ANNAMALAI UNIVERSITY

BACHELOR OF SCIENCE

B.Sc., ELECTRONICS SCIENCE

DEGREE COURSE
CBCS PATTERN

(With effect from 2021-2022)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components / Course Title		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		SEMESTER I					**CIA**	**Uni. Exam**	**Total**
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	**Communicative English I**	25	75	100
3.	III	Core Theory	Paper-1	6	4	Fundamentals of Electricity and Electronics	25	75	100
	III	Core Practical	Practical-1	4	0		0	0	0
4.	III	Allied -1	Paper-1	6	3	Basic Mathematics I	25	75	100
5.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English I**	**25**	**75**	**100**
6.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		**36**	**20**		**150**	**450**	**600**
		SEMESTER II					**CIA**	**Uni. Exam**	**Total**
7.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8.	II	English (CE)	Paper-2	6	4	**Communicative English II**	25	75	100
9.	III	Core Theory	Paper-2	5	4	Electromagnetism and AC Circuits	25	75	100
10.	III	Core Practical	Practical-1	3	2		25	75	100
11.	III	Allied-1	Paper-2	4	3	Basic Mathematics II	25	75	100
12.	**III**	**PE**	**Paper 1**	**6**	**3**	**Professional English II**	25	75	100

13.	IV	Value Education		2	2	Value Education	25	75	100
14.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		**36**	**25**		**225**	**675**	**900**
		SEMESTER III							
15.	III	Core Theory	Paper-3	5	4	Physics of Materials	25	75	100
16.	III	Core Theory	Paper-4	5	4	Analog Electronics	25	75	100
17.	III	Core Theory	Paper-5	5	4	Programming in C	25	75	100
	III	Core Practical	Practical - 2	3	0	A. Computer Programming B. Electronics Experiments	0	0	0
18.	III	ALLIED-2	Paper-3	7	3	Basic Physics I	25	75	100
19.	IV	Skill based Subject	Paper-1	3	2	Computer Oriented Office Automation	25	75	100
20.	IV	Non-major elective	Paper-1	2	2	Basic Electronics	25	75	100
				30	**19**		**150**	**450**	**600**
		SEMESTER IV							
21.	III	Core Theory	Paper-6	5	4	Semiconductor Devices and IC Fabrication Technology	25	75	100
22.	III	Core Theory	Paper-7	5	4	Electronic Communication Systems	25	75	100
23.	III	Core Theory	Paper-8	5	4	Digital Electronics	25	75	100
24.	III	Core Practical	Practical - 2	3	3	A. Computer Programming B. Electronics Experiments	25	75	100
25.	III	ALLIED-2	Paper-4	7	5	Basic Physics II	25	75	100
26.	IV	Skill based Subject	Paper-2	3	2	Principles of Electronic Appliances	25	75	100
27.	IV	Non-major elective	Paper-2	2	2	Fundamentals of Electronic Communication	25	75	100
				30	**24**		**175**	**525**	**700**

		SEMESTER V							
28.	III	Core Theory	Paper-9	6	6	Microprocessor and its Applications	25	75	100
29.	III	Core Theory	Paper-10	6	6	Cellular Mobile Communication	25	75	100
30.	III	Core Theory	Paper-11	6	5	Electrical and Electronic Instrumentation	25	75	100
	III	Core Practical	Practical - 3	3	0		0	0	0
	III	Core Practical	Practical - 4	3	0		0	0	0
31.	III	Elective	Paper-1	3	3	**(to choose any 1 out of 3)** A. Medical Electronics B. Industrial Electronics C. Data Processing and Personal Computers	25	75	100
32.	IV	Skill based Subject	Paper-3	3	2	PCB Design and Fabrication	25	75	100
				30	**22**		**125**	**375**	**500**
		SEMESTER VI							
33.	III	Core Theory	Paper-12	4	4	Television and Video Engineering	25	75	100
34.	III	Core Practical	Practical - 3	3	3		25	75	100
35.	III	Core Practical	Practical - 4	3	3		25	75	100
36.	III	Core	Paper-13	6	6	Core: Industrial Training (**Internal**)	100	0	100
37.	III	Core Project	Paper - 14	5	5	Individual / Group Project	25	75	100
38.	III	Elective	Paper-2	3	3	**(to choose any 1 out of 3)** 1. Power Electronics 2. Digital System Design 3. Robotics and Automation	25	75	100
39.	III	Elective	Paper-3	3	3	**(to choose any 1 out of 3)** 1. Microcontroller 8051 and its Applications 2. Computer Networks 3. Programmable Logic Control	25	75	100
40.	IV	Skill based Subject	Paper-4	3	2	Cellular Phones: Principles and Practice	25	75	100

41.	V	Extension Activities		0	1	Extension Activities	100	0	100
				30	**30**		**350**	**450**	**800**
									4100

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	Communicative English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Electives	3	3	9	100	300
	Core	13	(3-6)	59	100	1300
	Core Practical	4	(2-3)	11	100	400
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based subject	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	**41**		**140**		**4100**

ANNAMALAI UNIVERSITY
B.Sc., ELECTRONICS SCIENCE
SYLLABUS
UNDER CBCS PATTERN
(With effect from 2021-2022)

SEMESTER I

PAPER - 1
FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

COURSE OBJECTIVE
The students will learn:

- Basics of electrostatics, Gauss theorem and its applications
- Concept of a capacitor, various types of capacitors and dielectric constant
- Magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter.
- Basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits, and
- Transistor, its three modes of operation and the frequency response of an amplifier.

UNIT-I

Electrostatics: Electric charges - Coulomb's law - Electric field - Electric intensity and electric potential - Relation between electric potential and intensity - Electric intensity and potential due to a uniform charged conducting sphere at a point outside, on, and inside the conductor. Electric dipole - Dipole moment - Intensity and potential due to a dipole - Statement and proof of Gauss law - Application of Gauss law to uniformly charged solid sphere.

UNIT-II

Capacitors: Definition and unit of capacity - Capacitance of a parallel plate capacitor - Effect of dielectric on capacity - Capacitors in series and parallel - Energy stored in a charged capacitors - Loss of energy on sharing of charges between two capacitors - Force of attraction between plates of charged parallel plate capacitor - Measurement of potential and dielectric constant. Type of capacitors - Mica capacitor, Electrolytic capacitors, Variable air capacitor - Uses of capacitors.

UNIT-III

Electrical Measurements: Carey-Foster bridge - Determination of specific resistance - Potentiometer - Calibration of low voltmeters - Calibration of Low range ammeter. Magnetic Effect of Current: Biot-Savart's law - Principle, construction and theory of a moving coil ballistic galvanometer - Measurement of figure of merit of B.G. - Comparison of capacitors using B.G.

UNIT-IV

Diode circuits and power Supplies: Junction diode characteristics - Half and full wave

rectifiers - Expression for efficiency and ripple factor - Construction of low range power peak using diodes - Bridge rectifier - Filter circuits - Zener Diode - Characteristics - Regulated power supply using Zener diode - Clipper and Clamper using diodes. Differentiator and integrator using resistor and capacitor.

UNIT-V

Transistor circuits: Characteristics of a transistor in CB, CE modes - Relatively merits - Graphical analysis in CE configuration - Transistor as a amplifier - RC coupled Single stage amplifier - Frequency response - Thevenin's and Norton's theorems. Basis logic gates AND, OR, and NOT - Construction using diodes and transistors.

COURSE OUTCOME

On completion of this course the students will be able to

- Outline the basics of electrostatics.
- Explain the concept of a capacitor and its applications.
- Demonstrate electrical measurements and describe magnetic effect of current
- Discuss the basics of P-N junction diode and Zener diode with its applications.
- Describe the working of various configurations of Transistor and digital logic gates.

Text Books:

1. **Electricity and Magnetism** - M. Narayanamoorthi and Others, National Publishing Co., Chennai.
2. **Electricity and Magnetism** - R. Murugeshan, S. Chand & Co. Ltd., New Delhi, Revised Edition, 2006.
3. **Principles of Electronics** - V.K. Mehta, S. Chand & Co., 4/e, 2001.
4. **Basic Electronics** - B.L. Theraja, S. Chand & Co., 4/e, 2001.
5. **Applied Electronics** – R.S.Sedha S. Chand & Co., 1/e 1990,Reprint 2018.

Reference Books:

1. **Electricity and Magnetism** - *Brijlal & Subrahmanyam,* Ratan Prakashan Mandir, Agra.
2. **Fundamentals of Electricity and Magnetism** - *B.D. Duggal & C.L. Chhabra*, Shoban Lal Nagin Chand & Co., Jallundur.
3. **Physics, Vol. II** - *Resnick, Halliday & Krane,* 5/e, John Wiley & Sons, Inc.,.
4. **Basic Electronics** - *B. Grob,* McGraw - hill, 6/e, NY, 1989.
5. **Elements of Electronics** - *Bagde & Singh,* S. Chand &Co.

