency response of amplifier.
2. Determine the parameters of FET amplifier.
3. Know the effect of negative feedback on frequency response of amplifiers.
4. Generate sinusoidal signals at different frequencies.
5. Discriminate various power amplifiers.

LIST OF EXPERIMENTS

(The following experiments are to be simulated using PSPICE/MULTISIM software and verified by Bread board)

1. Common Emitter Amplifier.
2. Common Collector Amplifier.
3. Single Stage FET Amplifier.
4. Two Stage BJT RC coupled Amplifier.
5. Two Stage FET Amplifier.
6. Class A Power amplifiers.
7. Class B Power amplifiers.
8. Class C Power amplifiers.
9. Voltage series Feedback amplifier
10. Current shunt Feedback amplifier
11. Hartley Oscillator
12. Colpitts Oscillator
13. RC phase shift oscillator using Transistors.
14. Wien bridge oscillator using Transistors.

III SEMESTER

L138 - ELECTRICAL TECHNOLOGY LAB

Perquisite: Circuit Theory

Course Educational Objectives:

In this course student will carry out

1. Experimental procedures on different types of electrical machines.
2. Different types of wiring and devices connections.
3. The operation of electric machines under different loading conditions.

Course Outcomes:

At the end of the course, students should be able to:

1. Understand the concept of efficiency and the short circuit impedance of a three-phase transformer from no-load test, winding resistance, short circuit test, and load test.
2. Understand the effect of unbalanced loading on a three-phase transformer with different connections, and the effects and limitations of each connection.
3. The load characteristics of various dc motors and generators.

List of Experiments

1. Series and Parallel Resonance – Determination of Resonant frequency, Bandwidth and Q-factor for an RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, Determination and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of Maximum Power transfer theorem.
6. Verification of Thevenin's and Norton's equivalent
7. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
8. Predetermination of efficiency of a given DC Shunt machine working as motor and generator using Swimburne's test.
9. Brake test on DC shunt motor. Determination of performance characteristics.
10. Predetermination of efficiency and Regulation of a single phase at given power factor and equivalent circuit from OC & SC tests.

Additional Experiments

11. Brake test on 3-phase Induction motor. Determination of performance characteristics
12. Transient analysis of series RLC Circuit using PSPICE

IV SEMESTER

S410 - TRANSDUCERS IN INSTRUMENTATION

Prerequisite: Engineering Physics, Signals and Systems

Course Educational Objectives:

1. The basic operational characteristics of measurement systems
2. The working principles of various Active transducers
3. Various mechanical transducers principles & processing of signal using suitable signal conditioning circuit
4. Various Capacitive ,Inductive & Electromagnetic transducers working principles
5. The different Miscellaneous transducers principles & working.

Course Outcomes:

After completion of the course students are able to

1. Understand the operational characteristics of measurement system
2. Gain the knowledge about the active type transducers like Thermocouples, Piezoelectric, etc.
3. Acquire adequate knowledge about the mechanical transducers like Bellows, Diaphragms etc.,,
4. Understand the working of Capacitive & resistive type transducers & processing of signal from transducers
5. Understand the operational principle of different Miscellaneous transducers.

UNIT – I

Introduction to Instrument & measurement systems: General Concepts About Sensor & Transducer, Measurement Systems, Sensor Classification, General Input-Output configuration.

Performance characteristics: Static characteristics of measurement systems: Accuracy, Precision, Resolution, Threshold , Sensitivity, Linearity, Non-Linearity , Hysteresis, Dead Zone, Drift, Span Range, Resolution, Systematic Errors , Random Errors. Dynamic characteristics of measurement systems: Step Ramp Impulse & Frequency Response Of Zero-Order, First-Order, And Second-Order Measurement Systems

UNIT – II

Active Transducers : Thermocouple, Cold Junction Compensation, Piezoelectric Sensor, Charge Amplifier, Photovoltaic Sensor, Electrochemical sensor.

UNIT – III

Mechanical Transducers : Thermometer, Diaphragm, Bellows, Bourdon Tube, Bimetallic Transducers **Resistive Transducers**: Potentiometers, Strain Gauges And Types, Resistive Temperature Detectors (RTD), Thermistors, Magneto Resistors, Light-Dependent Resistors (LDR).Cantilever, Load Cell, Torsion Bar,

UNIT – IV

Capacitive Transducers: Variable and differential dielectric, gap between the plates & area of the plates. **Inductive Transducers:** Variable reluctance sensor, eddy current, linear variable differential transformers (LVDT), synchros, resolvers, inductosyn, magneto elastic sensors, magneto resistive Transducers, **Electromagnetic Transducers**: Transducers based on faraday's law, hall effect Transducers

UNIT – V

Miscellaneous Transducers:

Photo diode, Photo transistor, Position sensitive detector, Magneto Diode, Magneto Transistor.

TEXT BOOKS

1. Ramon PallásAreny,John G. Webster ,Sensors and Signal Conditioning; 2nd edition, John Wiley and Sons, 2000.
2. Arun K.Ghosh, Introduction to Measurement & Instrument,3rd edition,Published by PHI Learning,2009.

REFERENCES

1. D.Patranabis, Sensors and Transducers, TMH 2003.
2. Jon Wilson, Sensor Technology Handbook, Newnes Publications, 2004.
3. Herman K.P. Neubrat, Instrument Transducers – An Introduction to Their Performance and Design, Oxford University Press, 2008.
4. E.O. Doeblin, Measurement Systems: Applications and Design, McGraw Hill Publications, 2013.

IV SEMESTER

S361 - PULSE AND SWITCHING CIRCUITS

(Common to ECE, EIE)

Prerequisite: Electronic Devices and Circuits, Digital Electronic Circuits

Course Educational Objectives

In this course student will learn about

1. Concepts of linear and nonlinear wave shaping circuits.
2. Switching characteristics of transistor.
3. Analysis and design and of different Multivibrator circuits.
4. Various methods of time base generators.
5. Principle and operation of Sampling gates.

Course Outcomes

At the end of this course student will be able to

1. Analyze RC, RL, RLC, clipper and clamper circuits.
2. Understand Switching characteristics of transistor.
3. Differentiate various types of Multivibrators and their applications in digital systems.
4. Analyze the methods for generating time based sweep signals.
5. Understand sampling gate operation and their applications.

UNIT – I

Linear Wave Shaping Circuits: Low pass and High pass RC circuits and their response for sinusoidal, step, pulse, square and ramp inputs. RC circuit as differentiator, integrator and double differentiator, RL, RLC circuits and their response for step input.

UNIT – II

Non Linear Wave Shaping Circuits: Clipper circuits using Diode and Transistor, clipping at two independent levels, Zener Diode Clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, Clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem and practical clamping circuits.

UNIT – III

Switching Characteristics of Devices: Diode Modeling, Diode Switching Times, Transistor as a switch, Break down voltage considerations of transistor, saturation parameters of Transistor and their variation with temperature, Transistor switching times.

Multivibrators-I: Bistable Multivibrator-Fixed bias, self biased transistor binary, commutating capacitors, Principle of operation, analysis and design of Bistable Multivibrator.

UNIT – IV

Multivibrators-II: Monostable Multivibrator-Collector-coupled and Emitter-coupled Mono stable Multivibrator, Principle of operation, analysis and design of Monostable Multivibrator; Astable Multivibrator-Collector coupled and Emitter-coupled, Design of Astable Multivibrator; Schmitt trigger circuit-Principle of operation, analysis and design, calculation of UTP, LTP and applications.

UNIT – V

Time Base Generators: Features of Time Base Signals, methods of generating time based signals, RC ramp generator, constant current ramp generator, UJT saw tooth generator, Bootstrap ramp generator, Miller integrator ramp generator.

Sampling Gates: Operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, reduction of pedestal in gate circuits, applications of sampling gates.

TEXTBOOK

J.Millman and H.Taub, "Pulse,Digital and Switching Waveforms", McGraw-Hill Publishers,1965.

REFERENCES

1. A. Anand Kumar, **"**Pulse and Digital Circuits", PHI Publishers, 2005.
2. K.Venkatarao, K.Rama Sudha and G.Manmadha rao, "Pulse and digital circuits", Pearson education Publishers, 2010.
3. V.U.Bakshi and A.P.Godse, **"**Pulse and Digital Circuits", Technical Publications, Pune, 2009.
4. J.B.Gupta, **"**Pulse and Digital Switching Circuits", SK.Kataria and Sons Publications, New Delhi, 2007.

IV SEMESTER

T148 - CONTROL SYSTEMS

Prerequisite: Applied Mathematics-I, Applied Mathematics-III Circuit Theory

Course Educational Objectives (CEOs):

In this course, students will learn about

Open loop and closed loop (feedback) systems, methods of representation of systems and to desire their transfer function models.

1. Time response of systems and steady state error analysis.
2. Basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
3. The concept of stability of control system and methods of stability analysis & different ways of designing compensation for a control system.
4. State Space Model, which can be used in Digital Control System.

Course Outcomes (COs):

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

1. Identify basic elements of open loop and closed loop control systems & derive systems input output relations using differential equation(from physical systems), BDR & signal-flow graphs techniques.
2. Understanding of stability, transient, and steady-state behavior of linear dynamic systems.
3. Understand and explain the frequency response specifications and use them for various stability analysis(Bode plot, polar plot and Nyquist plots techniques).
4. Design & implement Lead, Lag & Lead-Lag compensators and P, PI, PID controllers to meet the desired specifications, which is required in the process control Industry.
5. Apply & develop State Space Model for MIMO, which can be applicable to digital control systems.

UNIT – I

INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems. Transfer Function of DC Servo motor - Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT – II

TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral, PID systems.

UNIT – III

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications Polar Plots -Bode diagrams-Determination of Frequency domain specifications and Transfer function from the Bode Diagram-Phase margin and Gain margin- Nyquist Plots.

UNIT – IV

STABILITY ANALYSIS

The concept of stability – R-H stability criterion – qualitative stability and conditional stability – limitations of Routh's stability, The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci, Stability Analysis from Bode Plots - Nyquist Plots. Compensation techniques – Lag, Lead, Lead-Lag Compensator design in frequency Domain.

UNIT – V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

TEXT BOOKS

1. B. C. Kuo , "Automatic Control Systems" John wiley and sons, 8th edition, 2003.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P) Limited Publishers,2nd edition,2002.

REFERENCES

1. Katsuhiko Ogata , "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd edition,1998.
2. Norman S.Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi,2007
3. Richard C Dorf, Robert H Bishop, Modern control systems , 8th edition, Prentice Hall (Pearson education, Inc.), New Delhi 2003.
4. Benzamin C. Kuo and Farid Golnaraghi, Automatic Control ystems, 8th Edition, John Wiley, New Delhi, 2003.

IV SEMESTER

S169 - COMPUTER ORGANIZATION

(Common to EIE, CSE, ECE, EEE, IT)

Course Educational Objectives:

- Students will be able to make use of the binary number system to translate values between the binary and decimal number systems, to perform basic arithmetic operations (i.e. addition, subtraction, multiplication, and division) and to construct machine code instructions.
- Students will be able to design logical expressions and corresponding integrated logic circuits for a variety of problems including the basic components of a CPU such as adders, multiplexers, the ALU, a register file, and memory cells.
- Students will be able to explain the fetch-execute cycle performed by the CPU and how the various components of the data path are used in this process.

Course outcomes:

The specific course outcomes supporting the program outcomes are:

- Able to understand register transfer, micro operations such as arithmetic logic ad shift.
- Able to analyze the basic concepts and elements of a computer system.
- Able to learn how to design a CPU.
- Able to perform arithmetic operations.
- Able to study memory and I/O management.

Pre requisite: Digital Logic Design

UNIT – I

Register Transfer and Micro Operations: Register Transfer language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions– Instruction cycle, Memory – Reference Instructions, Input – Output and Interrupt.

UNIT – II

Micro Programmed Control: Control Memory, Address Sequencing, Micro program example, Design of Control unit, hard wired control, Micro programmed control.

Central Processing Unit: STACK organization, Instruction formats, Addressing modes, DATA Transfer and Manipulation, Program control, Reduced Instruction Set computer.

UNIT – III

Pipelining and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC pipeline, Vector Processing.

Computer Arithmetic: Data Representation, Fixed Point Representation, Floating Point Representation, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT- IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory. Associative Memory, Cache Memory, Virtual Memory.

UNIT – V

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input –Output Processor, Serial communication.

TEXT BOOK

M.Morris Mano, "Computer Systems Architecture", Pearson Education publishers, 2012.

REFERENCES

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, "Computer Organization", Tata McGraw Hill publishers, 2002.
2. William Stallings, "Computer Organization and Architecture", Sixth Edition, Pearson/PHI publishers, 2000.
3. Andrew S. Tanenbaum, "Structured Computer Organization", Pearson/PHI publishers, 2012.
4. Sivaraama Dandamudi, "Fundamentals or Computer Organization and Design", Springer publishers, 2003.

IV SEMESTER

S295 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to CE, CSE, EEE, EIE, IT)

Prerequisite: None

Course Educational Objectives:

In this course student will learn about

1. The concepts of economics and accounting to make them effective business decision makers;
2. To help to the students of engineering to understand the concepts of demand, production, cost, and market structures for various business decisions.
3. Fundamentals of Economics, which is an important social science subject helps to engineers to take certain business decisions in the processes of optimum utilization of resources:
4. An overview on capital investment appraisal methods and sources of raising capital to promote the students to start new enterprises
5. Fundamental skills about accounting and to explain the process of preparing accounting statements & analysis for effective business decisions.
6. Fundamentals of Balance sheet and financial accounting.

Course Outcomes:

After completion of the course, students will be able to

1. Capable of analyzing fundamentals of economics such as demand, production, price, supply and investment concepts which helps in effective business administration.
2. Choose the right type of business activity, establish the business unit and invest adequate amount of capital in order to get maximum return from select business activity.
3. Prepare and analyse accounting statements like income & expenditure statement, balance sheet apart from the fundamental knowledge, to understand financial performance of the business and to initiate the appropriate decisions to run the business profitably.
4. Take the effective business decision& analyze the accounting statements.
5. Prepare the Balance sheet and calculate the financial accounts.

UNIT – I

Introduction to Managerial Economics: Economics – Definitions, Micro, Macro & Welfare economics – Managerial Economics - Definition, Nature and Scope of Managerial Economics, Limitations –Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Types of demand. Definition, Types Measurement and Significance & types of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand Forecasting

UNIT – II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs. Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Cost & output relationship in short run & long run, Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

UNIT – III

Introduction to Markets & Pricing Policies:

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly - Price-Output Determination in case of Perfect Competition and Monopoly, Monopolistic competition. Objectives and Policies of Pricing-Methods of Pricing

UNIT – IV

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Components of working capital & Factors determining the need of working capital. Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method, Profitability Index, Internal rate of return (simple problems)

UNIT – V

Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts with simple adjustments. Financial Analysis through ratios: Importance, types: Liquidity Ratios, Activity Ratios, Capital structure Ratios and Profitability ratios

TEXT BOOK

Aryasri: Managerial Economics and Financial Analysis, 2nd edition, TMH, 2005.

REFERENCES

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
2. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
3. Lipey & Chrystel, Economics, Oxford University Press,12th Edition,2011.
4. Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Thomson, 2007.

IV SEMESTER

S207 - ELECTRICAL AND ELECTRONIC MEASUREMENTS

Prerequisite: Electronic Devices & Circuits, Circuit Theory

Course Educational Objectives:

In this course student will learn about

1. Various types of measurement errors, calibration and various standards of measurements
2. Voltmeters, Ammeters and Ohm meters for both DC and AC.
3. Various types of DC and AC bridges.
4. Various types and principle of operations of DVM used in Instrumentation
5. The principle of operation of Oscilloscope, Recorders and Analyzers.

Course Outcomes:

At the end of this course student will be able to

1. Explain the errors, calibration and various standards of measurement.
2. Explain various electromechanical indicating instruments.
3. Explain various DC and AC bridges for measurement of R, L& C.
4. Explain AC voltmeters, multimeters and digital voltmeters.
5. Explain the function of Oscilloscopes, Analyzers and Recorders.

UNIT – I

ERRORS,CALIBRATION & STANDARDS OF MEASUREMENTS

Definitions- Accuracy Vs Precision-significant figures-types of errors- Statistical analysis – probability of errors. Calibration: introduction-process instruments calibration. Standards: classification-standard for mass-length-volume-time and frequency standards-electrical standards-IEEE standards.

UNIT – II

ELECTRO MECHANICAL INDICATING INSTRUMENTS

Suspension galvanometer-torque & deflection of galvanometer-PMMC mechanism –DC Ammeters-DC voltmeters-voltmeter sensitivity- Series and shunt type of Ohm meter-Calibration of DC instruments and AC instruments- AC indicating instruments-thermo instruments-Electro Dynamo Meter in power measurement-Watt hour Meter –power factor meter-introduction to Instruments transformers.

UNIT – III

BRIDGE MEASUREMENTS

Introduction Bridges-DC BRIDGES: Wheatstone bridge-Kelvin double bridge-AC BRIDGES: Maxwell Bridge-Hay's Bridge -Schering Bridge-Anderson's bridge –Wein Bridge-Wagner ground connections, Q- meter.

UNIT – IV

ELECTRONIC INSTUMENTS

AC voltmeter using rectifiers, true RMS reading voltmeter, electronic multimeter , digital voltmeter DVM, staircase ramp DVM, dual slop DVM and successive approximation DVM- 3 ½ Digit – Resolution and sensitivity of Digital voltmeters.

UNIT – V

OSCILLOSCOPES , ANALYZERS AND RECORDERS

CRO block diagram operation- CRT operation- CRO probes- frequency and phase measurement using lissajous figures.-storage oscilloscope- Spectrum analyzers, -wave analyzer-Harmonic distortion analyzer-Recorders: introduction to magnetic recording techniques, strip chart recorder and x-y recorders and their applications.

TEXTBOOKS

1. Cooper W.D & Hlefrick A.D, Electronic instrumentation & measurement technique, 3rd Edition, PHI, 1991.

REFERENCES

1. Alan S Morries, "Principles of Measurement and Instrumentation", Prentice-Hall of India, 2nd Edition, 2002.
2. A.K.Sawhney, A Course in Electrical and Electronics Measurements and Instrumentation, Dhanpat Rai and sons, New Delhi, 1995.
3. H.S.Kalsi, Electronic Instrumentation, TMH, 2002

IV SEMESTER

S243 - ENVIRONMENTAL STUDIES

(Common to all branches)

Prerequisite: None

Course Educational Objectives:

In this course the student will learn about

1. Environmental issues related to local, regional and global levels.
2. Concepts of ecosystems and threats to global biodiversity.
3. Environmental pollution problems.
4. Environmental issues in the society.
5. Problems associated with over population and burden on environment.