ALLIED - 1

PAPER - 1

BASIC MATHEMATICS I

COURSE OBJECTIVE
To explore the fundamental concepts of Mathematics.

- To develop logical and problem solving skills; becoming familiar with some of the *basic* techniques used to construct *mathematical.*

Unit I : Algebra

Partial fractions, Binomial, Exponential, Logarithmic Series [No Proof] Summation Problem.

Unit II: Theory of Equations:

Transformation of equations by increasing, decreasing and multiplying the roots by a constant, Reciprocal Equations, Newton's method (Problem Only)

Unit III : Matrices

Square Matrix, Symmetric and Skew symmetric, Orthogonal, Hermitian, Skew Hermitian, Unitary Characteristic equations , eigen values, Cayley Hamilton's Theorem (Problem Only)

Unit IV : Matrices (Contd)

Operations on matrices, Adjoint and inverse of a matrix - Determinant of a matrix, Solving equations by matrix method & Cramer's rule.

Unit V : Trignometry

Expansions of sin nθ, cos nθ, tan nθ - Expansions of $\sin^n\theta$, $\cos^n\theta$ - Expansions of sinθ, cosθ, tanθ in terms of θ (Simple Problem)

COURSE OUTCOME
On completion of this course the students will be able to

- Solve problems on Algebra.
- Explain Theory of Equations and its various operations.
- Discuss the methodology of different matrices.

- Explain the different operations on matrices.
- Solve problems on trigonometry.

Text Books

1. P.R.Vittal (2003) *Allied Mathematics* . Marghan Publications, Chennai
2. P.Balasubramanian and K.G.Subramanian, (1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.

Reference Books:

1. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. Vikas Publications, New Delhi.

SEMESTER II
PAPER – 2
ELECTROMAGNETISM AND AC CIRCUITS

COURSE OBJECTIVES:

The students will learn:

- The concepts of electromagnetic induction and its applications.
- Resonant circuits with RC, LR and LCR combinations and the power factor of an AC circuit.
- Power generation, three phase AC, DC motors and induction motors.
- Theory of electromagnetic waves and Maxwell's equations.

UNIT-I

Electromagnetic Induction: Expression for induced EMF - Self induction of a Solenoid - Mutual induction of a solenoid inductor - coefficient of Self induction of a solenoid inductor - Coefficient of coupling - Determination of self and mutual induction - Measurement of intense magnetic field using search coil - Induction coil - Eddy current and its uses.

UNIT-II

Alternating Current: EMF induced in a coil rotating in a uniform magnetic field - Mean, RMS and peak values of alternating currents and EMF - Power factor in the case of an AC circuit containing i) Resistance ii) Inductance iii) Capacitance iv) Inductance and Resistance v) capacitance and resistance vi) LCR

UNIT-III

AC Circuits: Construction and working of transformers - Losses - Tesla coil - Growth and decay of current in a circuit having L and R - Time constant - Growth and decay of charge in a circuit having C and R - Growth and decay of current in a charge having LCR - condition for discharge to be oscillatory - Frequency of oscillation.

UNIT-IV

Electromagnetic Machines: Production and distribution of three phase AC - Star and Delta connections - Advantages of AC over DC - AC and DC dynamos - Armature winding – Series and Shunt dynamos and their characteristics - Working Principles of DC Motor.

UNIT-V

Gauss's law for electrostatics and magnetostatics. Faraday's law, Amperes circuital law, Amperes Force law, Maxwell's Equations with statement (Integral & Differential form)

COURSE OUTCOME

On completion of this course the students will be able to

- Explain the concept of electromagnetic induction and its applications
- Discuss the effect of alternating current on circuits containing passive components.
- Describe the fundamental behavior of *AC circuits* and solve *AC circuit* problems.
- Explain the working of Electromagnetic Machines
- Outline the laws of electrostatics and electromagnetism.

Text Books:

1. **Electricity and Magnetism** - *M. Narayanamoorthi & Others*, National Publishing Co., Chennai.
2. **Electricity and Magnetism** - *R. Murugeshan*, S. Chand & Co. Ltd., New Delhi, Revised Edition, 2006.

Reference Books:

1. **Electricity and Magnetism** - *Brijlal & Subrahmanyam*, Ratan Prakashan Mandir, Agra.
2. **Fundamentals of Electricity and Magnetism** - *B.D. Duggal & C.L. Chhabra*, Shoban Lal Nagin Chand & Co., Jallundur.
3. **Physics, Vol. II** - *Resnick, Halliday & Krane*, 5/e, John Wiley & Sons, Inc.

CORE PRACTICAL

Practical - 1

COURSE OBJECTIVES:
After performing these experiments, the students will learn:

understand the concepts and working of various instruments like Multimeter, CRO, AFO, galvanometer and its conversion into voltmeter and ammeter, PN Juntion Diode, Zener diode, transistor, construction of power supply, logic gates, wave shaping circuits.

Experiments:

1. Study of Multimeter – Checking of Components.
2. Colour Coding of Resistors & Resistance in Series and Parallel.
3. Verification of Ohm's Law.
4. Characteristics of PN junction diode.
5. Half wave rectifier using PN junction Diode.
6. Full wave rectifier using PN junction Diode.
7. Characteristics of Zener diode.
8. Regulated power supply using Zener diode.
9. Transistor characteristics in CE mode.
10. Conversion of galvanometer into voltmeter, ammeter and ohmmeter.
11. Uses of CRO - Measurement of voltage, current, frequency and phase - Displaying waveforms and Lissajou's figures - Study Experiment.
12. Transistor single stage amplifier - Frequency response.
13. Construction of low range power supply using rectifying diodes (5 V to 12 V).
14. Basic logic gates (AND, OR) using diodes.
15. Basic logic gates (AND, OR, NOT) using transistor.
16. Differentiating and integrating circuits using R and C.
17. Clipping and clamping circuits.
18. Uses of LDR and relay.

OUTCOME
On completion of this course the students will be able to

- Identify the value of resistance by color coding and multimeter.
- Examine the characteristics of PN junction diode, Zener diode and Transistor with its applications.
- Demonstrate the working of galvanometer and CRO.
- Analyze the functionality of Transistor single stage amplifier, power supply, differentiator, integrator, clipper, clamper, LDR and relay

- Construct basic logic gates using diodes and transistor.

Text Books:

1. **Basic Electronics - A Text Lab Manual -** *Zbar, Malvino & Miller* - Tata McGraw Hill.
2. **B.E.S. Practicals -** *R. Sugaraj Samuel & Horsley Solomon* - Department of Electronic Science, C.T.M. College of Arts and Science, Chennai.

Reference Books:

1. **A Text Book of Practical Physics -** *M.N. Srinivasan & others* - Sultan Chand & Sons, New Delhi.
2. **Practical Physics -** St.Joseph's College, Tiruchirappalli.
3. **Practical Physics -** *M. Arul Thalapathi*, Comtek Publishers, Kanchipuram.

ALLIED - 1
PAPER - 2

BASIC MATHEMATICS II

COURSE OBJECTIVE:

The students will learn:

- To explore the fundamental concepts of Mathematics.
- To introduce the *basic* concepts required to understand, construct, solve and interpret differential equations.

Unit I : DIFFERENTIAL CALCULUS

Successive differentiation, nth derivative, Leibnitz Theorem (with out proof), Jocobians, Maxima and minima.

Unit II: ORDINARY DIFFERENTIAL EQUATION

Second order linear differential equation with constant coefficient

Unit III : PARTIAL DIFFERENTIAL EQUAITON

Formation of equation by elimination of constants and arbitrary functions. Complete intergrals & general intergrals, Four standard types.

Unit IV : VECTOR ANALYSIS

Scalar point function, vector point function, gradient, divergence, curl, irrotational, solenoidal, Line and surface integrals; Gauss, Green, Stoke's theorem (Statement Only)

Unit V : INTEGRAL CALCULUS

Integration by part's, Bernoulli's formula, Properties of definite Integral, Reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, Fourier series for a function in $(-\pi,\pi)$, even and odd function

COURSE OUTCOME

On completion of this course the students will be able to

- Use Differential Calculus for solving problems.
- Solve *basic* application problems described by second order

linear *differential equations* with constant coefficients.

- Obtain an approximate set of solution function values to a second order boundary value problem using a finite *difference equation*.
- Perform Vector analysis to find solutions.
- Solve problems using Integral Calculus

Text Books

1. P.R.Vittal (2003) *Allied Mathematics* . Marghan Publications, Chennai

2. P.Balasubramanian and K.G.Subramanian, (1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.

Reference Books:

1. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.

2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. Vikas Publications, New Delhi.

SEMESTER III
PAPER - 3
PHYSICS OF MATERIALS

COURSE OBJECTIVE

The students will learn**:**

- Structure of crystals and their characterization using X-rays.
- Electron theory and energy bands in solids.
- Basics of PN junction, expression for potential barrier.
- Hall effect and its applications.

UNIT - I

Bonding in solids: Types of bonds in crystals - Ionic, Covalent, Metallic, Molecular and Hydrogen bonds - Lattice point - Space lattice - Basis - Crystal structure - Unit cell - Primitive cell - Lattice parameters - Crystal system - Seven crystal systems - Detail study of Bravais lattice - Miller indices.

UNIT - II

X-ray diffraction: Derivation of Bragg's law - Bragg spectrometer - Determination of crystal structure - Laue's, Rotating crystal and Powder methods.

UNIT - III

Free electron theory of metals: Fermi level - Fermi energy - Density of states - Expression for Fermi energy - Mean free path and relaxation time - Drude-Lorentz theory - Ohm's law, electrical conductivity and thermal conductivity.

UNIT - IV

Energy bonds in solids: Classification of solids on the basis of energy band theory - Semiconductors - Bonds in semiconductors - Effect of temperature on semiconductors - Hole current - Intrinsic and Extrinsic semiconductors - n type and p type semiconductors - Majority and minority charge carriers, Doping. Electron and hole concentration in intrinsic semiconductor and electrical conductivity - Law of mass action - Fermi level in n type and p type semiconductor and electrical conductivity.

UNIT - V

P-n junction - Mobile and immobile charges - Depletion region - Potential barriers - Depletion capacitance. Drift velocity and mobility of charge carriers - Expression for potential barriers and width of depletion region. Hall effect - Hall voltage and Hall coefficient - Experimental determination of Hall coefficient - Applications.

COURSE OUTCOME

On completion of this course the students will be able to

- Explain the Bonding in solids
- Describe the principle of X-ray diffraction.

- Interpret the Free electron theory of metals
- Outline the concept of energy bonds in solids and semiconductors
- Brief the fundamentals involved information of P-N Junction and demonstrate Hall Effect with suitable experiment.

Text Books:

1. Solid State Physics - *Gupta & Kumar*, K.Nath & Co., Educational Publisherrs, Meerut.
2. Solid State Physics - *S.O. Pillai*, New Age International Publishers, Revised 6/e.

Reference Books:

1. Introduction to Solid State Physics - *C. Kittel*, Wiley Eastern Limited.
2. Fundamentals of Solid State Physics - *Saxena, Gupta & Saxena*, Pragati Prakashan, Meerut.
3. Solid State Physics - *Neil W. Aschroft & N. David Mermin*, CBS Publishing Asia Ltd.

PAPER - 4

ANALOG ELECTRONICS

COURSE OBJECTIVE

The students will learn:

- the design and working of RC coupled amplifiers, transformer coupled amplifiers and power amplifiers,
- the concept of negative and positive feedback,
- pulse shaping and Schmitt trigger, and
- the op-amp characteristics, frequency response and its linear and non-linear applications.

UNIT - I

Amplifiers: General principles of small signal amplifiers - Classifications - RC Coupled amplifiers - Gain - Frequency response - Input and output impedance - Multistage amplifiers - Transformer coupled amplifiers - Equivalent circuits at low, medium and high frequencies – Emitter follower. Class A and Class B power amplifiers - Single ended and push-pull configurations - Power dissipation and output power calculations.

UNIT - II

Feedback Amplifiers: Basic concept of feedback amplifiers - Transfer gain with feedback - General characteristics of negative feedback amplifier - Effect of negative feedback on gain - Gain stability - Distortion and bandwidth - Input and output resistance in the case of various types of feedback - Analysis of voltage and current in feedback amplifier circuits.

UNIT - III

Operational Amplifiers: Principles - Transfer characteristics - Various offset parameters - Differential gain - CMRR - Slew rate - Bandwidth.

UNIT - IV

Op-amp Circuits: Basic operational amplifier circuits under inverting and non-inverting modes - Adder - Subtractor - Integrator - Differentiator - Comparator - Sine, square and triangular waveform generators - Active filters - Sample and Hold circuits.

UNIT - V

Oscillators: Positive feedback - Stability issues - Feedback requirement of oscillations - Barkhausen criterion for oscillation - Hartley, Colpitts, Phase shift and Wien bridge oscillators - Condition for oscillation and frequency derivation - Crystal oscillator - UJT relaxation oscillator. Monostable multivibrator, bistable multivibrator and astable multivibrator - Schmitt trigger.

COURSE OUTCOME

On completion of this course the students will be able to

- Explain the working of amplifier with its types.
- Outline the concept of feedback amplifiers with parameters involved.
- Discuss the DC and AC characteristics of Operational amplifier
- Develop electronic circuits using Op-amp.
- Describe the working of Oscillators and its types.

Text Books:

1. Introduction to Integrated Electronics - *V. Vijayendran*, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2005.
2. Electronic Circuits and Systems - *Y.N. Bapat*, Tata McGraw Hill Publishing Co. Ltd.

Reference Books:

1. Electronic Devices and Circuits - *G.K. Mithal*, Khanna Publishers, Delhi.
2. Hand Book of Electronics - *Gupta & Kumar*, Pragati Prakashan, Meerut.
3. Electronic Devices and Circuit Theory - *R. Boylestad & L. Nashelsky*, Prentice Hall of India Private Limited, 6/e.
4. Electronic Devices and Circuits - *J.P. Agarwal & Amit Agarwal*, Prakasam Publishers.
5. Linear Integrated Circuits - *D. Roy Choudhury & Shail Jain*, New Age International (P) Limited.

PAPER - 5

PROGRAMMING IN C

COURSE OBJECTIVE

The students will learn:

- The students will learn the rudiments of computer programming using C.
- To provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C

UNIT - I

Fundamentals: Character set - Keywords - Identifiers - Data types - Constants - Variables - Operators and their hierarchy - Expression - Statements - Input /Output functions.

UNIT - II

Decision making statements: if-else, while, do-while, for, switch I break, continue, go to statements. Functions: Definitions - Arguments - Function prototype - Recursion - Library functions.

UNIT - III

Arrays: Array definition - Processing arrays - Passing array to a function - Multidimensional arrays - Strings - Storage classes - Multiple programs. Pointers: Pointer declaration - Pointer arithmetic - Pointers and arrays - Pointer operation - Passing pointers to a function - Passing function to a function.

UNIT - IV

Structures and Unions: Structure definition - Processing a structure - Structures and pointers - Passing structure to a function - Self-referential structures - Unions.

UNIT - V

Data Files: Opening, Closing, Creating, Processing data files - Register variables and bitwise operations - Command line parameters - C preprocessor.

COURSE OUTCOME

On completion of this course the students will be able to

- Explain the fundamentals of C Programming.
- Develop programs using Decision making statements and functions.
- Write C programs using Arrays and pointers.
- Interpret the concept of Structures and Unions in C language
- Use Data file concepts in C language.

Text Books:

1. Theory and Problems of Programming with 'C' (Schaum's Series) - *B.S. Gottfried*, McGraw Hill International Book Company.
2. Programming in ANSI C - *E. Balagurusamy*, Tata McGraw Hill Publishing Co. Ltd., 2/e.

Reference books:

1. Programming with 'C' - *K.R. Venugopal & R.P. Sudep*, Tata McGraw Hill Publishing Co. Ltd.
2. The C Programming Language - *B.W. Kernighan & D.M. Ritchie*, Prentice Hall of India Private Ltd., New Delhi, 2/e.
3. Mastering Turbo C - *Stan Kelly & Bootle*, BPB Publications, New Delhi.
4. Let Us C - *Yashawant Kanetkar*, BPB Publications, New Delhi, 3/e.
5. The Spirit of 'C' - *H. Mullish & H.L. Cooper*, Jaico Publishing House.

ALLIED - 2
PAPER - 3

BASIC PHYSICS I

COURSE OBJECTIVE

- The students will understand the basic concept of physics.

UNIT - I

Moment of Inertia - Radius of gyration - Moment of inertia of a circular ring, circular disc, solid sphere - Kinetic energy of a rolling object - Acceleration of a body rolling down an inclined plane - Uniform circular motion - Centripetal force - Banking of curves. Gravitation: Newton's law - Determination of G by Boys method - Mass and mean density of earth - Variation of g with altitude, depth and latitude - Escape velocity - Weightlessness.

UNIT - II

Elasticity: Elastic constants - Young's modulus - Bending moment - Bending of beams - Young's modulus by non-uniform bending - Energy stored in a wire - Torsion in a wire - Torsional oscillations - Determination of rigidity modulus by static torsion.