Course Outcomes:

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

1. Evaluate local, regional and global environmental issues related to resources and management.
2. Understand the implications of the ecosystems and identify the threats to global biodiversity
3. Realige the problems related to pollution of air, water and soil.
4. Investigate and solve social issues of the environment.
5. Create awareness on the concept of sustainable population growth**.**

UNIT – I

Natural Resources: Definition, Scope and importance of Environmental Studies – Need for Public Awareness. Renewable and non-renewable resources –

Natural resources and associated problems – Forest resources, Water resources, Mineral resources, Food resources and Energy resources.

UNIT - II

Ecosystems: Concept of an ecosystem - Structure and functions of an ecosystem - Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession, Food chains, Food webs and ecological pyramids. Bio-Geo Chemical Cycles.

Biodiversity and its conservation: **Introduction** – Definition & Levels of Measuring Biodiversity: Genetic, Species, Community and Ecosystem diversity.

Bio-geographical classification of India, India as a mega diversity nation, Values of Biodiversity: Direct and Indirect Values, Hot-spots of biodiversity, Threats to biodiversity, Man-wildlife conflicts, Endangered and endemic species of India. Conservation of biodiversity.

UNIT - III

Environmental Pollution: Definition, Sources, Effects and Control measures of

a) Air pollution
b) Water pollution
c) Soil pollution
d) Noise pollution
e) Radioactive Pollution

Solid waste Management: Sources of waste, Effects of improper handling of waste and measures to reduce the waste production and management methods of Municipal solid waste.

Disaster management: Floods, Earthquakes, Cyclones, Landslides and Tsunami.

UNIT - IV

Social Issues and the Environment: From Unsustainable to Sustainable development & Equitable use of resources for sustainable life style - Environment and human health - Resettlement and Rehabilitation of people, its problems and concern & Case Studies - Climate change : Global warming, Acid rains, Ozone layer depletion, Nuclear accidents and Holocaust & Case studies - Consumerism and waste products.

UNIT -V

Human Population and the Environment: Population growth & Variations among Nations, Population explosion – Family Welfare Program - Human Rights - Value Education - HIV/AIDS - Women and Child Welfare - Role of Information Technology in Environment and human health & Case Studies. Environmental legislation in India.

TEXT BOOKS

1. P.N.Palanisamy et al., "Environmental Science" 2nd edition, Dorling Kindersley Pvt.Ltd. Licenses of Pearson Education in South Asia, 2013.
2. R. Rajagopalan, "Environmental Studies (From Crisis to Cure)", by Oxford University Press,2nd Edition,2011.

REFERENCE

1. M. Anji Reddy, "Textbook of Environmental Sciences and Technology" by BS Publications, 2nd Edition, 2011.
2. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", by University Grants Commission, University Press (India) Private Limited, 2005. (2010 Reprinted).

IV SEMESTER

L182 - TRANSDUCER AND MEASURMENTS LAB

Prerequisite: Transducers in Instrumentation

Course Educational Objectives:
In this course student will learn about

1. DC & AC meters using D'Arsonaval Galvanometers
2. Work with various types of sensors/Transducers
3. Work with different types of AC & DC bridges
4. Measurement of Quality factor with Q-Meter

Course Outcomes:
At the end of this course student will be able to

1. Test & design DC AC meters using D'Arsonaval Galvanometers
2. Gain knowledge about working of different transducers used for different parameters
3. Gain knowledge about various bridges used to measurement of Resistance, Capacitance & Inductance
4. Understand the measurement of Quality factor using Q-meter

List of Experiments:

Measurements:

1. Conversion of D'Arsonval Galvanometer into D C meters.
2. Conversion of D'Arsonval Galvanometer into A C meters.
3. Conversion of D'Arsonval Galvanometer into Ohm- meter.
4. Q-factor measurement.
5. Measurement of Inductance using Maxwell's Bridge.
6. Measurement of Capacitance using Schering Bridge.
7. Measurement of Inductance using Hay's Bridge.
9. Measurement of Frequency using Lissajous Patterns.
10. Measurement of Phase using Lissajous Patterns.
11. Measurement of Resistance using Wheatstone bridge.

Transducers:

1. Measurement of Strain using Strain gauge.
2. Measurement of Temperature using RTD
3. Measurement of Displacement using LVDT.
4. Measurement of Displacement using Capacitive
5. Measurement of force using piezoelectric transducer.
6. Measurement of Pressure using Bourdon tube.
7. Measurement of Acceleration using Piezoelectric Transducer.
8. Measurement of speed using optical and magnetic pick-ups

NOTE: Minimum 10 experiments can do in above mentioned experiments.

IV SEMESTER

L174 - PULSE AND DIGITAL CIRCUITS LAB

(Common to ECE, EIE)

Prerequisite: Digital Electronic Circuits

Course Educational Objectives

In this Laboratory student will learn about

1. Linear and Non-linear wave shaping circuits.
2. Switching characteristics and Switching Times of Transistor
3. Analyze different type of Multivibrators
4. Function of various logic gates.
5. Different type of Flip-Flops and counters and their excitation.

COURSE OUTCOMES

At the end of this course student will be able to

1. Analyze the response of linear and non-linear wave shaping circuits.
2. Understand the Switching behaviour of Transistor
3. Design various Multivibrator circuits for different applications.
4. Represent basic logic gates using discrete components and implementation using universal gates.
5. Design different types of Flip-Flops and counters.

LIST OF EXPERIMENTS

(Minimum 12 experiments to be conducted)

Part-1: Pulse Circuits

1. Linear Wave Shaping Circuits-Low Pass and High Pass
2. Non Linear Wave shaping Circuits - Clippers & Clampers
3. Switching behaviour of Transistor
4. Bistable Multivibrator
5. Monostable Multivibrator
6. Astable Multivibrator
7. Schmitt Trigger
8. UJT Relaxation Oscillator
9. Sampling gates

Part-2: Digital Circuits

1. Realization of Logic Gates Using Discrete Components
2. Implementation of Logic Gates with Universal Gates
3. Adder and Subtractor Circuits
4. SR and JK Flip Flops
5. Modulo- N Counter

V SEMESTER

S162 - COMMUNICATION SYSTEMS

Prerequisite : Applied Mathematics - 1

Course Educational Objectives:

In this course student will learn about

1. To introduce the basic concepts of communication systems and explain various linear modulation systems like amplitude modulation.
2. To discuss the limitations of the linear modulation and also explain the significance of angle modulation.
3. To highlight the significance of discrete time modulation and introduce various approaches of discrete time modulation.
4. To introduce and elaborate various means of digital modulation techniques.
5. To explain the significance of Pulse digital modulation and also various aspects of it.

Course Outcomes:

At the end of the course student will be able to

1. Know the basic concepts of communications and discriminate between various linear modulation schemes.
2. Know the significance of Angle modulation.
3. Understand the significance of discrete time modulation.
4. Differentiate between various digital modulation techniques.
5. Know the various aspects of Pulse digital modulation.

UNIT – I

Linear Modulation:

Introduction to Electrical Communication System, Need for modulation, Classification of modulation schemes, Amplitude modulation: Definition, time domain and frequency domain representation, Single tone amplitude modulation, modulation index, power relations in AM waves, Generation of AM waves: Square law modulation, Envelope Detection of AM waves. Double side band suppressed carrier modulation (DSBSC): Definition, time domain and frequency domain representation, Generation of DSBSC waves: Balanced modulator, Coherent detection of DSBSC waves, Limitations of Coherent detection: Frequency error, Phase Error, Costas receiver, Single side band (SSB) Modulation: Definition, Generation of SSB waves: phase discrimination method, Coherent detection of SSB waves, Frequency division multiplexing (FDM).

UNIT – II

Angle modulation:

Definition, types of angle modulation: Frequency modulation, Phase modulation, single tone frequency modulation, Narrow band FM(NBFM):time and frequency domain representation , Wide band FM(WBFM):time and frequency domain representation, Transmission bandwidth of FM , Generation of FM : direct method, indirect method. Detection of FM waves: Frequency discrimination method, Phase discrimination method.

UNIT – III

Pulse modulation:

Pulse modulation : sampling theorem types of pulse modulation, Pulse amplitude modulation(PAM):definition , generation of PAM waves : Ideal, natural and flat top sampling. Demodulation of PAM waves, Pulse width modulation (PWM):Definition, generation of PWM, Demodulation of PWM waves, Pulse position modulation(PPM) :Definition , generation of PPM, Demodulation of PPM , Time division multiplexing (TDM). Noise: Definition, classification of Noise, Internal noise and external noise.

UNIT – IV

Digital modulation:
Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, DPSK, Comparison of various digital modulations.

UNIT - V

Pulse Digital modulation :
Advantages of digital communication over analog communication, Quantization, Pulse Code Modulation system, bandwidth of PCM, Differential PCM, Delta Modulation, drawbacks of delta modulation, Adaptive delta modulation,

TEXT BOOKS

1. Simon Haykin, Communication Systems, Second Edition, John Wiley & Sons Publications, Singapore, 1983.
2. R.P.Singh, S.D.Sapre, Communication Systems (Analog & Digital), Second Edition, Tata McGraw-Hill Publications, 2009.

REFERENCES

1. Herbert Taub , Donald L. Schilling, Principles of Communication Systems, Second Edition, Tata McGraw-Hill, New Delhi, 1991.
2. Hwei, P. Hsu, Analog and Digital Communications, Schaum's Outlines, Second Edition, TMH Publiscations,1991.
3. B.P.Lathi, Modern Digital and Analog Communication Systems, Third Edition, Oxford University,1993**.**
4. Gerd Keiser, Optical Fiber Communications, Second Edition, Tata McGraw Hill (international Student Edition), 1991.
5. TimotyPratt, Satellite Communications, Second Edition, John Wiely & sons Publications, (Student Edition),2003.

V SEMESTER

S277 - INTEGRATED CIRCUITS AND APPLICATIONS

Prerequisite: Electronic Devices & Circuits, Analog Electronic Circuits

Course Educational Objectives:

In this course student will learn about

1. Basic concepts of Op-amp and its applications
2. Difference between active and passive filters
3. IC 555 timer applications , IC 565 PLL and different types of ADC and DAC converters
4. Design of combinational circuits using IC's
5. Design of sequential circuits and memories using IC's.

Course Outcomes:

At the end of this course student will be able to

1. Understand linear ICs and use of linear ICs in practical cases
2. Differentiate various filters using their frequency bands
3. Understand the applications of IC 555 and different types of ADC and DAC converters
4. Design all combinational circuits using digital IC's
5. Design all sequential circuits and understand the importance of various memories and their design.

UNIT – I

OPERATIONAL AMPLIFIER:

Basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features. Basic applications of op-amp- Adder, Subtractor, Adder-Subtractor, instrumentation amplifier, V to I and I to V converters, sample & Hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators.

UNIT – II

ACTIVE FILTERS & OSCILLATORS:

Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and Quadrature type, waveform generators-triangular, sawtooth, square wave and VCO.

UNIT – III

TIMERS & A/D-D/A CONVERTERS:

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, PLL-introduction, block schematic, principles and description of individual blocks of 565. CONVERTERS - Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, different types of ADCs – parallel comparator type ADC, counter type ADC and dual slope ADC. DAC and ADC specifications.

UNIT – IV

LOGIC FAMILIES & COMBINATIONAL CIRCUITS

Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS&CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS &CMOS driving TTL. Design using TTL -74XX series, decoders, Demultiplexers, Encoder, priority Encoder, multiplexers & their applications, parity generators/checker circuits. Digital arithmetic circuits- parallel binary adder/sub tractor circuits using 2's compliment system, Digital comparator circuits.

UNIT – V

SEQUENTIAL CIRCUITS & MEMORIES

74XX series of IC counters ,ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

TEXT BOOKS

1. D. Roy Chowdhury," Linear Integrated Circuits", New Age International (p) Ltd, 2nd Ed., 2003.
2. Floyd and Jain," Digital fundamentals", Pearson Education, 8th Edition, 2005.

REFERENCES

1. R.F. Coughlin and Fredrick F. Driscoll, Operational Amplifiers and Linear Integrated circuits, PHI, 1977.
2. Denton J. Daibey,"Opeational Amplifiers and Linear Integrated circuits: Theory and Applications", TMH,2001.
3. Serigo Franco, "Design with Operational amplifiers and Analog Integrated Circuits",McGraw Hill,3rd Ed., 2002.
4. J.Michael Jacob ,"Applications and Design with Analog Integrated Circuits", PHI 2nd Edition, ,2000
5. Ramakanth A. Gayakwad," Op-Amp & Linear ICs", PHI, 1987.

V SEMESTER

S352 - PROCESS CONTROL INSTRUMENTATION

Prerequisite: Control systems, Transducers in Instrumentation

Course Educational Objectives:

In this course student will learn about

1. Fundamentals of Process Dynamics.
2. Types of control actions and controllers used in Industries.
3. Determining of controller settings and suitable tuning methods for the controller.
4. The operation of various types of control valves.
5. The various advanced control techniques.

Course Outcomes:

By the end of this course students will be able to

1. Acquire the knowledge of Process Dynamics.
2. Design a suitable controller for the given requirements.
3. Find the controller settings and tuning of the controllers as per requirement.
4. Select the control valves as per requirement.
5. Get the adequate knowledge on advanced control techniques.

UNIT – I
PROCESS DYNAMICS:

Process variables-load variables-dynamics of simple pressure, flow, level and temperature process-Interacting and Non interacting systems-continuous and batch process-self regulation, Dead-time

UNIT – II
CONTROL ACTIONS AND CONTROLLERS:

Basic control actions- characteristics of two position, three position, single speed and multiple speed floating, proportional, integral, and derivative control modes, PI, PD, PID control modes-problems. - Pneumatic, hydraulic and electronic controllers to realize various control actions.

UNIT – III
CONTROLLER SETTINGS AND TUNING:

Evaluation criteria- 1/4th decay ratio, IAE, ISE,ITAE- Determination of optimum settings for mathematically described process using time response and frequency response. - Tuning-process reaction curve method- continuous oscillation method- damped oscillation method-problems, Process Identification.

UNIT – IV
FINAL CONTROL ELEMENTS:

I/P converter, P/I converter- pneumatic, electric and hydraulic actuators.- Control valves-characteristics of control valves –Globe, Butterfly, diaphragm and ball valves-control valve sizing, problems

UNIT – V
MULTI LOOP CONTROL SYSTEMS :

Cascade control, feed forward control, ratio control, split range, multi variable control.

TEXT BOOKS

1. Stephanopoulos , “Chemical process control”, PHI, New Delhi, 1999.
2. P. Harriot,“ Process control”, TMH Publishers, 1991.

REFERENCES

1. D.P.Eckman, “Automatic process control”, Publisher: John Wiley and Sons 1958.
2. Dr. Donald, R.Coughahows, “Process systems analysis and control,” McGraw Hill, 1991.
3. Bela.G.Liptake, “Process control & optimization”, Handbook 3rd Edition, 1995.

V SEMESTER

S269 - INDUSTRIAL INSTRUMENTATION

Prerequisite: Transducers in Instrumentation

Course Educational Objectives:

In this Course student will learn about

1. Measurement of Length & angle
2. The various methods of velocity & acceleration measurements
3. The various methods of Force & Torque measurements
4. The various methods of pressure measurement including low pressure measurement
5. The various methods of Flow, Viscosity, Humidity & liquid level measurement.

Course Outcomes:

On successfully completing this course, students will be able to

1. Measure different parameters like length, area, angle etc.,
2. Measure speed using electromagnetic pickup & photoelectric pickup & acceleration using different types of accelerometers.
3. Explain the principle of various Force & torque measurement techniques
4. Explain the manometers,Mecleod Gauges ,Knudsen Gauges for measurement of pressure & calibration by Dead weight tester
5. Understand the measurement of Flow, Level, Humidity & Viscosity.

UNIT - I

METROLOGY

Measurement of length – Plainness – Area – Diameter – Roughness – Angle – Comparators – Gauge blocks –Optical Methods of length and distance measurements.

UNIT – II

VELOCITY AND ACCELERATION MEASUREMENT

Relative velocity – Translational and Rotational velocity measurement – Revolution counters and Timers - Magnetic and Photoelectric pulse counting stroboscopic methods - Accelerometers of different types -Gyroscopes.

UNIT – III

FORCE AND TORQUE MEASUREMENT

Force measurement – Different methods-Torque measurement – Dynamometers- Gyroscopic Force and Torque Measurement – Vibrating wire Force transducer

UNIT – IV

PRESSURE MEASUREMENT

Basics of Pressure measurement – Deadweight Gages and Manometers types – Force-Balance and Vibrating Cylinder Transducers – High and Low Pressure measurement – McLeod Gage, Knudsen Gage, Momentum Transfer Gages, Thermal Conductivity Gages, Ionization Gazes, Dual Gage Techniques.

UNIT – V

FLOW MEASUREMENT

Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, mass flow meter, ultrasonic type ,vertex shedding type, Hotwire anemometer type.
Laser Doppler Velocity-meter. Other measurements: viscosity, humidity, level

TEXT BOOKS

1. Doeblin E.O," Measurement Systems – Applications & Design", McGraw Hill International, IV edition, 1990.

REFERENCES

1. D. Patranabis, "Principles of Industrial Instrumentation", TMH, Edn: 1997
2 . Considine D.M,"Process Instruments & Control Hand book", McGraw Hill International, IV Edition 1993.
3. R.K.Jain,"Mechanical & Industrial Measurements", Khanna Publishers -1986.
4. Jones E.B.,"Instrument Technology",Vol-1,1974
5. A.K.Sawhney,"Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai and Co (LTD), 2004.

V SEMESTER

S168 - COMPUTER NETWORKS

(Common to EIE, CSE, ECE, EEE, IT)

Prerequisite: Communication systems

Course Educational Objectives:

In this course, students will learn about:

1. Concepts, vocabulary and techniques currently used in the area of computer networks
2. Protocols, network standards, the OSI model, IP addressing, cabling, networking components and basic LAN design
3. Existing state of art in network protocols, architectures and its applications
4. Transport layer elements and protocols
5. Application layer and its applications

Course Outcomes:

Students who complete this course will be able to:

1. Understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different networks
2. Identify main internal PC components and connections
3. Know how to design network routing for IP networks
4. Determine proper usage of the IP address, subnet masks and default gateway in a routed network.
5. Understand internals of main protocols such as HTTP, FTP, SMTP, TCP, UDP, IP.

UNIT - I

Introduction: Use of Computer Networks- Network Hardware- Network software-Reference models Example Networks- Network Standardization. Physical Layer: The theoretical basis for Data communication- Guided Transmission Media.