UNIT - III

Viscosity: Streamlined and turbulent flow - Comparison of viscosities - Oswald's viscometer - Stoke's law - Terminal velocity - Viscosity of highly viscous liquid - Lubrication. Surface Tension: Molecular theory of surface tension - Formation of drops and bubbles - Excess of pressure inside a soap bubble - Surface tension of liquid by Jaegar's method - Variation of surface tension with temperature.

UNIT - IV

Thermal Conductivity: Coefficient of thermal conductivity - Thermal conductivity of a bad conductor by Lee's disc method, Good conductor. Thermodynamics: Statement of first law of thermodynamics - Statement of second law of thermodynamics – Reversible and irreversible processes.

UNIT - V

Intensity and Loudness - Decibel - Intensity levels - Measurement of AC frequency - Melde string - Frequency of vibrator - Acoustics of Buildings and Ultrasonic: Reverberation - Time of reverberation - Sabine's formula - Absorption coefficient - Production and uses of ultrasonic waves.

COURSE OUTCOME

On completion of this course the students will be able to

- Explain the concepts of Moment of Inertia and gravitation.
- Discuss the idea of elasticity in physics.
- Interpret the importance of viscosity in liquids.
- Outline the concept of Thermal Conductivity and thermodynamics.

- Describe the parameters sound energy and acoustics.

Text Books:

1. Allied Physics Paper I & II - *R. Murugeshan*, S.Chand & Co. Ltd., New Delhi, 2005.

2. A Text Book of Allied Physics - *Dr. R. Sabesan, Dr. A. Dhanalakshmi & Others*, Popular Book Depot.

Reference Books:

1. College Physics - *Weber, Manning & White*.
2. Advanced Level Physics - *Nelkon & Parker*.
3. University Physics - *Sears, et al*, 6/e, Narosa Publishing House
4. Physics, Vol. I - *Resnick, Halliday & Krane*, 5/e, John Wiley & Sons, Inc.

SKILL BASED SUBJECT

PAPER – 1

COMPUTER ORIENTED OFFICE AUTOMATION

COURSE OBJECTIVE

The students will learn:

- Learn the basics of computer technology
- MS applications
- Adobe Photoshop

UNIT - I

BASICS OF COMPUTER

Introduction: What is a Computer - Software and Hardware Hardware Components - Hardware Accessories Operating System Software -Software Applications - Computer Network: LAN - Internet - E-Mail – Browsers- E-Mail - Clients

UNIT - II

MS WORD

Setting Page Style - Formatting - Border & Shading - Columns - Header & foot- Setting Footnotes - Inserting manual Page break - Column break and line break - Creating sections and frames Inserting - Clip arts, pictures, and other files - Anchoring & Wrapping Setting Document Styles - Table of Contents - Index - Page Numbering, data and Time, Author, etc., - Creating Master Documents -Web page

UNIT - III

MS EXCEL

Creating worksheet - entering and editing text, numbers, formulas - saving – Excel functions modifying worksheet range selection copying and moving data - defining names - inserting of deleting rows of columns - moving around worksheet naming worksheet, copying inserting of deleting worksheet - formatting, gauging, heading displaying value- changing of selecting fonts, protesting data using style so templates - reprinting worksheet creating charts - managing date - what if tables pate tables wraps, macros, linking worksheets

UNIT - IV

MS POWER POINT

Creating a presentation: Setting presentation style - Adding Text to the presentation - Formatting a presentation: Adding style - Color, gradient fills - Arranging objects – Adding Header & Footer - Slide Background - Slide layout - Adding Graphics to the presentation: Inserting pictures, movies, tables, etc into the presentation - Drawing Pictures using Draw - Adding effects to the presentation: Setting Animation & transition effect - Adding audio and video

UNIT - V

ADOBE PHOTOSHOP – BASIC

Introduction to Adobe Photoshop, Getting Started using Photoshop, Working with Images, Resizing and Cropping Images, Working with Basic Selections, Layers, Painting in Photoshop, Photo Retouching, Color Correction, Using Masks And The Quick Mask Mode, Working With The Pen Tool, Creating Special Effects, Printing And Exporting Work, Shortcut key for Tools.

Course Outcome
On completion of this course the students will be able to

- Explore the basics of computer and its associated hardware
- Discuss the usefulness of MS word in software industry.
- Elaborate the benefits of MS Excel in software industry.
- Describe the process involved in preparing presentation using MS Power Point
- Detail the process of Adobe Photoshop in photo making.

Text Books:

1. Microsoft Office Word 2007 Plain & Simple by Jerry Joyce & Marianne Moon

2. The Unofficial Guide to Microsoft Office Excel 2007 Julia Kelly & Curt Simmons

3. Microsoft Office Power point 2007 Plain & Simple Nancy Muir

4. Adobe Photoshop CC 2019 for Beginners by Hitesh Kapte

Reference Books:

1. Step by Step 2007 Microsoft Office System (W/CD) by Curtis Frye, Joyce Cox, Steve Lambert

NON-MAJOR ELECTIVE

PAPER - 1

BASIC ELECTRONICS

Course Objective

To enable the student to learn

- The concepts of electronic states and band structure formation and design amplifiers
- The concepts of Power Supplies and amplifiers with active loads
- The concepts of high frequency response of amplifiers

UNIT - I

BASIC COMPONENTS USED IN ELECTRONICS

Resister, capacitor, inductor and their different types - Diodes - Light Emitting diode (LED), Photo diode - Zener diode - LCD - solar cell.

UNIT - II

POWER SUPPLIES

Need of a power supply - Types of power supplies - Different types of unregulated and regulated power supplies - IC Regulated power supply - switched mode power supply.

UNIT - III

AMPLIFIERS

Transistor as an amplifier - Types of Amplifiers - Single stage amplifier - Amplifiers with feedback - Negative feedback amplifiers.

UNIT - IV

OSCILLATORS & SWITCHING CIRCUITS

Transistor as an oscillator - Barhausen criteria - Hartley and colpitt's oscillators - Multivibrators - Differentiating circuits - integrating circuits - clipping and clamping circuits.

UNIT - V

DIGITAL ELECTRONICS

Analog and digital signals - Digital circuits - Binary number system - conversion of Binary to decimal - decimal to binary - logic gates - OR gate - AND gate - NOT gate - Combination of Logic gates - NAND and NOR as universal building blocks.

Course Outcome

On completion of this course the students will be able to

- Outline the operation of basic components used in Electronics
- Discuss the working of power supply and its variants.
- Elaborate the working of different configurations of amplifier.

- Illustrate the usage of transistor as an oscillator and switching circuits.
- Recall various number systems and truth tables of logic gates

Text Books

1. Principles of Electronics - V.K. Mehla - S.Chan Publication, New Delhi
2. Electronic devices and circuits - G.J.Mithal, Khana publishers, New Delhi
3. Modern Physics - R.Murugesan - S.Chan publication, New Delhi
4. Basic Electronics - B.L. Theraja - S.Chan publication, New Delhi

Reference Books

1. Electronic devices and circuits - B.Sasikala, S.Poornachandra Scitech publication India Pvt. Ltd., Chennai.
2. Electronic devices and Application and integrated circuits - Mathur kul shresh the & Chandra Umesh publication, New Delhi.
3. Hand book of Electronics - Gupta & Kumar, Pragathi prakashan, Delhi.

SEMESTER IV

PAPER - 6

SEMICONDUCTOR DEVICES AND IC FABRICATION TECHNOLOGY

Course Objective

The students will learn:

- Structure, characteristics, working and applications of various diodes, UJT, SCR, TRIAC, JFET, MOSFET, etc.,
- Principles of charge coupled devices, metal semiconductor junction characteristics, and Monolithic IC fabrication technology.

UNIT - I

Transistors - Working of PNP and NPN transistors - Transistor connections - Relation between β and α - Expression for collector current - Transistor characteristics in CE mode - Transistor as an amplifier and oscillator its performance - Semiconductor devices numbering system - Phototransistor.

UNIT - II

Construction, working characteristics of FET and MOSFET (D and E type) - Parameters of FET - Difference between FET and BJT - Difference between FET and MOSFET - Applications of FET and MOSFET - Advantages of MOSFET.

UNIT - III

Construction, working characteristics of UJT and SCR - Equivalent circuit of UJT - SCR as a switch and rectifier - Applications of UJT and SCR - Characteristics of TRIAC.

UNIT - IV

Schottky effect - Working characteristics of MIS, MIM diodes - Working and merits of CCD, LED and LCD - LDR - Photodiode - Solar cell - Semiconductor LASER diode and its application.