UNIT - II

Data link layer: design issues- framing, error detection and correction, CRC, Elementary data link protocols- Simplex, Stop&Wait protocols, Sliding window protocols-one-bit,go-back-n,selective repeat. Medium Access Control Sub layer: Channel allocation problem- multiple access protocols-ALOHA,CSMA protocols, token bus,token ring, Ethernet, Collision free protocols, Data link layer switching, Bridges, Bridge learning algorithms,bridges from 802.x to 802.y, Local internetworking,spaning Tree bridges, Remote bridges.

UNIT – III

Network layer: Network layer design issues- Routing algorithms- Shortest path, Flooding, Distance vector routing, Link State routing , Hierarchical Routing, Broadcast routing & Multicast Routing,ICMP,ARP,RARP,BOOTP,DHCP, Congestion control algorithms- Leaky Bucket, Toke Bucket,Quality of service, Internetworking- network layer in the Internet.

UNIT - IV

Transport layer: Transport service- Elements of transport protocols- Internet transport protocols: TCP & UDP, Flow control-Segments, TCP Timers.

UNIT - V

Application Layer: Domain Name System- Electronic Mail -the World Wide Web, Network Security.

TEXT BOOK

Andrews S. Tanenbaum; "Computer Networks";4thEdition, PHI,2011.

REFERENCES

1. William Stallings; "Data and Computer Communications"; seventh Edition, Pearson Education, 2007.
2. Behrouz A .Fourouzan; "TCP/IP Protocol Suite"; 4th Edition, Tata-McGraw Hill, 2010.
3. James F.Kurose, Keith W.Ross, "Computer Networking - A Top-Down Approach featuring the Internet"; Pearson Education,2012.

V SEMESTER

S192 - DIGITAL SIGNAL PROCESSING

(Common to ECE, EIE)

Prerequisite: Signals and Systems

COURSE EDUCATIONAL OBJECTIVES:

In this subject student will learn about

1. The basic concepts and types of discrete time signals and discrete time systems and about discrete time Fourier transform and its properties.
2. The Z-transforms and its properties and the realization of discrete time systems.
3. The discrete Fourier transform and its properties and different types of fast Fourier transforms.
4. Classification and characteristics of filters, design techniques of IIR digital filters from analog filters.
5. The different design techniques of FIR Digital filters, Advantages and applications of Digital signal processing.

COURSE OUTCOMES:

By the end of the course the student will be able to:

1. Differentiate the different types of discrete time signals and their representations, Understand the different types of responses of a system.
2. Calculate the Z-transforms, Inverse Z-transforms and differentiate the different realization techniques of discrete systems.
3. Find the DFT, FFT and understand the importance of FFT in digital signal processing.
4. Differentiate the different types of filters and understand the different transformation techniques.
5. Analyze how FIR design is simplest than IIR design and how digital signal processing overcomes the analog signal processing.

UNIT-I

Discrete Time Signals: Elementary Discrete Time Signals- Impulse, Unit Stem, Unit Ramp, Rectangular, Decaying Exponential, Raising Exponential, Double Exponential; Representation of Discrete Time Signals- Graphical, Functional, Tabular and Sequence.

Discrete Time Systems: System Representation Through LCCDE, Impulse Response, Response of a System-Natural Response, Forced Response; Properties of Discrete Time Systems- Linear and Nonlinear, Shift Invariant and Variant, Causal and Non Causal, Stable and Unstable.

Discrete Time Fourier Transform: DTFT of a Sequence, Magnitude Spectrum and Phase Spectrum; DTFT of a System, Frequency Response, Magnitude Response and Phase Response; Properties of DTFT- Linear, Periodicity, Time Shifting, Frequency Shifting, Time Reversal, Conjugate and Parseval's Theorem.

UNIT-II

Z Transform: Z-Transform of Causal, Anti-Causal and Non-Causal Sequence. Region of Convergence and Properties; Properties of Z Transform- Linearity, Time Shifting, Time Reversal, Scaling in Z domain, Conjugate, Differentiation in Z domain, Time Convolution, Initial Value and Final Value Theorems; Z Transform of Various Classes of Signals; Inverse Z Transform Through Long Division, Partial Fractions and Residue Methods.

Realization of Discrete Systems: Direct Form-I, Direct Form-II or Canonic Form, Parallel Form and Cascade Form.

UNIT-III

Discrete Fourier Transform: Concept of DFT, Computation of DFT, Computation of IDFT, Relation between DTFT and DFT, Properties of Twiddle factor, Properties of DFT- Linear, Periodicity, Time Shifting, Frequency Shifting, Time Reversal, Conjugate, Parsevel's Theorem, Concept of Convolution, Linear Convolution, Circular Convolution, Linear Convolution through Circular Convolution, Response of the LSI System through Circular Convolution, Circular Convolution through DFT and IDFT, Linear Convolution through DFT and IDFT.

Fast Fourier Transform: Need of FFT, Radix-2 Decimation in Time FFT Algorithm, Radix-2 Decimation in Frequency FFT Algorithm, Comparison between DIT and DIF Algorithms, Inverse FFT.

UNIT-IV

Filters: Concept of Filter, Characteristics of Filters, Classification of Filters- LPF, HPF, BPF, BEF; Analog and Digital Filters.

IIR Filter Design: Impulse Invariant Transformation - Aliasing Effect, Bilinear Transformation - Frequency Warping. Specifications of Low Pass Filter, Analog Butter Worth Filter, Design of Low Pass Digital Butterworth Filter, Analog Chebyshev Filter, Design of Low Pass Digital Chebyshev Filter, Analog Frequency Transformations.

UNIT-V

FIR Filter Design: Steps to design FIR Filters, Characteristics of FIR filters with linear Phase, Frequency Response Linear Phase FIR filters, Design of FIR filters- Fourier series method, Windowing Techniques-Rectangular Window, Hanning Window, Hamming Window, Blackman Window, Barlet/Triangular Window, Comparison of various Window Functions, Comparison between FIR and IIR Filters.

Signal Processing: Digital Signal Processing System, Advantages of DSP, Limitations of DSP, Applications of DSP.

TEXT BOOKS

1. Alan V Openheim, Ronald W. Schafer, Digital Signal Processing, PHI learning Pvt.Ltd, 1975.
2. John G. Proakis, Digital Signal Processing, Principles, Algorithms & Applications, Pearson education, Fourth edition , 2007

REFERENCES

1. Manson H Hayes, Digital Signal Processing, Schaum's Outlines, TMH Publications, 2004
2. Lonnine C. Ludeman, "Fundamentals of Digital Signal Processing", John Wiley & Sons Publications, 2011.
3. A.Nagoor Kani, "Digital Signal Processing", RBA Publications, Chennai, 2003.
4. P.Ramesh Babu, Digital Signal Processing, Scitech Publications Pvt Ltd, Chennai, 2007.
5. Ananda kumar, "Digital Signal Processing", PHI Publishers, New Delhi, 2012

V SEMESTER

L152 - INTEGRATED CIRCUITS AND APPLICATIONS LAB

Prerequisite: Electronic Devices & circuits, Circuit theory

Course Educational Objectives:

In this course student will learn about

1. The IC 741 operational amplifier and its various applications
2. IC 555 timer and its applications
3. IC 723 voltage regulators
4. VHDL programming using behaviour, data flow, structural models
5. Various functions of digital IC's & simulated through "Xilinx" software
6. Function tables of digital IC's verified by using " Digital trainer kit"

Course Outcomes:

At the end of this course student will be able to

1. Describe applications for linear integrated circuits using IC 741
2. Describe applications for liner integrated circuits using IC 555
3. Understand the voltage regulation using IC723
4. Write VHDL programs for digital IC's in three different methods of modelings
5. Simulate functionality of digital IC's using "Xilinx" software
6. Verify the function table using Digital trainer kit.

LIST OF EXPERIMENTS

1. Op-Amp Applications-Adder, Sub tractor, Comparator Circuits.
2. Active Filter Applications-LPF,HPF(First Order)
3. Function Generator Using Op-Amps.
4. IC 555 Timer-Monostable and Astable Operation Circuits.
5. Voltage Regulator Using IC 723.
6. Three Bit DAC Using Op-Amp.
7. Active Filter Applications-BPF
8. Active Filter Applications-BSF
9. D-Flip Flop 74x74
10. Decade Counter-74x90
11. Shift Register-74x95
12. 3x8 Decoder-74x138
13. 4-Bit Magnitude Comparator 74x85
14. 8x1 Multiplexer 74151 and 1x4 De Multiplexer 74x155

V SEMESTER

L171 - PROCESS CONTROL LAB

Course Educational Objectives:

In this course student will learn about

1. Operation and working of different Transmitters.
2. The controlling of different process variables by using different control methods.
3. Working of Control valves.
4. The controlling of DC motor, PID response of a Second order system.
5. Operation and working of Multiloop control systems.

Course Outcomes:

By the end of this course students will be able to

1. Find the characteristics of different transmitters.
2. Control different process variables as per requirement.
3. Get adequate knowledge on selection of control valves.
4. Control the DC motor and be able to draw PID response of Second order system
5. Controlling multiple variables by using Multiloop control systems.

Prerequisite: Control systems, Transducers in Instrumentation

List of Experiments

1. Flow control.
2. Level Control.
3. Temperature Control.
4. Pressure Control.
5. I/P Converter.
6. Control valve (Quick opening & Linear) Characteristics.
7. P/I converter.
8. Process control Simulator.
9. D C Servo motor controller.
10. Multi-loop control systems-Cascade & Ratio.
11. Temperature Transmitter.
12. Flow Transmitter.
13. Level Transmitter.
14. Pressure Transmitter.

V SEMESTER

L176 – SEMINAR

(Common to all branches)

Prerequisite Course: None

Course Educational Objectives:

In this course student will learn about

1. How to select the advanced topics for seminar.
2. How to prepare slides for the PPT
3. How to make presentation effectively within stipulated time.
4. How to answer the queries posed by the judge.
5. Developing presentation skills

Course Outcomes:

By the end of this course, students will be able to

1. Identify the topics relevant to instrumentation
2. Acquire knowledge in the preparation of PPT in an effective manner
3. Manage the time for effective presentation.
4. Obtain familiarity to answer the queries in the concerned topic
5. Improve presentation and communication skills.

VI SEMESTER

S333 – OPTO-ELECTRONICS AND LASER INSTRUMENTATION

Prerequisite: Engineering Physics

Course Educational Objectives:

In this course, students will learn about

1. Basic concepts of optical waveguides, working principle of optical fibers, light sources for fibers, detectors and modulators.
2. Construction and working of various lasers along with operation of laser in various modes.
3. Various fiber optic sensors for accurate measurement, diodes and modulators.
4. Industrial and biomedical applications of lasers along with holographic methods.
5. Laser tissue interaction, process of plastic surgery and use of laser in dermatology.

Course Outcomes:

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

1. Understand the basic concepts of optical fibres including connecting fibres.
2. Put the knowledge in working with different lasers used in variety of applications.
3. Know required working methodology for measurement of various parameters viz., pressure, temperature, current, voltage, liquid level etc using fiber optic sensors.
4. Understand the importance of holography, process of making hologram and its real time applications in combination with lasers.
5. Understand the role of lasers in various medical applications viz., repairing damaged tissue, plastic surgery, dermatology etc.

UNIT – I

OPTICAL FIBERS AND THEIR PROPERTIES

Introduction to optical fibers – Light guidance – Numerical aperture – Dispersion – Different types of fibers and their properties. - Light Sources for fiber optics, Photo detectors, source coupling, splicing and connectors.

UNIT – II

LASER FUNDAMENTALS

Laser configuration – Q-Switching – Mode locking – Different types of Lasers – Ruby, Nd-YAG, He-Ne, CO_2, Argon ion.

UNIT – III

FIBER OPTIC SENSORS

IR sources and detectors – Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope – Polarization maintaining fibers – Applications.

Opto-Electronic Components: LED, LD, PIN & APD, and Electro-optic, Magneto optic and Acousto-optic Modulators.

UNIT – IV

LASER INSTRUMENTATION

Industrial applications of lasers – Bio-medical application – Laser Doppler velocity meter – Laser heating - **Holography:** Principle, Methods, Holographic Interferometers and applications.

UNIT – V

MEDICAL APPLICATIONS

Lasers and tissue interaction, Laser instruments for surgery, removal tumors of vocal cords, plastic surgery, Dermatology.

TEXT BOOKS

1. Allen H.C, An Introduction to Optical fibers, McGraw Hill, Singapore, 1993.
2. P. Sarah, Lasers and Optical Fibre Communications, I.K. International Publishing House Pvt. Ltd., 2008.

REFERENCES

1. A.K. Ghatak, Optics , Tata McGraw-Hill, New Delhi, –2nd Edition,1992.
2. Thyagarajan K and Ghatak A.K, Lasers: Theory and Application by Plenum Press, New York, 1981.
3. Das P, Lasers and Optical Engineering, Springers International Students Edition, 1991.
4. Ghatak A.K and Thyagarajan K, Optical Electronics by Foundation Books, 1991.
5. S.C. Gupta, Optical Fiber Communication and its Applications, Prentice-Hall of India, 2004.

VI SEMESTER

S325 - OBJECT ORIENTED PROGRAMMING USING JAVA

(Common to AE, EIE, IT)

Prerequisite: Data structures, Computer Programming.

Course Educational Objectives:

In this course, students will learn about:

1. Object oriented paradigm and implementation and basics of JAVA
2. Hierarchical abstractions, packages & interfaces
3. Exception handling & termination by usage of try, catch, throw etc.,
4. Differences between applets & applications and event handling
5. Limitations of AWT, MVC architecture

Course Outcomes:

Students who complete this course will be able to:

1. Know the need for OO paradigm and its implementation
2. Know substitutability forms of inheritances
3. Know the differences between multi-threading and multi-tasking
4. Know event sources, classes & models
5. Know exploring Japplets, Jframes

UNIT – I

Basics of Object Oriented Programming (OOP):

Need for OO paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

Java Basics:

Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT - II

Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes. **Packages and Interfaces:** Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT - III

Exception handling and Multithreading: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT - IV

Applets: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets. Applet to applet communication, secure applet**, Event Handling:** Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes.

The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grid bag.

UNIT - V

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS

1. Herbert Schildt, Java: The complete reference, 7/e, TMH, 2012.
2. N.B Venkateswarlu, E V Prasad, Learn Object Oriented Programming using Java,S. Chand Publications, 2010.
3. Dietal, Java: How to Program, 8/e, PHI, 2010.

REFERENCES

1. Dr K Soma Sundaram, Programming in Java2 JAICO Publishing house, 2005.
2. P. Radha Krishna, Object Oriented Programming through Java, University Press, 2007.

VI SEMESTER

S129 - ANALYTICAL INSTRUMENTATION

Prerequisite: Engineering Physics, Engineering Chemistry

Course Educational Objectives:

In this course student will learn about

1. The operation of P^H meters & Gas analysers
2. The operation of Gas chromatography & Liquid chromatography
3. The components used in UV,VIS & IR spectrophotometers & their operation
4. Operation of NMR,ESR & Mass spectrometers.
5. The various types of Nuclear radiation detectors

Course Outcomes:

At the end of this course student will be able to explain:

1. Explain the various types of PH meters & Gas analysers
2. Understand the working principles of Gas chromatography & Liquid chromatography
3. Explain & identify the single & double beam instruments in UV,VIS & IR regions
4. Understand the working principle of NMR,ESR & Mass spectrometers & identify the suitable applications
5. Acquire the knowledge about various types of Nuclear radiation detectors

UNIT – I

ELECTRO-CHEMICAL INSTRUMENTS & PH MEASURING SYSTEMS: Introduction to AI-Objectives-Electro-chemical cell, construction-potentiometers. Conductivity meters construction- measurement of conductance. polarographs-types of electrodes instrumentation. - Principles of PH measuring electrodes, measuring-reference-selective ion type measuring circuits, industrial PH-meters

UNIT – II

SPECTRO PHOTOMETERS:

Spectral methods of analysis, Beer's law, UV – visible spectrophotometers, single beam and double beam instruments, sources and detectors, IR spectrophotometers, sources and detectors, FTIR spectrometers, atomic absorption spectrophotometer, flame emission spectrophotometers, sources of flame photometry – applications

UNIT – III

GAS ANALYSER & CHROMATOGRAPHY:

Oxygen analyzer, CO monitor, Nox analyzer, H2S analyzer, dust and smoke measurement-thermal conductivity type - thermal analyzer, industrial analyzers. Gas chromatography, liquid chromatography - principles, types and applications, high-pressure liquid chromatography, detectors

UNIT – IV

NUCLEAR MAGNETIC RESONANCE AND RADIATION TECHNIQUES:

NMR - basic principle, NMR spectrometers, applications, introduction to mass spectro-photometers, nuclear radiation detectors, GM counter, proportional counter, solid state detectors, introduction to X-ray spectroscopy.

UNIT – V

ENVIRONMENTAL POLLUTION MONITORING INSTRUMENTS:

Air pollution monitoring, instrument systems for-carbon monoxide-sulphur dioxide-nitrogen oxides-hydro carbons ozone automated wet chemical analyzers, water pollution monitoring.

TEXT BOOK

Willard H.H., Merrit L.L. , Dean J.A., Scattle F.I. – Instrumental methods of Analysis, 7th Edn., CBS, 1986

REFERENCES:

1. Skoog D.A. --Principles of Instrumental Analysis, Holt Soundes publications, 4th Edn. 1982
2. Man R.S. Khandpur – Handbook of Analytical Instruments, TMH 1989
3. C.K., Vicker T.J. & Gullick W.H. – Instrumental Analysis, Harper and Row Publishers, 1974.

VI SEMESTER

S334 - PC BASED INSTRUMENTATION

Prerequisite: Process control instrumentation, Data structures

Course Educational Objectives:

In this course student will learn about

1. The PC expansion bus system i.e. ISA-EISA bus
2. Operation of IEEE-488 bus & RS-232 bus.
3. The general principle of interfacing analog and digital signals to PC expansion bus modules.
4. The various applications of PC systems.
5. Acquiring the data using I/O systems.

Course Outcomes:

At the end of this course student will be able to

1. Interface with standard serial and parallel interfacing buses.
2. Better insight into interfacing sensors/transducers to PC
3. Interface analog and digital signals to PC expansion bus modules.
4. Apply various PC systems for solving industrial problems.
5. Design DAQ using I/O systems.

UNIT – I
INTRODUCTION TO PC BASED INSTRUMENTATION SYSTEM

Features of PC –PC expansion bus system – development of PC expansion bus Architecture – PC ISA/EISA expansion system – ISA bus – 62 way ISA – 36 way EISA –AGP – USB bus – applications-features- connections –devices-interfacing.

UNIT – II
I/O CARDS

PDISO-8 – Blue chip technology Measurement computing loop – Dual 422 – IEEE – 488 Bus – devices, Listener, Talkers, T-L controllers, IEEE - 488 signals, commands, Handshaking, service requests, multiline commands – IEEE 488 software – Troubleshooting IEEE – 488 bus.

UNIT – III
INTERFACING

Characteristics of digital I/O ports – characteristics of analog I/O ports – sensors -, Interfacing switches & sensors: sensors with digital o/p – sensors with analog o/ps.

O/P Devices: Slatus & warning indications, driving LCD display, audible outputs, DC motors, o/p drivers, driving solenoids & solenoid operating valves, driving stepper motors.

UNIT – IV
APPLICATIONS

PC instruments, industrial PC systems, network / distributed PC systems, Backplane bus based systems, specifying software and hardware. Strain Measurement and display, load sequencer, environmental monitoring.

UNIT – V
DATA ACQUISITION SYSTEM

Analog i/p – analog o/p digital I/O-timing IO – Plug in Data Acquisition & control boards: digital I/O board – Timing I/O board – General Purpose plug in DAQ board – DAQ using serial interface – RS-232- RS -422 RS-485 serial interfaces.

TEXT BOOK

Mike Tooley “PC Based Instrumentation & Control” Elsevier publisher, 3rd Edition, 2005.

REFERENCES

1. N. Mathivanan, “PC based instrumentation concepts and practice” PHI publishers, 2003.
2. K. Krishna Kanth, “Computer control of process “, Tata McGraw-Hill, 2009.

S188 - DIGITAL CONTROL SYSTEMS

(Common to EEE, EIE)

VI SEMESTER

Prerequisite: Applied Mathematics-III, Control systems

Course Educational Objectives:

In this course, student will learn about

1. The basic block digital control system and basics of Z-transforms.
2. The analysis of Discrete-time control systems.
3. The state space analysis of discrete time systems.
4. Finding the controllability, observability and stability.
5. The design of state feedback controllers and state observers.

Course Outcomes:

At the end the student will be able to learn

1. The basics of digital control systems and Z-transform concepts.
2. How to analyze Discrete-time control systems.
3. How to analyze Discrete-time systems using state space analysis.
4. Different concepts on controllability, observability.
5. Design state feedback controllers based on pole placement &Ackerman's formula

UNIT – I
INTRODUCTION

Examples of Digital control system , Block diagram of Digital Control System, Advantages and applications. Digital to Analog conversion and Analog to Digital conversion. Z-Transforms-Introduction, Linear difference equations, , Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms.

UNIT – II
Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM

Z-Transform method for solving difference equations, Pulse transform, pulse response, Block diagram analysis of sampled data systems.

UNIT – III
STATE SPACE ANALYSIS

State Space Representation of discrete time systems, Pulse Transfer Function, solving discrete time state space equations, State transition matrix and it's Properties ,Methods for Computation of State Transition Matrix, Discretization of continuous time state space equations

UNIT – IV
CONTROLLABILITY, OBSERVABILITY AND STABILITY

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function. Stability Analysis-Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Stability Analysis-Jury stablility test, the Bilinear Transformation.

UNIT – V
DESIGN OF FEEDBACK CONTROLLER

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula. State Observers – Full order and Reduced order observers.

TEXT BOOKS

1. B. C. Kuo, Digital Control Systems, Oxford University Press, 2/e, Indian Edition, 2007.
2. K. Ogata, Discrete Time Control Systems, Prentice Hall, 2/e, 1995.

REFERENCES

1. M. Gopal, Digital Control and State Variable Methods, Tata McGraw Hill, 2/e, 2003.
2. G.F. Franklin, J.D. Powell and M.L. Workman, Digital Control of Dynamic Systems, Addison Wesley, 1998, Pearson Education, Asia, 3/e, 2000.
3. K. J. Astroms and B.Wittenmark, Computer Controlled Systems - Theory and Design, Prentice Hall, 3/e,1997.

VI SEMESTER

S416 - VIRTUAL INSTRUMENTATION

(Common to AE, EIE)

Prerequisite: None

Course Educational Objectives:

In this course, student will learn about

1. Principle of virtual Instrumentation.
2. How Build an engineering application in lab view, install and configure data acquisition hardware.
3. User interfaces, program control, data structures, file input output, hardware interfacing, data analysis and signal processing.
4. Acquire the data using various LABVIEW modules.
5. Interfacing of various devices using Standard instruments.

Course Outcomes:

After successfully completing this course, students will be able to

1. Develop software programs called virtual instruments that apply user interface, program control, data structures, file input output, hardware interfacing, data analysis and signal processing
2. Experiment with, analyze and document proto type measurement systems using a computer, plug in DAQ interfaces and bench level instruments.
3. Build an engineering application in lab view, install and configure data acquisition hardware.
4. Design DAQ using LABVIEW modules.
5. Verify the applications of Virtual Instrumentation by the various interfacing modules.

UNIT - I

Introduction to Virtual Instrumentation: History of Instrumentation. Systems, Evolution of Virtual Instrumentation, Premature Challenges, Programming Requirements, Drawbacks of Recent Approaches, Conventional Virtual Instrumentation, Distributed Virtual Instrumentation, Virtual Instrumentation Versus Traditional Instruments, Advantages

Introduction to Lab VIEW: History of Lab VIEW, Growth of Lab VIEW, Development of Virtual Instruments using Lab VIEW, Evolution of Virtual Instruments in Engineering, Advantages of Lab VIEW

UNIT - II

Programming Concept Of VI: VI& Sub Vis, loop, nodes, case and sequence structures, formula nodes, arrays, clusters

UNIT - III

Error handling, graphs, charts, local and global variables, string, files I/O, Tables, List Box

UNIT - IV

Data Acquisition Systems: Introduction to data acquisition, Data Acquisition in Lab VIEW, Hardware Installation And Configuration, Components of DAQ ,DAQ Assistant, DAQ Hardware.

UNIT – V

Standard Instrument Interfaces: RS232 Standard, RS422 and RS485, GPIB

LabVIEW based virtual instrumentation application: Data acquisition & user interface,

TEXT BOOK:

S.Sumathi,P.Surekha "Virtual Instrumentation with LabVIEW", ACME LEARNING PVT LTD.

REFERENCES:

1. Rick Bitter, Taqi Mohiuddin, Matt nawrocki "LABVIEW Advanced Programming Technique", 2nd Edition, 2001.
2. Lisa K. wells & Jeffrey Travis, "LabVIEW for everyone", Prentice Hall, New Jersey, 1997
3. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.

VI SEMESTER

S368 - RELIABILITY IN INSTRUMENTATION

Prerequisite: Transducers in Instrumentation, Industrial Instrumentation

Course Educational Objectives:

In this course student will learn about

1. The reliability terms and their issues.
2. The importance of System Design to build high reliability systems.
3. Various types of failures and the significance of human operator in control instrumentation.
4. The redundancy techniques in instrumentation.
5. The Operation of Process plant control.

Course Outcomes:

At the end of the course student will be able to

1. Apply the principles of reliability techniques to prevent or to reduce frequency of failures, while making a product.
2. Use System Design to build high reliability systems
3. Analyse various type of failures and design failure tolerant system.
4. Analyse various redundancy techniques and produce better quality product.
5. Decide and take necessary actions while operating Process plant control.

UNIT – I

Definition of reliability:

reliability and MTBF – MTTF-maintainability - exponential failure law – availability – choosing optimum reliability – compound systems - Reliability assessment: component failure rates – variation of failure rate with time – failure modes – the effect of temperature of failure rates – estimating component temperature – the effect of operating voltage on failure rates – Accelerated life tests – component screening – confidence limits and confidence level – assembly screening – dealing with the wear – out phase – estimation of failure rate – parallel systems – environmental testing

UNIT – II

System Design:

Signal coding – digitally coded system – performance margin in system design – coping tolerances – component tolerances – temperature effects – design automation – built test equipment – sneak circuits. Building high reliability systems: Reliability budgets – component selection – use of redundancy - redundancy with majority voting – the level of redundancy – analog redundancy – common mode faults.

UNIT – III

The human operator in control instrumentation: The scope of automation – features of human operator – user friendly design – visual displays – safety procedures. Safety monitoring: Type of failures – designing fail safe system – relay tripping circuits – mechanical fail safe devices – control system faults – circuit fault analysis. Software reliability: comparison with hardware reliability – the distinction between faults and failures – typical failure intensities - high reliability software – estimating the number of faults – structured programming failure tolerant system .

UNIT – IV

Electronic and avionic systems: Radio transmitters – satellite links – aircraft control system – one channel of triplicate elevator control system – two pairs of processors in Lockheed aircraft – Railway signaling and control – robotic systems. Nuclear reactor control systems: Requirements for reactor control – principles of reactor control – various sensors for detecting faults – double 2/3 logic – types of failure – redundant logic controlling safety shutdown rods – common mode faults – reactor protection logic – core and winding Ladder

UNIT – V

Process and plant control : additional hazards in chemical plants – hazardous areas – risks to life – the oil industry – reliability of oil supply - fault tree chart of oil industry – electro static hazards – the use of redundancy – parallel and series redundancy. Fault Finding method for flow control – fault finding instruments – Noise problems – types of noise source – Grounding – isolation techniques

TEXT BOOK

Walt Boyes, "Instrumentation Reference Book", Elsevier, 3rd` edition, 2009.

REFERENCES

Andrew.Parr, "Industrial Control Handbook", Newns Reed & Education publishing,3rd edition, 2011.

VI SEMESTER

S274 - INSTRUMENTATION AND CONTROL IN PETRO CHEMICAL INDUSTRIES

Prerequisite: Process control Instrumentation, Industrial Instrumentation

Course Educational Objectives:

In this course student will learn about

1. Learn the reliability terms and their uses
2. Understand the importance of reliability in Instrumentation
3. Understand various failure modes.
4. Understand the redundancy techniques in instrumentation
5. Understand the operation of process plant control

Course Outcomes:

At the end of this course student will be able to

1. Apply the principles of reliability techniques to prevent or to reduce or frequency of failures, while making a product.
2. Better insight into reliability concepts in Instrumentation and difference between maintainability ,MTTF & MTBF
3. Ability to analyze various redundancy techniques and produce better quality product
4. Ability to decide & take necessary actions, while operating in Electronic and avionic systems, Nuclear reactor control systems and Process and plant control.
5. Operate the process using different controls.

UNIT – I

Introduction: Petroleum Exploration, production and Refining - Refining Capacity in India - Consumption of Petroleum products in India - Constituents of Crude Oil.- : P & I diagram of petroleum refinery.

UNIT–II

Atmospheric Distillation of Crude oil - Vacuum Distillation process - Thermal Conversion process - Control of Distillation Column - Temperature Control - Process control - Feed control - Reflux Control - Reboiler Control.

UNIT-III

Controls of chemical Reactors: Temperature Control, Pressure Control - Control of Dryers - Batch Dryers - Atmospheric and Vacuum; Continuous Dryers. - Control Heat Exchangers and Evaporators - variables and Degrees of freedom - Liquid to Liquid Heat Exchangers - Steam Heaters - Condensers -Reboilers and Vaporizers - Cascade Control - Feed forward Control.

UNIT-IV

Evaporators: Types of Evaporators. - Evaporators in Petroleum refinery

UNIT-V CONTROL OF PUMPS :

Centrifugal pump: On-Off level control - Pressure control - Flow control - Throttling control. Rotary pumps: On-Off pressure control.-Reciprocating Pumps: On-Off control and Throttling control.- Effluent and Water Treatment Control: Chemical Oxidation - chemical Reduction - Naturalization - Precipitation - Biological control.

TEXT BOOK

Dr. Ram Prasad, Petroleum Refining Technology, Khanna Publisher, 1st Edition, 2000

REFERENCES

1. B.G. Liptak, Instrumentation in Process Industries, Chilton Book Company, 1973
2. M. Considine and S.D. Ross, Handbook of Applied Instrumentation, McGraw Hill, 1962.
3. B.G. Liptak, Instrument Engineers Handbook, Chilton Book Company, Volume II, 1989

VI SEMESTER

S139 - AUTOMATION OF INDUSTRIAL PROCESS

Prerequisite: Control Systems, Industrial Instrumentation**,** Digital control systems

Course Educational Objectives:

In this course student will learn about

1. The role of computers in the control of various Industrial process
2. The importance of fundamental blocks used in Automation
3. The design of Control System.
4. Advances in Process Control and different automation tools.
5. The importance of Distributed Digital Control in industries.

Course Outcomes:

At the end of this course student will be able to

1. Talk about the role of computers for automatic process control
2. Design a Control System using the fundamental blocks of Automation and different Automation tools
3. Apply Advances strategies for effective Process Control
4. Use advances in automation tools.
5. Apply various Digital controlling techniques for effective control.

UNIT - I

INTRODUCTION TO COMPUTER CONTROL

Role of computers in the control of Industrial processes (plants). Elements of Computer Controlled Process / Plant. Classification – Batch, Continuous, Supervisory and Direct Digital Controls. Architecture – Centralized, Distributed and Hierarchical Systems. Man Machine or Human Computer Interface (HCI).

UNIT - II

BUILDING BLOCKS.

Process Control Requirements of Computers. Process related variables. Computer Network. Communications in Distributed control Systems. Smart Sensors and Field bus.

UNIT - III

CONTROL SYSTEM DESIGN

Control System Design – Heuristics, Structural, Controllability and Relative Gain Array. Controller Design – Regulator design and other design considerations.

Computer aided Control System Design. -Computer control loop, Modified Z – Transform, Zero-order hold equivalence, First order system with time delay, Converting continuous time controller to discrete time domain, Design of controllers based on discrete time model – Deadbeat and Dahlin's algorithms

UNIT - IV

ADVANCED STRATEGIES

Predictive Control – Model based and Multivariable System. Adaptive Control – Adjustment, Schemes, and Techniques Inferential Control. Intelligent Control. Statistical Process Control. Algorithms for Processes with Dead Time – Smith Predictor (SP), Analytical Predictor (AP). Optimal Control

UNIT - V

DISTRIBUTED DIGITAL CONTROL

Programmable logic controllers (PLC)- Architecture ,Selection. Overview of Distributed Digital Control System (DCS). DCS Software configuration. DCS Communication – Data Highway. DCS Supervisory computer Tasks,DCS Integration with PLCs and Computers.

TEXT BOOK

1. S.K.Singh ,Computer Aided Process Control , PHI, 2004.
2. M.Chidambaram,"Computer Control of Processes", Narosa Publications, 2003.

REFERENCES

1. Krishna Kant ,"Computer-based Industrial Control", PHI, 1997
2. S. Bennett," Real Time Control: An Introduction, Pearson Education India, 2nd edition, 2003.

VI SEMESTER

S190 - DIGITAL IMAGE PROCESSING

(Common to ECE, EIE)

Prerequisite: Digital Signal Processing

Course Educational Objectives:

In this course student will learn about

1. Sampling and quantization in spatial domain.
2. 2D transforms and their properties.
3. The enhancement techniques in Spatial domain and Frequency domain.
4. The restoration techniques and color models in Color image processing.
5. Image compression and segmentation techniques.

Course Outcomes:

At the end of this course student will be able to

1. Do Sampling and quantization for better resolution of image.
2. Extract various image feature using 2D transforms.
3. Improve the quality of noised image by applying enhancement techniques.
4. Restore the information from degraded image and improve colour resolution.
5. Increase computation in time and recognize objects from the image.

UNIT-I

Introduction: Introduction to 2D function, Define: Light, Luminance, Brightness and contrast, Definition of Digital Image, Fundamental Steps and Components of an Image Processing System, Applications of Image Processing, Structure of Human Eye, Image formation in the Eye, Concept of gray levels, Basic concept of Sampling and Quantization, Representing Digital Images, Spatial and intensity Resolution, Relationship between pixels: Neighbors of a Pixel, Adjacency, Connectivity, Regions and Boundaries, Distance Measures

UNIT-II

Image Transforms: Introduction to Image Transforms, Two-Dimensional Orthogonal and Unitary Transforms, Separable Unitary Transform, Properties of Unitary Transforms :Energy conservation and Rotation, Energy Compaction and Variances of Transform Coefficients, Basis Images, Two-Dimensional DFT and Properties, Cosine Transform and Properties, Hadamard Transform and Properties, Haar transform and Properties, Slant Transform and Properties.

UNIT-III

Image Enhancement in Spatial and Frequency Domain: Spatial domain Enhancement, Point processing, Intensity Transformation Functions, Image Negatives, Log Transformation, Power-Law(Gamma) Transformations, Piecewise-Linear Transformation Functions, Histogram Processing and its types, Filtering in Spatial domain Enhancement, Smoothing Spatial Filters, Order-Statistic (Nonlinear) Filters and Sharpening Spatial Filters: First-Order Derivative for Image Sharpening using Gradient, Second Derivative for Image Sharpening using Laplacian, Unsharp Masking and high boost Filtering. Filtering in Frequency domain Enhancement, Image Smoothing using Ideal Low Filters, Butterworth Low Filters, Gaussian Low Filters, Sharpening using Ideal High Filters, Butterworth High Filters, Gaussian High Filters, Laplacian in the Frequency Domain.

UNIT-IV

Image Restoration: Image Restoration Degradation model, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Mean Filters ,Least mean square filters, Order-Statistics Filters, Adaptive Filters, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.

Color Image Processing: Color Fundamentals, Color Models, The RGB Model, The CMY and CMYK Color Models, The HSI Color Model, Pseudo color Image Processing, Intensity Slicing, Intensity to Color Transformations, Basics of Full-Color Image Processing, Color Transformation, Color Slicing, Tone and Color Corrections, Histogram Processing.

UNIT-V

Image Compression: Coding Redundancy, Spatial and Temporal Redundancy, Irrelevant Information, Measuring Image Information, Fidelity Criteria, Image Compression Models, Error-Free Compression: Huffman coding, Arithmetic Coding, LZW Coding, Run-Length Coding, Bit-plane coding, Lossless Predictive Coding, Lossy Compression: JPEG , Lossless Predictive Coding,

Image Segmentation: Detection of discontinuities, Detection of Isolated Points, Line Detection, Edge Models, Basic Edge Detection, More Advanced Technique for Edge detection, Edge Linking and Boundary Detection, Local Processing, Global Processing via the Hough Transform& Graph-Theoretic Techniques, Thresholding, Basic Global Thresholding, Otsu's Method, Image Smoothing to improve Global Thresholding, Region Growing, Region Splitting and Merging.

TEXT BOOK

R.C. Gonzalez and R.E. Woods, Digital Image processing –Addison Wesley/ Pearson education,3rd Education, 2002.