UNIT-V

Integrated circuit - Monolithic Integrated Circuit technology - Fabrication of IC components - Resistors, Capacitors, Diodes, Transistors, FET and MOSFET - Thin and thick film technology - LSI - MSI - VLSI - IC package and symbols - Merits and demerits of ICs.

Course Outcome

On completion of this course the students will be able to

- Describe the working principle of Transistor and its variants.
- Explain the operation of FET and MOSFET with its application.
- Discuss the characteristics of UJT and SCR and obtain its equivalent circuits.

- Examine the characteristics of MIS, MIM diodes and other electronic devices.
- Illustrate the IC fabrication process with packaging standards and symbols.

Text Books:

1. Electronic Devices and Circuits (Applied Electronics Vol. I) - *G.K. Mithal*, Khanna Publishers.

2. Principles of Electronics - *V.K. Metha*, S. Chand & Co., 1991.

Reference Books:

1. Electronic Devices and Circuits - *Jacob Millman and C.C. Halkias*, Tata McGraw Hill Publishing Co. Ltd.

2. Physics of Semiconductor Devices - *S.M. Sze*, Wiley Eastern Limited.

3. Electronic Principles - *A.P. Malvino*, Tata McGraw Hill Publishing Co. Ltd.

4. A Text Book of Applied Electronics - *R.S. Sedha*, S. Chand & Co., 2005

PAPER - 7

ELECTRONIC COMMUNICATION SYSTEMS

Course objective:

The students will learn:

- Amplitude modulation and demodulation and radio wave transmission and reception,
- Frequency modulation and demodulation and FM radio wave transmission and reception,
- Principle of analog and digital pulse modulation and their applications,
- Transmission and detection of digital signals.
- Fundamentals of antenna, their characteristics and types,

UNIT - I

Modulation - Needs for Modulation - Types of Modulation - Amplitude Modulation - Generation and detections circuits - Balanced Modulator - DSB/SC and SSB Modulation - VSB modulation. Block diagram of AM Radio transmitter and super heterodyne Receiver.

UNIT - II

Frequency Modulation - Definition - Derivation of Modulated wave - Generation of FM - Varactor diode and Reactance tube Modulators - Detectors - Balanced slope detector, Foster Seeley discriminator, ratio detector - Block diagram of FM transmitter and receiver.

UNIT - III

Pulse Modulation - Sampling theorem - PAM, PWM, PPM, PCM - quantizing, sampling, coding, decoding, quantization error, delta modulation and adaptive delta modulation.

UNIT - IV

Multiplexing - FDM, TDM, CDMA - ASK, FSK, PSK - Advantages of Digital Communication - Introduction to Microwave, Fiber optic, Satellite Communications - RADAR - range equation.

UNIT - V

Antenna – Radiation Pattern - Efficiency – Directivity - Directive gain - Bandwidth, Beam width and polarization - Dipole - Folded dipole - Yagi - Uda - Helical - Discone - Parabolic - Dish Antennas - Ground wave, sky wave and space ware propagation.

Course Outcome

On completion of this course the students will be able to

- Explain modulation and discuss the different types modulation
- Explain the concept and principles of amplitude modulation, frequency and phase modulation.
- Discuss the idea behind various multiplexing schemes.
- Illustrate the construction and working of different types of antennas.

Text Books:

1. Electronic Communication Systems - *George Kennedy*, McGraw Hill Book Company, 4/e, 2005.
2. Communication Engineering - *T.G. Palanivelu*, Anuradha Publicatons, 1/e, 2002.

Reference Books :

1. Communication System - *Roddy & Coolen*, 4/e, Pearson Education, 2005.
2. Principles of Communication Engineering - *Anok Singh*, 4/e, Sathyaprakasam Publications, 2004.
3. Electronic Communication Systems *Wayne Tomasi*, 4/e, Pearson Education, 2004.
4. Antennas by J.D.Kraus

PAPER - 8

DIGITAL ELECTRONICS

Course Objective

The students will learn:

- number systems and the interconversion between them, Boolean algebra and the simplification of logic circuits using Karnaugh map,
- arithmetic circuits, multiplexing and demultiplexing operations and a few logic families,
- various flip-flops, design of registers and counters, and the architecture and applications of Timer 555, and
- A/D and D/A converters and their accuracy and resolution.

UNIT - I

Number system and codes: Decimal, binary, octal, hex numbers, conversion from one to another - codes, BCD, excess 3, gray codes conversion from one to another - Error correction / detection codes.

UNIT - II

Boolean algebra and theorems: Basic, Universal logic gates - Boolean Theorems - sum of products, products of sums expression, simplification by Karnaugh Map method, simplification based on basic Boolean theorems - don't care conditions.

UNIT - III

Combinational Digital Circuits: Arithmetic building blocks, Basic Adders and Subtractors, BCD adders - Data processing circuits, multiplexers, demultiplexers, encoders, decoders - TTL, CMOS digital logic families.

UNIT - IV

Sequential Digital Circuits: Flip - Flops, RS, clocked SR, JK, D, T, master-slave types - shift registers, ring counters-ripple counters - Design of counters - modulus of counters - timer IC 555, applications.

UNIT - V

DAC and ADC: Parameters, Accuracy, Resolution - DAC, variable resistor network, R-2R ladder network types - ADC, counting, continuous, successive approximation, dual-slope types - comparison of various types of ADC and DAC.

Course Outcome
On completion of this course the students will be able to

- Recall various number systems and its application in digital circuits.
- Apply Boolean laws and Karnaugh map to simplify the switching functions
- Design various combinational circuits using logic gates
- Design and analyze the various sequential digital circuits using flip-flops

- Perform analog to digital conversion and digital to analog conversion for given inputs

Text Books:

1. Digital Fundamentals - *V. Vijayendran*, S.Viswanathan Publishers, Chennai.
2. Modern Digital Electronics - *R.P. Jain*, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.

Reference Books:

1. Micro Electronics - *J. Millman*, McGraw Hill International Book Company, New Delhi, 1990.
2. Digital Principles and Applications - *A.P.Malvino & D.P.Leach*, 4/e, Tata McGraw Hill Publishing Co. Ltd.
3. Digital Integrated Electronics - *H. Taub & D. Schilling*, McGraw-Hill Book Company.
4. Digital Fundamentals - *T.L. Floyd*, Pearson Education, 8/e.
5. Digital Electronics - *W.H. Gothmann*, Prentice Hall of India Private Limited, 2/e.

CORE PRACTICALS II

Objective

The students will learn
- To write simple programs in C language.
- The generation of electric pulses, their width and duration,
- Characteristics of semiconductor devices such as UJT, JFET and SCR,
- Power control by SCR, audio wave generation and pulse shaping using Schmitt triggers.

A. Computer Experiments: Writing Programs in C (about 10 programs).

B. Electronics Experiments:

1. IC Regulated power supply.
2. Characteristics of UJT.
3. Characteristics of SCR.
4. SCR power control.
5. Characteristics of TRIAC.
6. Characteristics of JFET.
7. FET as an amplifier.
8. Source follower.
9. JFET multivibrator.
10. Emitter follower.
11. Darlington pair amplifier.
12. Transistor Hartley oscillator.
13. Transistor Colpitts oscillator.
14. Transistor phase shift oscillator.
15. Transistor Wien bridge audio oscillator.
16. Transistor monostable multivibrator.
17. Resistivity and Hall coefficient - Four probe method.
18. Energy band determination.

Course Outcome

On completion of this course the students will be able to
- Construct and verify Regulated power supply
- Demonstrate the characteristics of UJT, SCR, JFET and FET devices
- Design and implement amplifier, Source follower, JFET multivibrator and Emitter follower circuits
- Examine the characteristics of amplifier, oscillator and multivibrator circuits developed using transistor.

- Illustrate the concept Resistivity, Hall coefficient and Energy band determination

Text Books:

1. Theory and Problems of Programming with 'C' (Schaum's Series) - *B.S. Gottfried*, McGraw Hill International Book Company.
2. Basic Electronics - A Text Lab Manual - *Zbar, Malvino & Miller*, Tata McGraw Hill Publishing Company Limited.

Reference Books:

1. B.E.S. Practicals – *R. Sugaraj Samuel & Horsley Solomon* – Department of Electronic Science, C.T.M. College of Arts and Science, Chennai.

ALLIED - 2

PAPER - 4

BASIC PHYSICS II

Course Objective

- Students will learn fundamentals of Optics, Spectroscopy, Relativity and Particle Physics.

UNIT - I

Optics: Interference - Interference in wedge shaped films - Newton's rings - Measurement of wavelength and radius of curvature by Newton's rings - Diffraction - Fresnel and Fraunhofer diffraction - Elementary theory of formation of spectra by transmission grating (normal incidence) - Determination of wavelength - Polarization - Optical activity - Biot law - Determination of specific rotatory power - Half shade polarimeter - Uses of polarized light.