REFERENCES

1. Anil K. Jain," Fundamentals of Digital image Processing', PHI publications, 1998.
2. Tinku Acharya, Ajoy K. Ray, "Image Processing Principles and Applications, Wiley- Inter science, 2005.
3. William J. Prati, "Digital Image Processing", John Wiley & sons, 2007

VI SEMESTER

S279 - INTELLIGENT INSTRUMENTATION

Prerequisite: Transducers in Instrumentation, Process control

Course Educational Objectives:

In this course student will learn about

1. The basic difference between general Instrumentation and Intelligent Instrumentation system
2. Various types Intelligent sensors
3. Various standards and protocols used in Intelligent Instrumentation
4. Various Intelligent sensor standards and protocols.
5. Artificial intelligence and Fuzzy based sensors.

Course Outcomes:

After completion of the course students are able to:

1. Acquired adequate knowledge about various Intelligent sensors and their principles
2. Able to know different types standards & Protocols
3. Acquired the knowledge about working of intelligent sensors with Artificial Intelligence and Fuzzy logic.
4. Understand the various Intelligent sensor standards and protocols.
5. Acquired the knowledge of linearization& calibration in ANN and Fuzzy Logic Systems.

UNIT - I

INTELLIGENT SENSORS-I

Introduction-definition of Intelligent Instrumentation, components of Intelligent Instrumentation, smart sensors: sensor classification, general architecture of smart sensors, description of smart sensors, block level design considerations of smart sensors, importance and adoption of smart sensor, types of sensors and compensation

UNIT - II

NTELLIGENT SENSORS-II:

Cognet sensors, virtual sensors, self-adaptive sensors, self-validate sensors, Temperature compensating intelligent sensor

UNIT – III

INTELLIGENT SENSORS-III:

Intelligent pressure, Flow, level. Intelligent sensor application in process control. Intelligent analytical instruments. Application of intelligent sensor in biomedical engineering. Future scope of intelligent instrument.

UNIT – IV

INTELLIGENT SENSOR STANDARDS AND PROTOCOLS:

Introduction-IEEE 1451 standard-Network Technologies-LonTalk-CEBUS communication Protocol for smart homw-J1850 Bus-M1 Bus-Plug-n-Play Smart Sensors.

UNIT – V

SENSORS WITH ARTIFICIAL INTELLIGENCE:

Introduction to Artificial Intelligence sensors: sensors with Artificial Intelligence, multidimensional intelligent sensors, gas classification and recognition, localization and spatial distribution. ANN based intelligent sensors: Linearization and calibration by ANN, compensation error by ANN, soft sensing by ANN, fault detection by ANN, Fuzzy Logic based Intelligent sensors

TEXTBOOK

Manabendra Bhuyan, “Intelligent Instrumentation: Principles and Applications”, CRCpress,2011

REFERENCES

1. J.B. Dixit Amit, “Intelligent Instrumentation for Engineers”, University science press, 2010
2. A.S. Morris, “Principles of measurement and Instrumentation”, Prentice Hall, 1993.

VI SEMESTER

S374 - SAFETY INSTRUMENTATION

Prerequisite: Transducers in Instrumentation, Industrial Instrumentation

Course Educational Objectives:

In this course student will learn about

1. The importance of safety instrumentation by following standard procedures.
2. The various safety measures.
3. The various Field Instruments and Devices for safety measures.
4. The various justification issues for safety instrumented system.
5. The various hazards and accidents occurs in Industry.

Course Outcomes:

After completion of the course students are able to

1. Analyze various types of hazards and how can avoid such type of hazards to follow precautions carefully.
2. Better insight into manufacturing of sensors without failures by following Technology choices.
3. Apply various Field Instruments and Devices to minimise errors.
4. Justify various issues suited for better safety instrumented system.
5. Analyze hazards and accidents occur in Industry.

UNIT – I

INTRODUCTION:

Introduction to safety instrumentation – hazard and risks – risk reduction-fatal accident rate(FAR)- overview of safety system engineering –- safety function –Standards: IEC 61508 nod ISA S84- driving forces for management of safety and evolution of functional safety standards – features of IEC 61508 –ANSI/S84.01 –IEC 61511 standard –equipment under control

UNIT – II

Technology Choices-design stage: Conceptual design stage –technologies for logic solver – pneumatics-relays-safety relay-solid state systems –development of safety PLCS- characteristic of safety PLCS: Hardware and software characteristics –design of safety PLC's – safety controllers.

UNIT – III

SAFETY IN FIELD INSTRUMENTS AND DEVICES:

Field devices for safety – sensor types – failures in sensors – failure modes –actuator types – guidelines for application of filed devices :techniques to min failures –file-safe operation – sensor diagnostics – valve diagnostics – redundancy in sensors and actuators –design requirements for filed devices – intelligent field devices advantages-disadvantages.

UNIT – IV

JUSTIFICATION FOR SAFETY INSTRUMENTED SYSTEM:

Justification issues – impact of safety system failures modes –responsibilities-life cycle –PFD comparison- costing - nuisance trip comparisons- cost comparisons.

UNIT – V

INDUSTRIAL ACCIDENTS & HAZARDS:

Types of accidents in industry – effects of accidents –causes of accidents- accident prevention – reasons-steps on accidents prevention - typical accidents in chemical and other industries – machine guarding. Classification of hazards – safety hazard – health hazard – Hazard identification – hazard assessment and evaluation – hazard control – major industrial hazards

TEXT BOOKS

Dave Macdonald, "Practical Industrial Safety, Risk Assessment and Shutdown Systems", Newns, Elsevier, 2004

REFERENCES

Amir kumar guptha, "Industrial safety and environment", LP publication, 2006.

VI SEMESTER

L109 - ANALYTICAL AND P. C. BASED INSTRUMENTATION LAB

Prerequisite: Engineering Physics, Transducers in Instrumentation

Course Educational Objectives:

In this course student will learn about

1. Interfacing of two computers using serial port communicator (RS-232)
2. The acquiring of Physical variable from the process & monitor the values in pc
3. The conversion of Analog to digital form by using ADC0808
4. The conversion of Digital to analog by using & DAC080
5. Analysis of different parameters like Calorific value, chromatograms & atomic emission

Course Outcomes:

At the end of this lab, student will be able to

1. Understand the interfacing of two computers using serial port communicator
2. Understand the concepts of acquiring physical variable from the process & monitor the values in PC using Data Acquisition
3. Understand the concepts of Analog to digital conversion using ADC0800
4. Understand the concepts of Digital to Analog conversion using DAC0800
5. Have the hands on experience of analysing different parameters

List of Experiments:

P.C. Based Instrumentation:

1. Serial communication through RS232C between PCs
2. Data Acquisition of physical Variables
3. Interfacing of ADC to PC.
4. Interfacing of DAC to PC & generate various types of signals.
5. GPIB Interface – master to slave data transfer
6. Interfacing PLC trainer with PC

Analytical Instrumentation:

1. Flame photometer
2. UV-VIS spectrometer
3. Liquid Chromatography
4. Gas Chromatography
5. Measurement of Calorific Value
6. PH Measurement

NOTE: Minimum 10 experiments can do in above mentioned experiments

VI SEMESTER

L119 - COMMUNICATION AND PRESENTATION SKILLS LAB

(Common to all branches)

Prerequisite: English -I, English - II

Course Educational Objectives

In this course, the students will learn to

1. Gather information and to organize ideas relevantly and coherently
2. Participate in group discussions and debates, Face interviews
3. Write project/research reports/technical reports/ formal letters
4. Make oral presentations
5. Transfer information from non-verbal to verbal texts and vice versa

Course Outcomes

After the completion of this course, prospective engineers will have the ability to

1. Make power point presentations and oral presentations
2. Articulate English with good pronunciation
3. Face competitive exams like GRE, TOEFL, IELTS etc.
4. Face interviews and skillfully manage through group discussions
5. Negotiate skillfully for better placement

The following course content is prescribed for the Communication and presentations Lab:

- Vocabulary building – synonyms and antonyms, one-word substitutes, analogy, idioms and phrases, verbal & alphabet series.
- Oral Presentations – JAM
- Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Making power point presentations.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, practicing mock-interviews.
- Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.
- Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, and critical reading.

Minimum Requirement:

The English Language Lab shall have two parts:

i. **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii. **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i. P – IV Processor
   1. Speed – 2.8 GHZ
   2. RAM – 512 MB Minimum
   3. Hard Disk – 80 GB

ii. Headphones of High quality

Suggested Software:

- Glob arena's software,2002
- Young India's Clarity software,2005

Books Recommended:

1. Stephen Bailey, "Academic Writing- A Practical guide for students", Rontledge Falmer, London & New York, 2004.
2. Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, "English Language Communication: A Reader cum Lab Manual, Anuradha Publications, Chennai, 1st edition, 2006
3. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi, 2007
4. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup, 15th edition, 2010
5. IELTS series with CDs by Cambridge University Press, 3rd Edition, 2007

VI SEMESTER

L164 – MINI PROJECT

(Common to all branches)

Prerequisite: None

Course Educational Objectives:

In this course, students will learn about

1. Design and simulation of various devices using software
2. Circuit designing with various components using fundamental concepts
3. Simulation techniques for given design in order to get efficient result
4. Making of project report according to given regulations
5. How to make presentation effectively in stipulated time.

Course Outcomes:

Students who complete this course will be able to:

1. Use the knowledge in designing various devices to obtain optimum output
2. Develop circuits using different components for different applications
3. Understand the importance simulation techniques for better output
4. Prepare project documentation and to make presentation
5. Acquire adequate knowledge in answering questions in concerned topic.

VII SEMESTER

S313 - MICROPROCESSORS AND MICROCONTROLLERS

(Common to ECE, EEE, EIE)

Prerequisite: Digital Electronic Circuits, Computer organization

Course Educational Objectives:

In this course student will learn about

1. 8086 Microprocessor Architecture and Assembly Language Programming
2. Memory Interfacing with 8086 Microprocessor
3. Various interfacing peripherals with 8086 Microprocessor
4. Concepts of Interrupts and Serial Communication
5. 8051 Microcontroller Architecture and Assembly Language Programming

Course Outcomes:

At the end of this course student will be able to

1. Understand the architecture of 8086 and write Assembly Language Program using 8086 instructions.
2. Interface memory with 8086 Microprocessor
3. Interface various Peripherals with 8086 Microprocessor
4. Use Interrupts to handle multiple I/O devices
5. Understand the architecture of 8051 and write Assembly Language Program using 8051 instructions.

UNIT-I

Microprocessor Architecture: Introduction to Microprocessors-Purpose of a Microprocessor, different types of Microprocessors, their features and their comparison; 8086 Microprocessor-Architecture and Pin diagram of 8086, Special functions of General purpose registers, 8086 flag register and function of 8086 Flags, Addressing modes of 8086.

Instruction Set: Instruction set of 8086, Assembly language programs involving logical, Branch and Call instructions, Sorting, Evaluation of Arithmetic Expressions, String manipulation, Assembler directives, simple programs, procedures, and macros.

UNIT-II

8086 Memory and I/O Interfacing: Minimum mode and maximum mode of operation, Timing diagram, Memory interfacing to 8086 (Static RAM & EPROM).

UNIT-III

Peripherals and Interfacing: Need for DMA. DMA data transfer Method, Interfacing with 8237/8257, 8255 PPI – various modes of operation and interfacing to 8086, Keyboard and Seven segment Displays, Stepper Motor and actuators, D/A and A/D converter interfacing.

UNIT-IV

Interrupts: Interrupt structure of 8086, Interrupt Vector table, Interrupt service routines, Introduction to DOS and BIOS interrupts, 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance.

Data transfer: Serial data transfer schemes, RS 232C, TTL to RS 232C and RS232C to TTL conversion, 8251 USART architecture and interfacing.

UNIT-V

Microcontroller: 8051 Microcontroller Architecture, Register set of 8051,Instruction Set and Programs, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing of 8051.

TEXT BOOK

1. A.K.Ray and K.M. Bhurchandi ,Advanced Microprocessor And Peripherals (2/e), TMH Publishers, 2006.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.Mckinlay "Microcontrollers and Embedded System", Pearson Education Publishers, 2006.

REFERENCES

1. Douglas V. Hall, "Micro Processors & Interfacing", TMH, 2007.
2. Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design, Pearson Education Publishers, 2005.
3. J.K.Uffenbeck, "The 8088 and 8086 Micro Processors", PHI, 4th Edition, 2003.
4. Ajay Deshmukh, "Micro Controllers-Theory and Applications", Tata McGraw Hill Publishers, 2005.
5. Kenneth J.Ayala, "The 8051 Micro Controller", Cenage Learning Publishers, 2004.

VII SEMESTER

S419 - VLSI DESIGN

(Common to ECE, EEE, EIE)

Prerequisite: Digital Electronic Circuits, Computer organization

Course Educational Objectives:

In this course student will learn about

1. IC fabrication process and Electrical properties of MOSFET
2. Concepts of Stick diagrams and layouts using MOS layers and design rules
3. Concept of combinational and sequential Sub system design
4. VLSI Design tools for CMOS System design
5. CMOS testing techniques

Course Outcomes:

At the end of this course student will be able to

1. Understand IC fabrication process and properties of MOSFET
2. Design Logic gates using Static CMOS, NMOS logic from schematic to layout
3. Design Combinational and Sequential sub systems
4. Use VLSI Design tools for CMOS based System Design
5. Use testing techniques to detect various faults of CMOS based Systems

UNIT - I

IC fabrication Technology: Silicon semiconductor technology–wafer processing, oxidation, epitaxy, deposition ion implantation, and diffusion, the silicon gate process; NMOS fabrication, CMOS fabrication, BI-CMOS technology, Comparison between CMOS and bipolar technologies.

Electrical properties of MOS circuits: saturated, non saturated regions, threshold voltage, body effect, trans conductance, output conductance, figure of merit, pass transistor, NMOS inverter, pull up to pull down ratio ,alternative forms of pull up, MOS transistor circuits, scaling factors of MOS devices, CMOS inverter, latch up in CMOS circuits.

UNIT - II

VLSI Circuit Design Process: Design flow, MOS layers, Stick diagrams- NMOS design style, CMOS design style, lambda- based design rules, design rules for contact cuts, CMOS lambda based design rules, layout diagrams for NMOS and CMOS inverters and logic gates. Concepts of sheet resistance and standard unit of capacitance, area capacitance, inverter delays, rise time, fall time estimation, cascaded inverters of drivers, wiring capacitance and choice of layers.

UNIT - III

Subsystem Design: Sub system design flow, Adders- single bit adder schematic, adder/ sub tractor, carry look ahead adder, carry save adders, 4x4 array multiplier, modified Booth's multiplier, serial/parallel multiplier, Shifters- design of 4x4 barrel shifter, Parity generator using XOR gates, XNOR based Comparator circuit, Zero/One Detectors, synchronous up/down counters, registers.

UNIT - IV

System Design and Design Methods: CMOS design methods, design strategies-structured design strategies, hierarchy, regularity, modularity, locality; Design methods-behavioural synthesis, RTL synthesis, logic optimization; Structural to layout synthesis–placement and routing, an automatic placement example, layout synthesis.

Design Tools: Design capture tools-HDL design, schematic design, layout design, floor planning, chip composition; Design Verification Tools-Simulation-circuit level, timing, logic level, switch level, mixed mode simulators. Timing verifiers, network isomorphism, net list comparison, layout extraction, back annotation, design rule verification, pattern generation.

UNIT - V

CMOS Testing: Need for testing- functionality tests, manufacturing tests, a walk through the test process, Manufacturing Test Principles-fault models, observability, controllability, fault coverage , automatic test pattern generation(ATPG) , Fault Grading and fault simulation, delay fault testing, statistical fault analysis, fault sampling ,

Design Strategies for Test: Design for testability, Ad-Hoc testing, scan based test techniques, self test techniques, IDDQ testing, Chip level Test Techniques- regular logic arrays, memories, random logic. System-level Test Techniques-boundary scan, Layout design for improved testability.

TEXT BOOKS

1. Kamran Eshraghian, Eshraghian Dougles and A.Pucknell, Essentials of VLSI circuits and systems, PHI Publishers, 2005.
2. Neil.H.E.Weste and Kamaran Eshraghian, Principles of CMOS VLSI Design (2/e), Pearson Education Publishers, 2000.

REFERENCES

1. John .P. Uyemura, Introduction to VLSI Circuits and Systems, John Wiley Publishers, 2000.
2. Wayne Wolf, Modern VLSI Design (3/e), Pearson Education Publishers, 2008.
3. M.Sze, VLSI Technology, 2nd Edition, TMH Publishers, 2003.

VII SEMESTER

S148 - BIO-MEDICAL INSTRUMENTATION

Prerequisite: Transducers in Instrumentation, Integrated circuits and applications.

Course Educational Objectives:

In this course student will learn about

1. Medical instrumentation system and different types of electrodes used in bio-potential recording.
2. Physiology and bio electric potentials generated by Cardiovascular and nervous systems.
3. Therapeutic, Prosthetic devices and instrumentation concerned with measuring blood pressure, blood flow.
4. Clinical laboratory instruments, Medical imaging systems and patient safety.
5. Physiology and instrumentation concerned with respiratory system.

Course Outcomes:

At the end of the course student will be able to

1. Understand Medical instrumentation system and classify of electrodes used in bio-potential recording.
2. Measure bio electric potentials generated by Cardiovascular and nervous systems. .
3. Understand the measurement of blood pressure, blood flow.
4. Use Clinical laboratory instruments, Medical imaging systems to handle the patient in critical conditions.
5. Understand Physiology and instrumentation concerned with respiratory system.

UNIT - I

Generalized Medical instrumentation system, Problems encountered with measurements from Human beings, Cell structure, Action & Resting potentials. Bio-potential electrodes, Bio chemical electrodes, Internal Electrodes, External electrodes.

UNIT – II

PHYSIOLOGY OF CARDVASCULAR,NERVOUS SYSTEMS

Electro Cardiograph –Block Diagram of ECG Machine, Einthoven triangle (12-Lead configuration), **Electro-Encephalography**-,Block Diagram of EEG recording System, Electrode locations,10-20 electrode System, Resting Rhythms

Electromyography: Block Diagram of EMG machine, Stimulation,

UNIT – III

Blood Pressure: Direct and Indirect measuring techniques of BP. **Blood Flow**: Electro Magnetic, Doppler and dilution methods **Therapeutic and Prosthetic Devices**: Pacemaker, Defibrillator, Short wave Diathermy

UNIT - IV

Study of Clinical laboratory Instruments: Spectrophotometry, Flame photometer.

Medical Imaging Systems: Ultrasonography, Computed Tomography, Ultrasonic Transducers Patient **Safety**: Physiological effects of Electrical Current, Electric shock Hazards, Electrical safety analyzer.

UNIT – V

RESPIRATORY SYSTEM:

Physiology of the Respiratory System, Mechanics of Breathing, Spirometry, Respiratory Therapy Equipment-Ventilators, Pnuemotachograph.

TEXT BOOKS

1. Leslie Cromwell, Fred j. Weibell, Erich a. Pfeiffer," Bio medical instrumentation & Measurements", PHI publishers, 2nd edition,2001.
2. John G.Webster, editor john wiley,"Medical instrumentation application & design", 3rd edition, 2009.

REFERENCES

1. Dr.M.Arumugam ''Bio medical instrumentation" Anuradha Agencies publishers,2003.
2. R.S.Khandpur , "HandBook of BioMedical Instrumentation", TMH, New Delhi,2003.
3. L.A.Geddes and L.E.Baker, "Principles of Applied Bio-Medical Instrumentation", John Wiley & Sons Inc,1975.

VII SEMESTER

S344 - POWER PLANT INSTRUMENTATION

Prerequisite: Transducers in Instrumentation, Industrial Instrumentation

Course Educational Objectives:

In this course student will learn about

1. The importance of various power plants.
2. The working of steam generator.
3. Principles and working of Steam turbines & Water circulation system.
4. Control strategies present in plant control & emission control.
5. Emerging technologies in power generation.

Course Outcomes:

By the end of this course students will be able to

1. Acquire the knowledge on various power plants.
2. Able to explain the working of Steam generator.
3. Explain the principle and working of steam turbines & water circulation systems.
4. Acquire the knowledge on control strategies present in plant control and emission control.
5. Explain the emerging techniques in power generation.

UNIT-I
OVERVIEW OF POWER GENERATION

Various Conventional and Non-conventional Power Plants-advantages-drawbacks- Importance of Instrumentation in power generation – Various Mechanical and Electrical Transducers used in power plants –Basic Building Blocks of Thermal power plants

UNIT-II
STEAM GENERATOR

Steam Generator systems-excess air – steam temperature control – minimum load capability – flue gas emissions – feed water quality –steam purity –steam generator arrangement – startup system Types of Boilers -Furnace-drum boiler – super heater-Reheater-Economizer-air heater – soot blowers-coal feeder –pulverizes burner ignites-warm-up burner-Ash Hoppers Damper

UNIT-III
STEAM TURBINES & WATER CIRCULATION SYSTEM

Operating principles – steam expansion – electrical energy – turbine types-steam turbine component – components of steam generator – steam flow control. Circulation of water system – cooling pond – Recirculation cooling system – components of circulation water system.

UNIT-IV
PLANT CONTROL & EMISSION CONTROL

Plant Control System :On-Off control – Feed forward Control – Cascade Control – Modulating control: Boiler control – load demand control – firing rate control – pulverizer coal and air flow control – Furnace draft control – Feed water flow control – superheat & Reheat steam temperature control – Boiler Feedpump Recirculation control

Emission control: Particulate control – Nitrogen Oxide emission control- sulfur dioxide emission control – NOx and SO_2 Removal.

UNIT-V
EMERGING TECHNOLOGIES

Fossil Fuel Technology: GCC-Indirect fired Combined Cycle –MHD – Fuel cell, Renewable Techniques: solar – wind – bio mass – ocean – geothermal , Fusion Techniques: Magnetic confinement concept – Inertial confinement Techniques.

TEXT BOOK

Black & Veatch , Power Plant Engineering, Publisher: Chapman & Hall Inc- New York, CBS Publishers & Distributors, New Delhi (for Indian Reprint edition)- 2005.

REFERENCES

1. Pergamon Press, Modern Power Station Practice, Vol. 6, Instrumentation, Controls and Testing –, Oxford, 1971.
2. Sam G Dukelow "The Control of Boilers" – 2nd Edition, ISA Publication, 1991.
3. Elokna S.M. and Kohal A., "Stand Boiler Operations" – Questions and Answers TMH, New Delhi, 1994.

VII SEMESTER

S202 - DSP PROCESSORS AND ARCHITECTURES

Prerequisite: Signals and Systems, Digital Signal Processing, Micro Processors & Microcontrollers

Course Educational Objectives:

In this course the student will learn about

1. Sampling process, DFT, FFT, Number formats for signals in DSP and errors in DSP.
2. DSP architectures, Pipelining, Interrupts and Inter locking concept.
3. Data addressing modes, instructions and programming, interrupt control, On-chip peripherals and pipelining operation of TMS320C54XX processor.
4. Implementation of DFT and FFT algorithms on TMS320C54XX processor.
5. Direct memory access (DMA), interfacing and programming of CODEC.

Course Outcomes:

At the end of this course student will be able to

1. Understand the sampling, decimation and interpolation and calculate DFT and FFT using MATLAB.
2. Understand the concept of pipelining, interrupts, branching and hardware looping.
3. Analyze the different addressing modes, interrupts and instructions used for TMS320C54XX processor.
4. Code the DFT and FFT algorithms used for TMS320C54XX processor.
5. Understand the Memory and parallel I/O interface, McBSP and CODEC programming.

UNIT-I

INTORODUCTION TO DIGITAL SIGNAL PROCESING

Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB. Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II

ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing. Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, and Pipeline Programming models.

UNIT-III

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV

IMPLEMENTATIONS OF BASIC DSP ALGORITHMS

The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing. Implementation of FFT Algorithms : An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT-V

INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS

1. Avtar Singh and S. Srinivasan, “Digital Signal Processing”, Thomson Publications, 2004.
2. Lapsley et al., “DSP Processor Fundamentals, Architectures & Features”, S. Chand & Co, 2000.

REFERENCES

1. B. Venkata Ramani and M.Bhaskar, “Digital Signal Processors, Architecture, Programming and Applications”, TMH, 2004.
2. Jonatham Stein, “Digital Signal Processing”, John Wiley, 2005.

VII SEMESTER

S236 - ENGINEERING MATERIALS

Prerequisite: Engineering Physics

Course Educational Objectives:

In this course student will learn about

1. The basic concepts of metallic glasses, ceramics, alloys and composites.
2. The various Crystal structures with their packing fraction.
3. Non-destructive testing for machines using ultrasonics.
4. Different types of polarizations in dielectric materials.
5. Synthesis of nanomaterial using different techniques.

Course Outcomes:

At the end of this course student will be able to

1. Understand the nature of metallic glasses shape memory alloys.
2. Use XRD technique to know the properties of crystal.
3. Know how machines tested using ultrasonic waves.
4. Understand the various dielectric parameters viz., dielectric constant, loss etc.
5. Understand the synthesis of carbon nanotubes and their properties.

UNIT – I

CLASSIFICATION OF MATERIALS

Introduction to metallic glasses, ceramics, alloys and composites, properties and applications of metallic glasses, shape memory alloys- characteristics of shape memory alloys- properties-Ti Alloys, advantages and disadvantages of shape memory alloys.

UNIT – II

MATERIALS CHARACTERISATION

Introduction –crystalline solids and amorphous solids-fundamental terms of crystallography-crystal structure, Primitive cell, multiple cell-Crystal systems with bravias lattices- Expression for lattice constant and density of crystal- Structure and packing fractions of Simple cubic-Body centered cubic- Face centered cubic crystals.

X-Ray Diffraction: Directions and planes in crystals – Miller indices – separation between successive (h k l)planes-Braggs X ray Diffractometer, Diffraction of X- rays by crystal planes – Braggs law.

UNIT – III

ULTRA SONICS AND N D T:

Properties of Ultrasonic Waves- Generation of ultrasonic waves- Magnetostriction effect, Piezoelectric effect-detection of ultrasonic waves, NDT Detection of flaws in metals – Inspection Methods –Through Transmission method- Pulse echo method – Different Types of Scans.

UNIT – IV

DIELECTRIC PROPERTIES

Polarization of dielectric materials, polar and non–polar dielectrics, Basic definition of dielectrics, Types of Polarizations -Electronic, Ionic and Orientation polarizations, frequency and temperature dependence of the polarizability, Equation of Lorentz internal field in solids, Claussius–Mosotti equation, Ferro and Piezo electricity, dielectric constant, dielectric loss, dielectric breakdown.

UNIT – V

NANOMATERIALS

Introduction – synthesis of nanomaterials, plasma arcing, chemical vapor deposition, sol-gels, electro deposition, ball milling, properties of nanomaterials, carbon nanotubes, types and structure of CNT, Fabrication of CNTs: Electric arc discharge Method, pulsed laser deposition, chemical vapor deposition, properties and applications.

TEXT BOOKS

1. Engineering Physics by S.K.Nayak and K.P.Bhuvana, Tata McGraw-Hill, New Delhi, 2012.
2. Engineering Physics by V. Rajendran, Tata McGraw-Hill, New Delhi, 2010.

REFERENCES

1. M.R. Srinivasan ,Engineering Physics, New Age International, 2014.
2. C. Kittle, Introduction to Solid State Physics, John Wiley & Sons, 1999.

VII SEMESTER

S373 - ROBOTICS AND AUTOMATION

(Common to CSE, EEE, EIE)

Prerequisite: None

Course Educational Objectives (CEOs):

In this course, student will learn about

1. The basic concepts of automation and material handling.
2. The basic concepts of Robot.
3. The various types of actuators and end effectors.
4. The methods of robot programming.
5. The various sensors and applications of robot.

Course Outcomes (COs):

At the end the student will be able to learn

1. Automation fundamentals.
2. About basics of robots and classification.
3. About actuators and grippers.
4. About basics of robot languages.
5. Various types of sensors and applications of Robot.

UNIT – I

AUTOMATION

Introduction, Types and strategies of automation, pneumatic and hydraulic components circuits. Automated Material Handling : Types of equipment, functions, analysis and design of material handling systems, conveyor systems, Automated guided vehicle system

UNIT – II

ROBOTICS

Introduction - Basic concepts – Robot anatomy –Components of robots- Robot motions – Number of D.O.F – Work volume – Classification of robots by control method – Specifications of robots.

UNIT – III

ACTUATORS

Pneumatic, Hydraulic Actuators, Stepper Motor Control Circuits.

END EFFECTORS: Introduction – Types of end effectors – Mechanical grippers – Vacuum cups, magnetic grippers, adhesive gripers and others – Robot / End effectors interface – Considerations in gripper selection and design

UNIT – IV

ROBOT PROGRAMMING

Methods of robot programming – Lead through method.-Textual robot languages – Generations of programming languages – Robot language structure – Motion commands – End effector and sensor commands – VAL II programming language.

UNIT – V

SENSORS

Acoustic, Optic, Pneumatic, Force/torque, optical encoders- Machine vision

ROBOT APPLICATION: Robots in Manufacturing and Non-Manufacturing applications – Future applications.

TEXT BOOK

1. Mikell P.Groover,"Automation, Production systems and computer Integrated Manufacturing", Prentice Hall of India Private Limited,New Delhi, 2008.
2. Mikell P.Groover, MITCHELL WEISS, ROGER N. Nagel& NICHOLAS G. Odrey; Industrial Robotics, McGraw- HILL International Editions, 1986.
3. R.K.Mittal and IJ Nagrath, Robotics and Control ,Tata Mc Graw – Hill publishing company Limited, New Delhi,2003.

REFERENCES

1. P. Radhakrishnan, S.Subramanyan, V.Raju," CAD/ CAM / CIM", New Age International Publishers, 2008.
2. Robert J.Schilling, Fundamentals of robotics analysis & control, PHI learning private limited, New Delhi, 2009.
3. Saeed B.Niku, Introduction to robotics analysis systems Application, PHI learning private limited, New Delhi, 2004.
4. K.S.Fu, R.C Gonzalez and C.S.G.Lee, Robotics control, Sensing, vision, and intelligence; Mc Graw HILL International Editions,1987.
5. Richard D.Klafter, Thomus A. Chmielewski, Michael Negin, "Robotic Engineering – An integrated approach", Prentice Hall India Private ltd, New Delhi, 2010.

VII SEMESTER

S319 - NANO TECHNOLOGY

(Common to AE, EIE, ME)

Prerequisite: Engineering Physics

Course Educational Objectives:

In this course student will learn about

1. The basics of Nanoscience and Technology.
2. Various process techniques available for the processing of Nanostructured materials.
3. The exotic properties of nanostructured materials at their nanoscale lengths.
4. Different nanoparticles synthesis methods and their skills.
5. The reactive merits of various process techniques.

Course Outcomes:

At the end of this course student will be able to

1. Have a sound grounding and expert knowledge in multidisciplinary areas of nanoscience
2. Understand the basic scientific concepts underpinning nanosciences
3. Understand the properties of materials at the atomic/molecular level and the scaling laws governing their properties
4. Understand the relationships and connections across the sciences and non-science disciplines that are core to nanotechnology
5. Understand the current frontier developments in nanotechnology.

UNIT – I
INTRODUCTION TO NANOTECHNOLOGY

Definition of Nano-Science and Nano Technology, Applications of Nano-Technology. Introduction to Physics of Solid State: Structure: Size dependence of properties; crystal structures, face centred cubic nanoparticles; Tetrehedrally bounded semiconductor structures; lattice vibrations. Energy Bands: Insulators, semiconductor and conductors; Reciprocal space; Energy bands and gaps of semiconductors; effective masses; Fermi Surfaces.

UNIT – II
SYNTHESIS METHODS & METHODS OF MEASURING PROPERTIES

Various nanomaterial synthesis approaches, RF plasma, sputtering, chemical methods, thermolysis, Pulsed Laser Methods.

Structure: Crystallography, particle size determination, surface structure, Microscopy: Scanning Prob Microscopy (SPM), Atomic Force Microscopy (AFM), Field Ion Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy (TEM)

Spectroscopy: Infrared and Raman Spectroscopy, X-ray Spectroscopy, Magnetic resonance, Optical and Vibrational Spectroscopy, Luminescence.

UNIT – III
CARBON NANOSTRUCTURES

Carbon molecules, nature of the carbon bond, new carbon structures, Carbon nanotubes, fabrication, types, electrical, vibrational and mechanical properties, Applications of carbon nanotubes: computers, fuel cells, chemical sensors.

UNIT - IV

QUANTUM WELLS, WIRES AND DOTS

Preparation of quantum nanostructures, size and dimensionality effects, size effects, conduction electrons and dimensionality, fermi gas and density of states, potential wells, particle confinement, Properties dependent on density of states, Excitons, Single electron tunneling, Applications: Infrared detectors, Quantum dot lasers.

UNIT – V

NANOMACHINES AND NANODEVICES

Micro-electro-mechanical systems (MEMS), characteristics, Nano-electro-mechanical systems (NEMS), fabrication techniques, nanodevices and nanomachines, Molecular and supramolecular switches.

TEXT BOOKS

1. Charles P. Poole, Frank J. Owens, "Introduction to Nanotechnology", Wiley Inter Science, 2003.
2. Mark A. Ratner, Daniel Ratner, "Nanotechnology: A gentle introduction to the next Big Idea", Prentice Hall P7R:1st Edition, 2002.

REFERENCES

1. Mick Wilson, Kamali Kannargare., Geoff Smith, "Nano technology: Basic Science and Emerging technologies", Overseas Press, 2005.
2. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2002.
3. T. Pradeep, "Nano: The Essentials, Understanding of Nanoscience and Nanotechnology," Tata McGraw-Hill, 2007.
4. Karkare Manasi, "Nanotechnology Fundamentals and Applications" I.K. International, 2008.

VII SEMESTER

S388 - SPACE SCIENCES

Prerequisite: Engineering Physics

Course Educational Objectives:

In this course student will learn about:

1. Introduction to space science and related basic parameters.
2. Kelper's laws of planetary motion and asteroids, satellites and comets.
3. Stellar spectra and energy production in stars.
4. Origin of galaxies, active galaxies and quasars.
5. Big bang theory, dark matter and dark energy.

Course Outcomes:

At the end of this course student will be able to:

1. Understand the fundamental necessary for space science
2. Understanding of Kelper's laws and mass of earth and planets
3. Understanding of luminosity of stars and stellar evolution
4. Understanding enough exposure about galaxies.
5. Understanding of big band theory and cosmic microwave background radiation.

UNIT - I

INTRODUCTION

Introduction to space science and applications, historical development.

UNIT - II

SOLAR SYSTEM

Nebular theory of formation of our Solar System. Solar wind and nuclear reaction as the source of energy. Sun and Planets: Brief description about shape size, period of rotation about axis and period of revolution, distance of planets from sun, Bode's law, Kepler's Laws of planetary motion, Newton's deductions from Kepler's Laws, Newton's Law of gravitation, correction of Kepler's third law, determination of mass of earth, determination of mass of planets with respect to earth. Brief description of Asteroids, Satellites and Comets.

UNIT - III

STARS

Stellar spectra and structure, stellar evolution, nucleo-synthesis and formation of elements. Classification of stars: Harvard classification system, Hertzsprung-Russel diagram, Luminosity of star, variable stars; composite stars (white dwarfs, Neutron stars, black hole, star clusters, supernova and binary stars); Chandrasekhar limit.

UNIT - IV

GALAXIES

Galaxies and their evolution and origin, active galaxies and quasars.

UNIT - V

CREATION OF UNIVERSE

Early history of the universe, Big-Bang and Hubble expansion model of the universe, cosmic microwave background radiation, dark matter and dark energy.

TEXT BOOKS

1. K.S. Krishnaswami, "Astrophysics: A modern Perspective" New Age International, 2006.
2. K.S. Krishnaswami, "Understanding Cosmic Panorama" New Age International, 2007.

REFERENCES

1. Robert. C. Haymes, Introduction to space science, John Wiley & Sons, 1971.

VII SEMESTER

S332 - OPTIMIZATION TECHNIQUES

(Common to CSE, EEE, EIE)

Prerequisite: Applied Mathematics-1

Course Educational Objectives:

The Objective of this course is to impart the following skills in students.

1. A basic understanding of numerical optimization algorithms.
2. Formulate the engineering design problems as a mathematical optimization problem.
3. Use unconstrained minimization for the solution of engineering problems.
4. Logical thinking for problem solving.
5. Understand different non-traditional optimization techniques.

Course Outcomes:

After completion of the course student will

1. Demonstrate knowledge and understanding of the basic ideas underlying optimization techniques.
2. Demonstrate knowledge and understanding of some of the most common standard optimization models.
3. Develop mathematical optimization models for a range of practical problems.
4. Formulate large-scale Linear and Integer Programming problems and then solve the problem using logical thinking.
5. Able to apply non-traditional optimization techniques for solving engineering problems.

UNIT – I

LINEAR PROGRAMMING (LP)

Introduction through engineering applications, standard form of LP problem (LPP), Geometrical interpretation, simplex method and algorithm, two phases of simplex method, Numerical problems, Revised simples method, Duality in LP, Dual simplex method, sensitivity analysis.