UNIT - II

Spectroscopy: Types of spectra - Scattering of light - Tyndall and Rayleigh scattering - Raman Effect - Experimental study of Raman Effect - Theory and applications. Laser: Principle, action and Characteristics of laser - Ruby laser - He-Ne laser - Applications of laser.

UNIT - III

Positive rays: Properties - Bainbridge mass spectrometer - Isotopes. Photoelectricity: Photoelectric emission - Einstein's equation - Millikan's experiment. Atom Model: Vector atom model - Postulates - Quantum numbers - Pauli's principle. Radioactivity: Natural radioactivity - Artificial radioactivity - Radio isotopes - Uses of radio isotopes.

UNIT - IV

Nuclear and Particle Physics: General properties of nuclei - Liquid drop model - Shell model - Magic numbers - Elementary particles - Classification - Anti-particles and anti-matter - Strangeness - Isospin - Basic ideas of quarks.

UNIT - V

Relativity: Frame of reference - Galilean transformation - Postulates of special theory of relativity - Lorentz transformation - Length contraction - Time dilation - Relativity of simultaneity - Variation of mass with velocity - mass energy equation.

Course Outcome

On completion of this course the students will be able to

- Describe the impact of Optics in the constructional and designing environment
- Comprehend the fundamental ideas of Spectroscopy and lasers
- Enumerate the preambles of positive rays, Atom Model and Radioactivity
- Discuss the concepts of Nuclear and Particle Physics
- Explain the principle of Relativity and its associated concepts

Text Books:

1. Allied Physics Paper I & II - *R. Murugeshan*, S.Chand & Co. Ltd., New Delhi, 2005.

2. A Text Book of Allied Physics - *Dr. R. Sabesan, Dr. A. Dhanalakshmi & Others*, Popular Book Depot.

Reference Books:

1. Modern Physics - *R. Murugeshan*, S.Chand & Co. Ltd., New Delhi.
2. College Physics - *Weber, Manning & White.*
3. Advanced Level Physics - *Nelkon & Parker.*
4. University Physics - *Young, Zemansky & Sears*, 6/e, Narosa Publishing House.
5. Physics, Vol. II - *Resnick, Halliday & Krane*, 5/e, John Wiley & Sons, Inc.,.

SKILL BASED SUBJECT

PAPER - 2

PRINCIPLES OF ELECTRONIC APPLIANCES

Course Objective

- To learn about Home appliances. Trouble shoot the faults in the electronic appliance.

UNIT - I

MICROWAVE OVENS

Microwaves - Properties and generation - Microwave oven block diagram - LCD timer with alarm - Controllers - Wiring and Safety instructions - Care and Cleaning.

UNIT - II

WASHING MACHINES

Electronic controller for washing machines - Washing machine hardware and software - Types of washing machines - Fuzzy logic washing machines - Features of washing machines.

UNIT - III

AIR CONDITIONERS AND REFRIGERATORS

Air Conditioning - Components of air conditioning systems - All water air conditioning systems - All air conditioning systems - Unitary and central air conditioning systems - Split air conditioners.

UNIT - IV

HOME / OFFICE DIGITAL DEVICES

Facsimile machine - Xerographic copier - Calculators - Structure of a calculator - Internal Organization of a calculators - Servicing electronic calculators - Digital clocks - Block diagram of a digital clock.

UNIT - V

DIGITAL ACCESS DEVICES

Digital computer - Internet access - Online ticket reservation - Functions and networks - Barcode Scanner and decoder - Electronic Fund Transfer - Automated Teller Machines (ATMs) - Set-Top boxes - Digital cable TV - Video on demand.

COURSE OUTCOME

On completion of this course the students will be able to

- Explain the working of Microwave Ovens and its safety procedures.
- Demonstrate the working of washing machines with different features.
- Describe the operation of Air Conditioners and Refrigerators.
- Discuss the importance and functionality of digital devices used in home and Office.
- Illustrate the operation of digital access devices used in regular activity.

Text Books

1. Consumer Electronic - S.P. Bali, Pearson Education, New Delhi, 2005.
2. Handbook of Repair and Maintenance Of Domestic Electronics Appliances handbook By Shashi Bhushan Sinha-india-2017

NON-MAJOR ELECTIVE

PAPER - 2

FUNDAMENTALS OF ELECTRONIC COMMUNICATION

Course Objective

The students will learn

- Various modulation and demodulation techniques of analog communication.
- Analyze different parameters of analog communication techniques and also pulse modulation and demodulation techniques

UNIT - I

BASIC COMMUNICATION SYSTEMS

Block diagram - information source and input transducer - Transmitter medium - Noise - Receiver - Destination - Necessity for modulation - Types of communication systems.

UNIT - II

AMPLITUDE MODULATION

Definition - AM waveforms - Frequency spectrum and hand width - Modulation index - DSB - SC, SSB, Independent SB, Vestigial SB - Comparison and application of various AM schemes.

UNIT - III

FREQUENCY AND PHASE MODULATION

Definition - Relationship between FM & PM - Frequency deviation - Spectrum and transmission BW of FM, comparison of AM and FM systems.

UNIT - I V

RADIO TRANSMITTER AND RECEIVER

AM transmitters - High level and low level transmitters - SSB transmitters - FM transmitters - Block diagram - stereo FM transmitter. AM receivers - operation - performance parameters - Communication Transceivers - Block diagram - SSB receiver - FM receivers - Block diagram.

UNIT - V

Television of TV system - Block diagram - Scanning - Synchronisation - VSB transmission and reception Colour signal transmission.

Course Outcome

On completion of this course the students will be able to

- Elaborate the concepts of basic communication systems.
- Explain the methodology of amplitude modulation, frequency and phase modulation techniques used in analog communication
- Discuss the functionality of transmitter and receiver circuits.
- Describe the principle of operation of television circuits.

Text Books

1. Electronic Communication Systems - *George Kennedy*, McGraw Hill Book Company, 4/e, 2005.
2. Communication Engineering - *T.G. Palanivelu*, Anuradha Publicatons, 1/e, 2002.

Reference Books

1. Basics of electronic Communications NIIT, prentice - Hall Pvt. Ltd, New Delhi, 2007.

2. Modern digital and analog communications - BP lathi third edition 1998, Oxford University press.

3. Communication System: Analog & digital Singh and sapre, TMH 1995.

SEMESTER V

PAPER - 9

MICROPROCESSOR AND ITS APPLICATIONS

Course Objective

The students will learn:

- Architecture of 8085 microprocessor instruction sets, addressing modes and programming exercises
- Stacks and stack operations
- Interfacing memory devices
- Interfacing 8085 microprocessor with input/output devices, and
- Interfacing programmable peripheral devices.

UNIT - I

Architecture of 8085 microprocessor - Registers - Flags - ALU - Address and data buses - Demultiplexing the address / data bus - Control and status signals - I0nstruction set of 8085 - Addressing modes - Assembly language programming - Programs for addition, subtraction, multiplication and division of binary and BCD numbers (8-bit only).

UNIT - II

Stack and stack related instructions - Subroutines - Advanced programming techniques - Code conversions - Block transfer of data - Sorting of data - Time delays using single register and register pair - Delay calculations.

UNIT - III

Semiconductor memories - Classification - Instruction cycle, Machine cycle and T-state - Timing diagrams for opcode fetch, memory read, memory write, I/O read and I/O write machine cycles - Interfacing memory chips - Interfacing an input port - Interfacing an output port - I/O mapped I/O and memory mapped I/O techniques.

UNIT - IV

Interrupts - Hardware and software interrupts - Interrupt priorities - SIM and RIM instructions - Polled I/O and interrupt controlled I/O data transfer - Interfacing programmable devices - Programmable Peripheral Interface 8255 - Internal architecture - Control register and control word - Programming 8255 - Interfacing hex-keyboard and seven segment display.

UNIT - V

Interfacing D/A converter and waveform generation - Interfacing A/D converters - Keyboard / Display Controller 8279 - Internal architecture and working - Programmable Interval Timer 8253/54 - Internal architecture and different modes of operation - Stepper motor interface - Temperature controller - Traffic lights controller.

Course Outcome

On completion of this course the students will be able to

- Illustrate the architecture, instruction set, addressing modes and programming of 8085 microprocessor.
- Demonstrate the concepts of advanced programming techniques in 8085 microprocessor.
- Elaborate the different types of memories in 8085 microprocessor.
- Design and develop the interfacing circuits for various applications using 8085 Microprocessor.
- Outline the procedure of interfacing various circuits with 8085 Microprocessor.

Text Books:

1. Microprocessor Architecture, Programming and Applications with the 8085 - *Ramesh S. Gaonkar*, 5/e, Penram International Publishing (India).