UNIT – II

APPLICATIONS AND EXTENSIONS OF LP

Transportation problem, Assignment problem, Karmarkar's method, Quadratic programming and Applications to Engineering problems.

UNIT – III

NON-LINEAR PROGRAMMING – UNCONSTRAINED MINIMIZATION

Interpolation methods, quadratic and cubic interpolation methods, Newton's method.Gradient Methods – Steepest descent, conjugate gradient, Newton's and quasi Newton methods, Davidon-Flecher-Powell method, numerical problems.

UNIT – IV

NON-LINEAR PROGRAMMING – CONSTRAINED MINIMIZATION

Legrangian multipliers, Kuhn-Tucker conditions, sequential LP method, methods of feasible directions, Rosen's gradient projection method, Generalized reduced gradient method, Interior and exterior penalty function methods.

UNIT – V

NON-TRADITIONAL OPTIMIZATION TECHNIQUES

Principle of optimality, computational procedure, engineering applications. Evolutionary Programming Techniques – Genetic Algorithm (GA), the three parameters of GA, computational procedure for both binary and analogue coded inputs. Introduction to Particle swarm Optimization. Numerical examples.

TEXT BOOKS

1. S.S. Rao ,"Engineering Optimization – Theory and Practice", III Edition, John Wiley & Sons 1996 and New Age International Pvt Ltd., New Delhi, 2002.
2. Kalyanmoy Deb, "Optimization for Engineering Design - Algorithms and Examples", PHI Learning Private Ltd, New Delhi, 1995.

REFERENCES

1. K.V. Mittal and C Mohan, "Optimization Methods in Operations Research and Systems Analysis", New Age International Publishers, II edition, New Delhi, 1983.
2. Christos H Papadimitriou and Kenneth Steiglitz, "Combinatorial Optimization – Algorithms and Complexity", Prentice Hall of India 1997.
3. J.C. Pant, "Introduction to Optimization & Operations Research", IV Edition, Jain Brothers, New Delhi, 2002.
4. D.E. Goldberg, "Genetic Algorithms in Search, optimization and machine learning: Reading, Mass", Addison-Wesley, 1989.
5. W.L. Winston, and M. Venkataramanan, "Introduction to Mathematical Programming", 4th Edn., Duxbury Press, 2002.

S270 - INDUSTRIAL MANAGEMENT
(Common to CSE, ECE, EEE, EIE, IT, ME

VII SEMESTER

Prerequisite: None

Course Educational Objectives (CEOs):

In this course student will learn about

1. The fundamental concepts and contributions of Management.
2. Human Resource Practices, Quality controls and Project Management which plays a vital role in the organization.
3. Study techniques for increased productivity.
4. Human Resource Management practices.
5. Various network analysis techniques.

Course Outcomes:

After completion of the course, students will be able to

1. Apply the conceptual knowledge of management and organization in work environment.
2. Take decisions relating to location of plant and layout of plant.
3. Conduct work study techniques for increased productivity and also able to control quality of products.
4. Manage human resources efficiently and effectively with best HR practices.
5. Plan and control projects through network analysis techniques.

UNIT - I

Introduction: Management - Definition, Nature, Importance of management Functions of Management - Taylor's scientific management theory, Fayal's principles of management, Contribution of Elton mayo, Maslow, Herzberg, Douglas MC Gregor, basic concepts of Organisation- Authority, Responsibility Delegation of Authority, Span of control, Departmentation and Decentralization - Organisation structures (Line organization, Line and staff organization, Functional organization, Committee organization, Matrix organization)

UNIT - II

Operations Management: Plant location, Factors influencing location, Principles and types of plant layouts - Methods of production (job, batch and mass production), Work study - Basic procedure involved in method study and Work measurement

UNIT - III

Quality and materials management: Statistical quality control – Meaning- Variables and attributes - X chart, R Chart, C Chart, P Chart, (simple Problems) Acceptance sampling, Sampling plans, Deming's contribution to quality. Materials management – objectives, Need for inventory control, Purchase procedure, Store records, EOQ, ABC analysis, Stock levels

UNIT – IV

Human Resource management (HRM): Concepts of HRM, Basic functions of HR manager: Man power planning, Recruitment, Selection, Training and development, Placement, Wage and salary administration, Promotion, Transfers Separation, performance appraisal, Job evaluation and merit rating.

UNIT - V

Project management: Early techniques in project management - Network analysis: Programme evaluation and review technique (PERT), Critical path method (CPM), Identifying critical path, Probability of completing project within given time, Project cost analysis, project crashing (simple problems)

TEXT BOOK

Dr. A.R.Aryasri, Management Science, TMH, 4th edition, 2009

REFERENCES

1. Koontz & Weihrich – Essentials of management, TMH, 8th edition, 2010
2. Stoner, Freeman, Gilbert, Management, 6th edition Pearson education, New Delhi, 2004
3. O.P. Khanna, Industrial engineering and Management, Prentice Hall Publications, 2013.

VII SEMESTER

S340 - PLC AND SCADA

Prerequisite: Digital Electronic Circuits, Computer Programming

Course Educational Objectives:

In this course student will

1. Understand the basic difference between PLC, Distributed Control System(DCS) & SCADA
2. Learn the basics of Modern PLCs and SCADA system
3. Understand the operation ,usage, hardware selection(I/O Modules) and configuration of PLC's & SCADA system
4. Learn programming of PLC(ladder diagrams).
5. Learn various protocols uses in SCADA system

Course Outcomes:

By the end of the course, students will be able to

1. Acquired adequate knowledge about PLC and SCADA
2. Known the Hardware structure of PLC and SCADA
3. Write the programs (ladder logic diagrams) in PLC
4. Use different types protocols (OSI,IP/TCP,CIP,DNP3)used in SCADA system.
5. Compare the various Supervisory systems.

UNIT - I

INTRODUCTION TO PLC

Definition & History of PLC, Overall PLC system, PLC Input and Output modules, CPU & programmer/monitors, solid state memory, the processor, Input module (Interfaces), Power supplies, PLC advantages & disadvantages- selection criteria for PLC.

UNIT – II

PROGRAMMING OF PLC

Programming equipments, proper construction of PLC ladder diagram, Basic components & their symbols in ladder diagram, Fundamentals of ladder diagram, Bollean logic & relay logic, and analysis of rungs. Input ON/OFF switching devices, Input analog devices, Output ON/OFF devices, Output analog devices, programming ON/OFF Inputs to produce ON/OFF outputs.PLC timer function-PLC Counter functions.

UNIT – III

INTRODUCTION TO SCADA

Introduction and brief history of SCADA, Fundamental principles of modem SCADA systems, SCADA hardware, SCADA software, Landlines for SCADA, Modem use in SCADA system, computer sites and troubleshooting, system implementation.

UNIT – IV

SCADA SYSTEM, HARDWARE AND FIRMWARE

Comparison of terms SCADA, Distributed Control System (DCS), PLC and smart instrument, considerations and benefits of SCADA system, Remote Terminal Units(RTU)s:Control Processor, Analog input& output module, Digital input &output module, communication interfaces, Power supply module for RTU, Application program me, PLC used as RTUs, Master station, System reliability and availability, communication architecture and philosophies

UNIT – V

THE EVOLUTION OF SCADA PROTOCOLS

Overview of open system interconnection(OSI) Model, Functions of OSI Model Layers, OSI Protocols, Functions of Transmission control protocol / Internet protocol(TCP/IP), DNP3 protocol,IEC61850 layered architecture, CIP protocol, DeviceNet, ControlNet, EtherNet/IP, Flexible Function Block process (FFB), Process Field bus (Profibus), The security Implications of SCADA protocols..

TEXT BOOKS

1. John W Webb, Ronald A. Reis, "Programmable Logic Controllers: Principles and Application", Pearson Education, 5th Edition, 2009.
2. David Bailey, Edwin Wright, "Practical SCADA for Industry", Newns,An Imprint of Elsevier, 2003.

REFERENCES

1. Ronald L. Krutz "Securing SCADA system", Wiley publishing, 2006
2. John R.Hackworth, Frederick D.Hackworth Jr., "Programmble Logic Controllers Programming Methods and applications", 2003
3. Gordan Clark, Deem Reynders, "Practical Modem SCADA Protocols Newnes An imprint of Elsevier, 2004.
4. Gary Dunning, "Introduction to Programmble Logic Controllers", Thomson, 2nd Edition, 2001.

VII SEMESTER

L161 - MICROPROCESSORS AND MICROCONTROLLERS LAB

(Common to ECE, EEE, EIE)

Prerequisite: Digital electronic Circuits, Computer Programming

Course Educational Objectives:

In this course student will learn about

1. Arithmetic programs like addition, subtraction, multiplication, division using 8086.
2. Logical Programs like shift and rotate using 8086 Kit..
3. Assembly Language Programs by using MASM/TASM
4. Usage of ADC's, DAC's ,Stepper motors ,Keyboards and Displays etc.
5. Microcontroller programs and interfacing with 8051.

Course Outcomes:

At the end of the course students will be able to

1. Develop Various Arithmetic programs in 8086.
2. Develop Various Logical programs in 8086.
3. Write Assembly Language Programs by using MASM/TASM
4. Interface various devices like ADC's, DAC's ,Stepper motors ,Keyboards and Displays to 8086.
5. Develop programs for Real time applications using 8051.

LIST OF EXPERIMENTS (Minimum 12 experiments has to be conducted)

Part I: 8086 Programs

1. Data Transfer Operations (MOV & XCHG)
2. Arithmetical Operations (ADD,ADC,SUB,SBB,DAA,AAA)
3. Logical Operations (AND,OR,XOR,Shift, Rotate)
4. String Operations
5. Sorting (Ascending & Descending Order)
6. Code Conversion Programs
7. String Comparison (PASSWORD CHECKING)
8. Read a Character and Display using MASM
9. Reverse the String using MASM

Part II: 8086 Interfacing

10. Key board Interfacing
11. Display Interfacing
12. Stepper motor Interfacing
13. DAC Interfacing (Sine, Square, Saw tooth, Triangular)
14. ADC Interfacing
15. 8259 Interrupt Controller

Part III: 8051 Programs

16. Arithmetical Operations
17. Logical Operations
18. Bit manipulation Operations
19. Parallel Port
20. Timers and Interrupts.

VII SEMESTER

L168 - PLC AND BIO MEDICAL INSTRUMENTATION LAB

Prerequisite: Microprocessors and Interfacing, Computer organization

Course Educational Objectives:

In this course student will learn about

1. The Operation of PLC and Bio Medical system.
2. Programming of PLC using ladder diagrams.
3. Controlling of various process variables with PLC.
4. Measurement of various bio electric potentials.
5. Automation of various systems using PLC.

Course Outcomes:

At the end of the course students will

1. Know the Hardware /Software structure of PLC and BioMedical system..
2. Be able to write Programs using ladder diagrams.
3. Able to control Various process variables using PLC.
4. Understand the Measurement of various bio electric potentials.
5. Be able to automate various systems using PLC.

1. PLC SIMULATOR
2. Water level control using PLC
3. Temperature control system using PLC
4. Bottle Filling automation system using PLC
5. DC Motor control system using PLC
6. Pressure controller using PLC
7. ECG Simulator
8. Electro-Encephalograph
9. Electro-Myograph
10. Pacemaker Simulator

VII SEMESTER

L153 - INTERNSHIP

(Common to all branches)

Prerequisite: None

Course Educational Objectives:

In this course student will learn about

1. Role of Instrumentation engineering in different industry environments.
2. Face different technical problems encountered in Industries.
3. The reporting of technical issues.
4. How to communicate in working environment.

Course Outcomes:

After the completion of the course, students will able to

1. The concepts of Instrumentation engineering& exposed to industry environment
2. Analyze the practical industry oriented problems
3. Improve the report writing skills
4. Improve soft skills and team work

S311 – MICRO-ELECTRO MECHANICAL-SYSTEMS

VIII SEMESTER

(Common to AE, ECE, EIE, ME)

Prerequisites: , Transducers in Instrumentation, VLSI Design

Course Educational Objectives:

In this course student will learn about

1. Fundamentals of Micro Electro Mechanical Systems & Micro systems with few examples
2. Scaling laws in miniaturisation, scaling in geometry ,electro statics, electromagnetic, fluids mechanics & heat transfer
3. Basic manufacturing techniques of MEMS viz..Photo resist, Etching, Deposition etc.,,
4. Different fabrication technologies & Packaging techniques used in MEMS
5. Biomedical, Chemical, Optical, Pressure& Thermal sensors along with Micro devices.

Course Outcomes:

At the end of this course student will be able to

1. Think in a unified way about interdisciplinary Microsystems
2. Realize the importance of scaling laws in making design of micro scale devices
3. Understand the suitable fabrication methods for the variety of Micro scale devices
4. Understand the different packaging techniques used for micro scale devices
5. Identify the suitable MEMS based sensors for various real time applications.

UNIT – I

Overview of MEMS

MEMS and Microsystems definitions and examples, Difference between Microsystems and Microelectronics, Benefits of miniaturization, Applications: Industrial/automotives sensors, Medical systems, aircraft sensors, Structural health monitoring, Telecommunication etc, Materials for MEMS.

UNIT – II

Scaling Laws In Miniaturization

Introduction to Scaling, Scaling in Geometry, Scaling in Electrostatic forces. MEMS Design Considerations.

UNIT – III

Micro Fabrication –I

Introduction, Photolithography, Photo resists and Application, Light Sources, Photo resist Removal, Ion Implantation, Diffusion, Oxidation, Chemical Vapour Deposition (CVD), Sputtering, Deposition by Epitaxy, Etching.

UNIT – IV

Micro Fabrication – II

Bulk Micromachining: Etching-Isotropic and Anisotropic, Wet Etching and Dry Etching (Plasma, Deep reactive ion) Comparison.

Surface Micromachining: Process, associated Mechanical problems (Adhesion, Interfacial stresses, Stiction), LIGA process, MEMS Packaging.

UNIT – V

MEMS Devices and Structures

Micro sensors: Biomedical Sensors, Chemical sensors, Optical Sensors, Pressure Sensors, Thermal Sensors.

Micro actuation: Actuation using thermal forces, Piezoelectric crystals, Electrostatic forces, MEMS with micro actuators: Micro grippers, Micro motors, Micro gears, Micro pumps.

TEXT BOOK

Tai-Ran Hsu, MEMS & Microsystems Design and Manufacture, Tata McGraw Hill, 2002.

REFERENCES

1. Marc J.Madou , “Fundamentals of Micro Fabrication.”, , CRC Press, March 12,2002.
2. Mohamed Gad-el-Hak , “The MEMS Handbook” , CRC Press, December 22,2005.
3. G.K.Anantha Suresh , “Micro and Smart Systems.”, Wiley India, 2005.

VIII SEMESTER

S229 - EMBEDDED SYSTEMS DESIGN

(Common to ECE, EEE, EIE)

Prerequisite: Microprocessors and Microcontrollers, VLSI design

Course Educational Objectives:

In this course student will learn about

1. The basic concepts of embedded systems and real time systems
2. The method of designing a real time system
3. Implementing and testing of an embedded system
4. The characteristics of latency in real time systems
5. Summarizing the special concerns that real time systems present and how these concerns are addressed.

Course Outcomes:

At the end of this course student will be able to

1. Understand the concepts of embedded systems and real time systems
2. Understand the unique design problems and challenges of real time systems
3. Explain the general structure of embedded system
4. Identify the unique characteristics of real time systems
5. Apply real time systems design techniques to various software programs.

UNIT – I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems. **Embedded Firmware**: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches.

UNIT -II

Embedded System Components: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS).Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces. Buses: Serial communication using I^2C Bus, CAN Bus, USB and Parallel Buses (ISA,PCI, PCI/X).

UNIT -III

Device drivers and Interrupts: Interrupt service routines(Hardware and Software), Device drivers, Parallel port Device drivers, Serial port Device drivers, Device drivers for timing Devices, Context, Latency and Dead line.

UNIT -IV

Inter-Process Communication: Multiple processes, tasks, threads, shared memory, Inter-Process Communication (Semaphore, Message queue,Mail box), Message Passing, Remote Procedure Call and Sockets, Task communication and Synchronization.

UNIT -V

Real Time Operating Systems

Introduction to Operating Systems, Operating System Services, basics of RTOS and Embedded Operating Systems, the scheduler, objects, services, characteristics of RTOS.

TEXT BOOKS

1. Raj Kamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw Hill Publishers, 2003.
2. Frank Vahid, Tony D. Givargis "Embedded System Design: A Unified Hardware/ Software Introduction ",Wiley India Edition, 2002.

REFERENCES

1. Peter Mervedel, "Embedded Systems Design",Springer Verlag Publications,2006.
2. K.V.K.K. Prasad "Embedded / Real Time Systems", Dreamtech Press, 2005.
3. Jonathan W. Valvano, "Embedded Microcomputer Systems: Real time interfacing", Thomson Engineering Publications,2006.
4. David E. Simon "An Embedded Software Primer", Pearson Edition Publications, 2005.
5. Sri Ram V Iyer, Pankaj Gupta "Embedded Real Time Systems Programming", TMH, 2004.

VIII SEMESTER

S107 - ADVANCED SENSORS

Prerequisite: Transducers in Instrumentation

Course Educational Objectives:

In this course student will learn about

1. The operation and principle of Thermal sensors.
2. The operation and working of Magnetic sensors.
3. Various advanced sensors used for measuring radiation.
4. The working of Smart sensors and Micro sensors.
5. New trends in Sensor Technologies.

Course Outcomes:

By the end of this course students will be able to

1. Have adequate knowledge about Thermal sensors
2. Explain the operation and working of Magnetic sensors.
3. Have the knowledge on advanced radiation sensors.
4. Have adequate knowledge on Smart sensors and Micro sensors.
5. Explain the recent trends in Sensor technologies.

UNIT – I
THERMAL SENSORS

Gas thermometric sensors, Thermal expansion type, acoustic temperature sensor, dielectric constant and refractive index thermo sensors, nuclear type, magnetic thermometer, thermo sensors using semiconductor devices, junction semi conductor types, PTAT sensors, Quartz crystal thermoelectric sensors, NQR thermometry, Spectroscopic thermometry, noise thermometry, heat flux sensors

UNIT – II
MAGNETIC SENSORS

Introduction to ADLCs, Matteucci effect, Villari effect, Wiedemann effect, Thomson effect, skin effect, Sixtus-Tanks effect, SQUID, Joule Effect – Types of sensors using these effects, Yoke coil type, co-axial types, Force and displacement sensors, Anisotropic magneto-strictive sensing, Semiconductor magneto resistors, Hall effect sensor, eddy current sensor, Switching magnetic sensors, SQUID sensors.