2. Fundamentals of Microprocessors-8085 - *V. Vijayendran*, S. Viswanathan (Printers & Publishers), Pvt. Ltd., 2002.

Reference Books:

1. Microprocessor and its Applications - *A. Nagoor Kani*, 1/e, RBA Publications, Chennai.

2. Introduction to Microprocessors - *Aditya P. Mathur*, 3/e, Tata McGraw Hill Publishing Company Limited.

3. Fundamentals of Microprocessors and Microcomputers - *B. Ram*, Fifth Revised and Enlarged Edition, Dhanpat Rai Publications, New Delhi.

PAPER - 10

CELLULAR MOBILE COMMUNICATION

Course Objective

The students will learn

- Basics of digital cellular system, cordless telephony and cell structure
- GSM wireless protocol and markup language fundamentals
- Basics of WLL and Bluetooth technology

UNIT - I

Advanced mobile phone service - Global system for mobile communication - Digital cellular system - Cordless telephony - Third generation wireless systems.

UNIT - II

7 Cell structure - Hand off - roaming management - Hand off detection - Channel assignment techniques - Interference - ACI, CCI - Intersystem hand off and authentication - Network signaling - Cellular digital packet data.

UNIT - III

GSM - Network signaling, mobility management, short message service - International roaming, administration and operation.

UNIT - IV

Wireless application protocol - Architecture - Datagram - Transport layer securities - Transaction protocol - Session protocol application environment, wireless markup language, WML - Script wireless telephony applications.

UNIT - V

Generation of mobile services - Wireless local loop - Bluetooth technology – wifi technology.

Outcome Course

On completion of this course the students will be able to

- Explain the principles of Mobile communication
- Discuss the cell structure and the process involved in cellular systems.
- Elaborate GSM technology and its associated operations.
- Explain the layers of wireless protocol and its related functions.
- Outline the different methods of wireless communication systems.

Text Books:

1. Mobile Communications - *Jochen Schiller*, 7/e, Pearson Education, 2003.
2. Principles of Wireless Networks - *Kauch Pahalavan & Prahanet Krishnamoorthy*, 2/e, Pearson Education, 2004.

Reference Books:

1. Wireless and Mobile Networks Architecture - *Yi-Bing Lin & Imnch Chlantee*, John Wiley, 2001.

2. Wireless and Mobile Communication - *Rapparport*, Pearson Education, 2001.

PAPER - 11

ELECTRICAL AND ELECTRONIC INSTRUMENTATION

Course Objective

The students will learn:

- Basic concepts of indicating instruments.
- Various electronic instruments such as CRO, storage oscilloscopes, function generators, spectrum analyzer etc.,
- Transducers, sensors and display devices.

UNIT - I

DC and AC indicating Instruments: Accuracy and precision - Types of errors - PMMC galvanometer, sensitivity, Loading effect - Conversion of Galvanometer into ammeter, Voltmeter and Shunt type ohmmeter- Multimeter. Electrodynamometer - Thermocouple instrument - Electrostatic voltmeter - Watt-hour meter.

UNIT - II

DC and AC bridges: Wheatstone bridge - Kelvin's bridge - Balancing condition for AC bridge - Maxwell's bridge - Schering's bridge - Wein's bridge - Determination of frequency.

UNIT - III

Oscilloscopes: Block diagram - Deflection Sensitivity - Electrostatic Deflection - Electrostatic Focusing - CRT Screen - Measurement of Waveform frequency, phase difference and Time intervals - Sampling Oscilloscope - Analog and Digital Storage Oscilloscopes.

UNIT - IV

Instrumentation Amplifiers and Signal Analyzers: Instrumentation amplifier - Electronic Voltmeter and Multimeter - Digital Voltmeter - Function Generator - Wave Analyzer - Fundamentals of Spectrum Analyzer.

UNIT - V

Transducer and Display Devices: Strain Gauge - Unbounded Strain Gauge - LVDT - Resistance Thermometer - Photoelectric Transducer - Pen Recorder - Audio Tape Recorder - Seven Segment Display - LCD.

Course Outcome

On completion of this course the students will be able to

- Explain the functional elements of instruments, their errors, characteristics and various electrical and electronics instruments
- Evaluate unknown R, L, C and frequency using AC and DC bridges.
- Describe the working oscilloscopes in signal measurement.
- Discuss the role of Instrumentation Amplifiers and Signal Analyzers in measurement.
- Demonstrate the functionality of Transducer and Display Devices.

Text Books:

1. Electronic Instrumentation and Measurement Techniques - *W.D. Cooper & A.D. Helfrick*, Prentice Hall of India.
2. Electronic Instrumentation and Measurement - *Kalasi*.

Reference Books:

1. A Course in Electrical and Electronic Measurement and Instrumentation - *A.K. Sawhney*, Dhanpat Rai and Sons.
2. Electronic Instrumentation and Measurements - *P.B. Zbar*, Mc Graw Hill International.
3. Measurement Systems Application and Design - *Ernest O. Doebelin*, 4/e, Tata McGraw Hill Publishing Co. Ltd.

INTERNAL ELECTIVE

PAPER -1

(to choose one out of 3)

A. MEDICAL ELECTRONICS

Course Objective

- The students will be able to handle most of the electronic instrumentation in the medical field.

UNIT - I

Bio-Amplifiers: Bio potentials - Bio-electricity - Necessity for special types of amplifiers for biological signal amplifications - Different types of Bio-OP - Amps.

UNIT - II

Bio-Potential Recording: ECG - EEG - EMG - ERG - Specific types of electrodes used - Different lead systems - their waveforms.

UNIT - III

Measurement of Biological Parameters: Measurement of respiration rate - Measurement of heart beat rate - Measurement of temperature - Measurement of blood pressure - Patient monitoring set up - Blood flow meters EM and plesthsmographic technique.

UNIT - IV

High Energy Radiation Applications: Applications of X-ray and gamma ray for diagnostics and therapeutic applications - Application of Lasers in biological medium.

UNIT - V

High Frequency Applications: Diathermy effect - Short, wave diathermy - Ultrasonic diathermy - Microwave diathermy.

Outcome Course

On completion of this course the students will be able to

- Illustrate different bioamplifiers used for the biosignal amplification.
- Outline the procedure used for the measurement of electrical parameters of the human body.
- Discuss the process used for the measurement of non-electrical parameters of the human body.
- Analyze the effect of different diagnostic and therapeutic application of electromagnetic radiation.
- Demonstrate the therapeutic applications high frequency radiations.

Text Book:

1. Biomedical Instrumentation - *M. Arumugham*, 2/e, Anuradha Agencies Publishers

Reference Books:

1. Clinical Engineering - *Jacobster & Webster*, PHI.

2. Applied Biomedical Instrumentation - *Geddes & Baker*, John Wiley & Sons.

INTERNAL ELECTIVE

PAPER -1

B. INDUSTRIAL ELECTRONICS

Course Objective

The students will learn:

- The applications of devices such as thyratron, ignitron, thyristor, SCR, UJT in industry
- The construction of power supplies
- The working of motors and their control
- The Principles of welding and heating

UNIT - I

Industrial Electronic Devices: Characteristics and applications of Thyratron, Ignitron, Thyristor, SCR and UJT - AC and DC switches - Over voltage protection - Flashers - Static circuit breakers.

UNIT - II

Power Supplies: DC voltage regulators - Different types of series voltage regulators - voltage and current regulation - Controlled rectifiers and inverters - Uninterruptible power supplies, Switched Mode Power Supply (SMPS).

UNIT - III

Motors and Controls: DC motors I Automatic regulation of speed and overload - Reversing motors - AC motors - Induction motors - Speed control - Synchronous motors.

UNIT - IV

Welding and Heating: Principle and theory of induction heating - Dielectric heating - Resistance welding - Control process - Sequence timer - Synchronous Welding control - Temperature control circuits.

UNIT - V

Application in Industry: Relays and their characteristics and applications - Generation, detection and application of Ultrasonic - Application of LASER in Industry.

Outcome Course

On completion of this course the students will be able to

- Describe the various power semiconductor devices and their application
- Discuss the working of different types of power supplies.
- Explain the operation of various Motors and its Control mechanism.
- Discuss the process and importance of welding and heating in industries.
- Outline the role of relays, ultrasonic waves and lasers in industries.

Text Books:

1. Industrial Electronics - *G.K. Mithal*, 14/e, Khanna Publishers , New Delhi.
2. Industrial and Power Electronics - *C. Rai*, Umesh Publications, New Delhi.

Reference Books:

1. Electronics and Industry - *M.G. Chute & R.D. Chute*, McGraw Hill.
2. Industrial Electronics - *Neol Morris*, 2/e, Tata McGraw Hill.