UNIT – III
RADIATION SENSORS

X-ray and nuclear radiation sensors – Ionization chamber, Geiger counter, Scintillation detectors, Solid state detectors, plastic film and luminescent detectors, factors affecting the radiation measurement

UNIT – IV
SMART SENSORS & MICRO SENSORS

Smart sensors: Primary sensors, Excitation, Converters, non-linearity, noise, response time, drift, cross sensitivity, interference and their compensation, information coding and data communication. Micro sensors: Thin films sensors, micro sensors for sensing thermal, radiation, mechanical, magnetic and chemical signals.

UNIT – V
RECENT TRENDS IN SENSOR TECHNOLOGIES

Film sensors: thick film and thin film, Semi -conductor IC technology, MEMS – applications, automotive sensors, flow rate, pressure, temperature and oxygen sensors, torque and position sensors, measuring air speed on aircraft, sensors for environmental monitoring - pollution hazards, sensing environmental pollution, ecological studies of air

TEXT BOOK:

D. Patranabis, Sensors and Transducers, Wheeler Publishing, New Delhi, 1997.

REFERENCE:

S. Middle Hock and S.A. Andel, Silicon Sensors, Academic Press, London, 1989.

VIII SEMESTER

S399 - TELEMETRY AND TELE MEDICINE

Prerequisite: Communication systems, Bio Medical Instrumentation

Course Educational Objectives:

In this course, students will learn about:

1. Principles of telemetry
2. Symbols & coding methods
3. Principle of TDM & FDM
4. Basics of satellite & Optical communication systems
5. Importance of telemedicine and their applications

Course Outcomes:

Students who complete this course will be able to:

1. Know the functional blocks & methods of telemetry system
2. Know various coding methods such as line & channel coding
3. Know different standards & FM & PG circuits
4. Understand tele transmitter & receiver circuits
5. Understand the functional block diagram of telemedicine system and its usage in mobile communications

UNIT – I

TELEMETRY PRINCIPLES

Introduction, Functional blocks of Telemetry system, Methods of Telemetry – Non Electrical, Electrical, Pneumatic, Frequency, Power Line Carrier Communication.

UNIT – II

SYMBOLS AND CODES

Bits and Symbols, Time function pulses, Line and Channel Coding, Modulation Codes. Inter symbol Interference.

UNIT – III

FREQUENCY DIVISION MULTIPLXED SYSTEMS

FDM, IRIG Standard, FM and PM Circuits, Receiving end, PLL - TIME DIVISION MULTIPLXED SYSTEMS: TDM-PAM, PAM /PM and TDM – PCM Systems.PCM reception. Differential PCM. Introduction, QAM, Protocols.

UNIT – IV

SATELLITE & OPTICAL TELEMETRY

General considerations, TT&C Service, Digital Transmission systems, TT&C Subsystems, 1 Telemetry and Communications. - Optical fibers Cable – Sources and detectors – Tele Transmitter and Receiving Circuits, Coherent Optical Fiber Communication System.

UNIT – V

TELEMEDICINE

Functional block diagram of telemedicine system – Telemedicine concepts - essential parameters of telemedicine – applications – Telemedicine technology – video conferencing – digital communication system – Telemedicine using mobile communications – use of Internet resource for telemedicine

TEXT BOOK

D. Patranabis, "Telemetry Principles", TMH, 2007.

REFERENCE

Khandpur, " Handbook of Bio Medical Instrumentation" second edition, TMH,1992.

VIII SEMESTER

S380 - SOFT COMPUTING TECHNIQUES

Prerequisite: Operating systems

Course Educational Objectives:

In this course, students will learn about:

1. Concept of neural network
2. Different types of neural networks
3. The knowledge on fuzzy sets, properties and membership functions
4. Implication methods and design of fuzzy logic controllers
5. The concept of generic algorithm and its application in optimization

Course Outcomes:

Students who complete this course will be able to:

1. Understand neural networks and analyze different types of neural networks
2. Know how to design training algorithms for neural networks
3. Know how to design fuzzy logic systems based on rule base for its development
4. Know defuzzication methods and applications of fuzzy logic
5. Develop algorithms using generic algorithm for optimization

UNIT – I
INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Soft Computing techniques, Organization of the Brain, Biological Neuron, Artificial Neural Networks, McCulloch-Pitts Model, ANN Architectures ,Learning strategy (Supervised, Unsupervised, Reinforcement).

UNIT – II
FEED FORWARD NEURAL NETWORKS

Perceptron Models: Perceptron convergence theorem-.Generalized Delta Rule, Derivation of Back propagation (BP) Training, Bidirectional Associative Memory (BAM), Architecture and training algorithms. Architecture of Hopfield Network, Potential Applications of ANN.

UNIT – III
FUZZY LOGIC-I

Introduction to Fuzzy sets-Properties, Operations, relations, Fuzzy membership functions - different types. Fuzzification, Membership value assignment, development of rule base.

UNIT – IV
FUZZY LOGIC-II

Implication methods-Defuzzification methods. Defuzzification to crisp sets and Fuzzy C-means. Fuzzy logic applications: Fuzzy classification, Fuzzy logic control and fuzzy decision making.

UNIT – V
GENETIC ALGORITHM

Basic concept of Genetic algorithm – Selection – Cross over– Mutation – Algorithmic Steps-Solution of typical control problems using genetic algorithm. Fuzzy Logic control genetic Algorithms.

TEXT BOOKS

1. Jacek M. Zuarda, “Introduction to Artificial Neural Systems”, Jaico Publishing House, 1999.
2. Timothy J Ross, “Fuzzy logic with engineering application”, Wiley publications,2010.

REFERENCES

1. James A. Freeman and Davis Skapura, “Neural Networks”, Pearson Education, 2002.
2. Rajasekharan and Pai, “Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications”, PHI Publication, 2003.

VIII SEMESTER

S370 - RENEWABLE ENERGY SOURCES

(Common to EIE, IT, ME)

Prerequisite: None

Course Educational Objectives:

1. To learn the Potential importance of renewable energy sources.
2. To learn the geothermal, Wind Energy systems.
3. To learn Critical issues related to the OTEC and Tidal Energy systems.
4. To learn power generation from Bio mass plants.
5. To learn the Direct Energy Conversion system principles.

Course Outcomes:

After the completion of course, students are able to

1. Design the various types of solar systems.
2. Develop the skills to operate and analyze geothermal energy plant.
3. Analyze the power generating capacities of Tidal, Ocean and Thermal Energy Conversion systems.
4. Design and Develop simple bio gas plants
5. Design and Develop the Direct Energy conversion systems.

UNIT - I

INTRODUCTION: Energy Scenario – Survey of Energy Resources – Classification – Need for Non-Conventional Energy Resources.

SOLAR ENERGY: The Sun - Sun-Earth Relationship –Solar radiation – Attention –Radiation measuring Instruments.

SOLAR ENERGY APPLICATIONS: Solar water Heating, Space Heating – Active and Passive heating – Energy storage – selective surface – solar stills and ponds – solar refrigeration – photovoltaic generation.

UNIT - II

WIND ENERGY: Wind – characteristics – wind energy conversion systems – types – Betz model – Interference Factor – Power Coefficient – Torque Coefficient and thrust coefficient – Lift machines and drag machines – matching – electricity generation..

GEOTHERMAL ENERGY: Structure of Earth – Geothermal Regions – Hot springs – Hot Rocks – Hot Aquifers – Analytical Methods to estimate Thermal Potential – Harnessing Techniques – Electricity Generation Systems.

UNIT - III

ENERGY FROM OCEANS: Tidal Energy; Tides – Diurnal and Semi – Diurnal Nature – Power from Tides.

WAVE ENERGY : Waves – Theoretical Energy Available – Calculation of period and phase velocity of waves – wave power systems – submerged devices.

OCEAN THERMAL ENERGY: Principles – Heat Exchangers – Pumping requirements – Practical Considerations.

UNIT - IV

BIO – ENERGY: Biomass Energy Sources – Plant Productivity, Biomass Wastes – Aerobic and Anaerobic bio-conversion processes – Raw Materials and properties of Bio-gas-

Bio-gas plant Technology and Status – The Energetic and Economics of Biomass systems – Biomass gasification

UNIT - V

DIRECT ENERGY CONVERSION SYSTEMS: Introduction to direct energy conversion systems, Peltier effect, seebeck effect, Thomson effect, Fuel Cells, efficiency of Fuel Cells, and Solar Cells–Thermionic and Thermoelectric Generation – MHD Generator-Open and Closed Systems, applications of direct energy energy conversion systems.

TEXTBOOK

1. G.D.Rai, Non-Conventional Energy Sources, 5th Edition 2011, Khanna Publishers, New Delhi, India, 2011.
2. Kreith, F and Kreider, J. F., Principles of Solar Engineering, McGraw-Hill, 1978.

REFERENCES

1. John Twidell &Tony Weir, Renewable Energy Resources, 2nd Edition, Taylor & Francis, 2006.
2. G.N.Tiwari, Solar Energy – Fundamentals, Design, Modeling and Applications, Narosa Publication Ltd., 2000.
3. Ashok V Desai, Non-Conventional Energy, Wiley Eastern, 2000.
4. Godfrey Boyle, Renewable Energy, Power for a Sustainable Future, Oxford University Press, U.K, 1996.
5. T.N. Veziroglu, Alternative Energy Sources, Vol. 5 and 6, Tata McGraw-Hill, 1990
6. K.C. Khandelwal, S.S. Mahdi, Biogas Technology - A Practical Handbook, Tata McGraw Hill, 1986.

VIII SEMESTER

S196 - DISASTER MANAGEMENT

(Common to CE, EEE, EIE)

Prerequisite: None

Course Educational Objectives:

In this course student will learn about

1. Understand the different types of disasters and prevailing Regulations in the country to handle them
2. An overview on various disasters and the impacts due to such disasters.
3. The various measures adopted to mitigate the disasters through participation & awareness.
4. Various planning & Risk prevention actions in disasters.
5. Impact of disasters.

Course Outcomes:

After completion of the course students will be able to

1. Get awareness about natural and manmade disasters
2. Respond according to the situation in case of occurrence of disaster.
3. Contribute individually and also along with the NGO to reconstruct damaged sections.
4. Develop the contingency plan to keep up the economy on track.
5. Identify the various health hazards & environmental disasters.

UNIT-I

DEFINITIONS, TYPES & EFFECTS OF DISASTER

Introduction - inter disciplinary–nature of the subject - Definitions – types of Disasters- Relationship between Disaster and Human and Development- Disaster Management Cycle: Terminologies, Various disaster in India: drought, cyclone, extreme heat and cold, avalanche, collision of tectonic plates-volcano, mudflow and landslide, Industrial, Nuclear and Chemical disasters, Accident Related Disasters, Biological Disasters, Disasters Caused due to Social, Ethnic and Religious Conflicts, Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and air craft's accidents, High Power Committee on Disaster Management in India-Disaster Management Act 2005

UNIT-II

IMPACT OF DISASTERS

Introduction: life & livestock-habitation, agriculture & livelihood loss-health hazards-malnutrition problems-contamination of water-impact on children-environmental loss-assessment of Disaster Impacts using Modern Technologies.

UNIT-III

ROLE OF TECHNOLOGY IN DISASTER MANAGEMENTS

Disaster management for infra structures, taxonomy of infrastructure treatment plants and process facilities – electrical substations – roads and bridges – mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment – multimedia technology in disaster risk management and training – transformable indigenous knowledge in disaster reduction.

UNIT-IV

RESPONDING TO DISASTERS

PLANNING & RISK PREVENTION: Planning, early warning system-crisis intervention and management-Response and Rehabilitation after Disasters-temporary shelter – food and nutrition-safe drinking water –rehabilitation after cyclones- respond to drought response to river erosion-response after earth quake-response after Tsunami- Hunger and Disaster.

EDUCATION AND COMMUNITY PREPAREDNESS: Education in disaster risk reduction – Essentials of school disaster education – community capacity and disaster resilience – Community based disaster recovery - Community based disaster management and social capital – Designing resilience – building community capacity for action

UNIT-V

OTHER ISSUES

Impact of disaster on poverty and deprivation - Climate change adaptation and human health – Exposure, health hazards and environmental capacity in disaster management - the red cross and red crescent movement - Corporate sector and disaster risk reduction - A community focused approach Casestudies.

TEXT BOOKS

1. Disaster Management – Future Challenges and Opportunities edited by Jagbir Singh, IK International Publishing, 2007
2. Ghosh G.K , "Disaster Management", APH Publishing Corporation, 2006.

REFERENCES

1. W.N.Carter, Disaster Management: A Disaster Management Handbook, Asian Development Bank, Bangkok, 1991.
2. U.K. Chakrabarty, Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007.
3. H K Gupta, Disaster Management, Universities Press, 2003
4. Government of India website on Disaster Management: www.ndmindia.nic.in

VIII SEMESTER

S157 - CLOUD COMPUTING

(Common to EIE, CSE, IT)

Course Educational Objectives:

After completing this course, students will be able to:

- Discuss, with confidence, what is cloud computing and what are key security and control considerations within cloud computing environments.
- Assess cloud characteristics and service attributes, for compliance with enterprise objectives
- Recognize steps and processes used to perform an audit assessment of a cloud computing environmentSummarize specific environments that would benefit from implementing cloud computing, contrasted against those environments that might not benefit.
- Weight the impact of improperly controlled cloud computing environments on organizational sustainability.

Course Outcomes:

- **CO 1:** Presents fundamental concepts of cloud computing, charting their evolution, Delivery models, and Deployment models, can present models for migrating applications to cloud environments.
- **CO 2:** Cover IaaS, from enabling technologies such as virtual machines and virtualized storage, to sophisticated mechanisms for securely storing data in the cloud and managing virtual clusters.
- **CO 3:** Describe PaaS/IaaS, detailing the delivery of cloud hosted software and applications. The design and operation of sophisticated, auto-scaling applications and environments
- **CO 4:** Presents monitoring and management mechanisms for CloudComputing. Architectures for federating cloud computingresources are explored, as well as service level agreement (SLA) management and performance prediction.
- **CO 5:** develop some novel applications that have been made possible by the rapid emergence of cloud computing resources. Best practices for architecting cloud applications, describing how to harness the power of loosely coupled cloud resources.

Pre requisite: Knowledge of issues related to computing.

UNIT - I

Foundations: Introduction to Cloud Computing, Migrating into a Cloud Enriching the 'Integration as a Service' Paradigm for the Cloud Era, Cloud Computing for Enterprise Applications

UNIT – II

Infrastructure as a Service (IaaS): Virtual Machines Provisioning and Migration Services, On the Management of Virtual Machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a Cluster as a Service.

UNIT - III

Platform and Software as a Service (PaaS): Aneka – Integration of Private and Public Clouds, CometCloud: An Autonomic Cloud Engine, T-Systems' Cloud-Based Solutions for Business Applications,

UNIT – IV

Software as a Service (SaaS):

Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments, The MapReduce Programming Model and Implementations

UNIT - V

Monitoring and Management, Applications: An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing: A Service Provider's Perspective, Performance Prediction for HPC on Clouds, Architecting Applications for the Amazon Cloud.

TEXT BOOKS

1. Rajkumar Buyya & James Broberg "Cloud Computing: Principles and Paradigms", John Wiley & sons Publications, New York, USA, 2011.
2. Michael Miller, Cloud Computing – Web Based Applications That Change the way you Work and Collaborate Online, Pearson Education, 2011.

REFERENCES

1. George Reese, Cloud Application Architectures, O'Reilly Media, 1st Edition, 2009.
2. David S. Linthicum, Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide, Addison-Wesley Professional http://www.cloudbus.org/intro.html, 2009.

VIII SEMESTER

S180 - DATABASE MANAGEMENT SYSTEMS

(Common to AE, CSE, EEE, EIE, IT)

Prerequisite: Elementary set theory, concepts of relations and functions, propositional logic data structures (trees, Graphs, dictionaries)& File Concepts.

Course Educational Objectives:

This course enables the students to know about

- DBMS basic concepts, Database Languages.
- Data base Design.
- Normalization process and Transaction processing.
- Indexing.

Course Outcomes:

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

CO1: Understand DBMS concepts, architecture, Database languages, data models and design of database.

CO2: Applying the concepts of relational algebra, calculus, and also SQL.

CO3: Applying the normalization process for data base design.

CO4: Understand the issues in transaction processing, Analyzing different Concurrency and recovery strategies of DBMS

CO5:Analyzing different file organization techniques & Indexing Techniques.

UNIT - I

Introduction: An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

UNIT - II

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra.

Introduction to SQL: Characteristics of SQL, Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

UNIT - III

Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

UNIT – IV

Transaction Processing Concepts*:* Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, log based recovery, checkpoints, ARIESalgorithm,deadlock handling.**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping

protocols for concurrency control, validation based protocol, multiple granularity, Recovery with concurrent transactions.

UNIT-V

Storage and Indexing: RAID levels, page formats, record formats, file types and organization, ISAM, B-tree,B+-tree.

TEXT BOOK

1. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill, 6th Edition, 2005.
2. R.Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley, 1999.

REFERENCES

1. Raghu Ramakrishnan, "Database Management System", McGraw Hill, 2002.
2. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi, 2005.
3. Date C J, "An Introduction to Database System", Addision Wesley, 2008.

VIII SEMESTER

L157 – MAIN PROJECT

(Common to all branches)

Prerequisite: Mini Project

Course Educational Objectives:

In this course, students will learn about

1. Designing of various devices using simulation software viz. MATLAB, LabVIEW, PLC, SCADA, COMSOL etc.
2. Interfacing of software program with developed hardware assembly
3. Verification of output and making of changes based on requirement
4. Making of project report according to given regulations.

Course Outcomes:

Students who complete this course will be able to:

1. Know in utilizing variety of simulation softwares for making design works to meet optimum output of the project
2. Understand the importance of interfacing software program with hardware
3. Monitor the output of the instrument and also to modify program accordingly
4. Acquire adequate knowledge in writing project reports in an effective manner.

VIII SEMESTER

L121 – COMPREHENSIVE VIVA-VOCE

(Common to all branches)

Prerequisite: All Subjects

Course Educational Objectives:

In this course, students will learn about

1. Familiar with concepts in various subjects
2. How to answer the questions effectively
3. Improve the knowledge in the interesting subjects
4. How to prepare for viva-voce using the entire knowledge.
5. Improve the communication, scientific and technical skills.

Course Outcomes:

Students who complete this course will be able to:

1. Explain various concepts in the relevant subjects
2. Acquire the knowledge the answer the questions posed by the committee
3. Improve the knowledge in their interesting subjects
4. Learn the preparation for Viva-Voce
5. Answer the questions in English with confidence.