INTERNAL ELECTIVE

PAPER -1

c. DATA PROCESSING AND PERSONAL COMPUTERS

Course Objective

The students will learn:

- Principle of data processing, storage devices,
- Various languages, compilers, DBMS, etc.,
- Architecture of personal computers and their various operating systems.

UNIT - I

Personal Computer: Types of personal computers - Theory of personal computer development - The microprocessor revolution - A typical personal computer configuration - Motherboard expansion slots - Parallel and serial interfaces - RAM - CPU - Keyboard - Monitor - MGA - CGA - EGA - VGA - SVGA.

UNIT - II

Storage Media: Types of data processing - Data processing cycle - Expanded data processing cycle - Data processing operations - Data organization - Pen drive - Hard disk - Floppy disks -

Winchester drives - Compact disks.

UNIT - III

Communication with Computer: I/O devices - Mass storage devices - File maintenance procedure - Input/Output systems and procedures - Introduction to languages - High level, Assembly level and Machine level - Introduction to translation mechanism - Compilers, Interpreters, Linkers, Loaders - DBMS.

UNIT - IV

Disk Operating System: Overview of MS-DOS - Command summary - DIR, SORT, TYPE, CD, FORMAT, etc. and their usage - The DOS boot mechanism - COMMAND.COM - IBMDOS.COM - IBMBIO.COM - An overview of DOS file system - Batch files - AUTOEXEC.BAT Windows (Concept only).

UNIT - V

UNIX: An overview of UNIX files system. PC Applications: Spreadsheets - Word processing - LAN - Information Technology - Internet - Intranet - Email - www.

Course Outcome
On completion of this course the students will be able to

- Categorize the types of Personal Computers and its accessories.
- Explain the different types of storage media used in personal computers.
- Discuss the process of establishing Communication with Computers by various devices.
- Elaborate the concept of disk operating system.
- Explain about UNIX system and PC Applications.

Text Books:

1. Fundamentals of Computers - *V. Rajaraman*, Prentice Hall of India Private Limited, 3/e.
2. Data Processing - *Lipschutz & Lipschutz*.

Reference Books:

1. Computer Data Processing - *Gordon Davis*.
2. Introduction to Data Processing - *Gregg*.
3. The IBM Technical Reference Manual.
4. The DOS Reference Manual.
5. Introduction to UNIX - *R. Thomas & Yates*.

SKILL BASED SUBJECT

PAPER - 3

PCB DESIGN AND FABRICATION

Course Objective

The students will learn:

- To understand the need for PCB Design and steps involved in PCB Design and Fabrication process.
- Familiarize Schematic and layout design flow using Electronic Design Automation (EDA) Tools.

UNIT - I

TYPES OF PCB

Single sided board – double sided – Multilayer boards – Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's.

UNIT - II

LAYOUT AND ARTWORK

Layout Planning – General rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and mounting – Cooling requirement and package density – Layout check. Basic artwork approaches – Artwork taping guidelines – General artwork rules – Artwork check and Inspection.

UNIT - III

LAMINATES AND PHOTO PRINTING

Manufacture of copper clad laminates – Properties of laminates – Types of Laminates – Manual cleaning process – Basic printing process for double sided PCB's – Photo resists – wet film resists – Coating process for wet film resists – Exposure and further process for wet film resists – Dry film resists.

UNIT - IV

ETCHING AND SOLDERING

Introduction – Etching machine – Etchant system. Soldering: Principles of Solder connection – Solder joints – Solder alloys – Soldering fluxes. Soldering Tools: Soldering, Desoldering tools and Techniques – Man Soldering – Solder mask – Safety, health and medical aspects in Soldering practice.

UNIT - V

DESIGN RULES AND AUTOMATION

Reflection – Crosstalk – Ground and Supply line noise – Electromagnetic interference from pulse type EM fields and automation – Automated artwork drafting – CAD.

Course Outcome

On completion of this course the students will be able to

- Categorize different types of PCB
- Design a PCB schematic layout and artwork process.
- Discuss the process of Laminates and Photo Printing
- Explain the concept of Etching And Soldering
- Formulate Design Rules and Automation procedure for PCB design

Text Books

1. Walter C.Bosshart "PCB DESIGN AND TECHNOLOGY" Tata McGraw Hill Publications, Delhi. 1983.

2. Clyde F.Coombs "Printed circuits Handbook" IIIEdition McGrawhill.

3. R.G. Gupta "Electronic instruments and system" Tata McGraw Hill Publication, New Delhi.

Reference books

1. *Printed Circuit Board Design* by Christopher T. Robertson, - New Delhi, 2003)

SEMESTER VI

PAPER - 12

TELEVISION AND VIDEO ENGINEERING

Course Objective

The students will learn:

- Principles of TV system, and overall view of complete TV system such as picture tube, transmitter, receiver, etc.,
- World TV transmission standards.
- Working of black and white and color TV receiver electronics.
- Working of video cassette recorder and player.

UNIT - I

Characteristics of Human eye - Theory of scanning - Camera tubes - Vidicon - Silicon diode array vidicon - Picture tubes - Composite video signal.

UNIT - II

Television transmitters - Television signal propagation - Television transmission antennas - Television receiver antennas - Colour Television Antennas - Television receiver - VHF Tuner - IF Subsystems - Video amplifiers - Sync processing and AFC circuit - Deflection oscillators.

UNIT - III

Colour Television systems - Colour characteristics - Colour Television Camera - Colour picture tube - Colour signal generation - PAL, NTSC, SECAM - Comparison.

UNIT - IV

Colour Television receivers - PAL D Colour receiver, AGC, Sync - Separators and deflection circuits, Luminance channel, Colour signal processing , separation of U and V modulation products - Subcarrier generation and control.

UNIT - V

Special Topics in Television - Digital tuning techniques - Remote control - Cable Television - Satellite TV - video tape recorders - Video disc systems - Digital TV - Fundamentals of Digital TV.

Course Outcome

On completion of this course the students will be able to

- Outline the characteristic of video capturing devices.
- Describe the working of Television and its related accessories.
- Explain the operation of Television architecture and its associated components.
- Discuss the functionality of advanced television concepts.

Text Books:

1. Television and Video Engineering - *G. Nagarajan*, 2/e, A.R.S Publications, 2005.

2. Monochrome and Color Television - *R.R. Gulati*, 1/e, New Age International Publishers, 2003.

Reference Books:

1. Basic Television - Principles and Servicing - *Bernard Grob*, 4/e, McGraw Hill, 1975.

2. Television and Video Engineering - *A. M. Dhake*, 2/e, Tata McGraw Hill Publishing Company Ltd., 2002.

CORE PRACTICAL III

Course Objective

The students will learn:

- the construction of dual power supply using Zener diode and IC
- application of Op-amp
- Universality of NAND and NOR gates and verification of Boolean identities using them
- Multi-vibrators and their applications

Experiments:

1. Construction of dual power supply using Zener diodes.
2. Construction of dual power supply using IC.
3. Op-amp - Inverting and Non-inverting modes, unity follower.
4. Op-amp - Summing amplifier - Inverting and Non-inverting modes.
5. Op-amp - Integrator and Differentiator.
6. Op-amp - Square wave generator.
7. Op-amp - Sine wave generator.
8. Instrumentation Amplifier.
9. Verification of Universal gate – NAND.
10. Verification of Universal gate – NOR.
11. Verification of basic Boolean identities using NAND gates.
12. Verification of basic Boolean identities using NOR gates.
13. Sum of Products and Product of Sums - NAND gates.
14. Sum of Products and Product of Sums - NOR gates.
15. Astable, Monostable multivibrators and Schmitt trigger using NAND gates.
16. Monostable multivibrators and Schmitt trigger using 555 timer.
17. Astable multivibrator using 555 timer.
18. Study of RS, D and JK flip flops.

Course Outcome

On completion of this course the students will be able to

- Develop Power supply using diode & IC
- Construct circuitry and demonstrate the working of various applications of Op-amp
- Verify the truth table, Boolean identities and Combinational logic using Universal gate and Flip-flop
- Develop Astable, Monostable multivibrators and Schmitt trigger using IC 555 timer

Reference Books:

1. Basic Electronics - A Text Lab Manual - *Zbar, Malvino & Miller*, Tata McGraw Hill Publishing Co. Ltd.

2. B.E.S. Practicals - *R. Sugaraj Samuel & Horsley Solomon* - Department of Electronic Science, C.T.M. College of Arts and Science, Chennai.

CORE PRACTICAL IV

Course Objective

The students will learn:

- AM, FM and PM modulation and detection techniques.
- Adder, subtractor circuits and counters using logic gates.
- Application of microprocessor in basic mathematical function, code conversion and DAC.

Experiments:

1. Amplitude modulation and detection.
2. Frequency modulation and detection.
3. Pulse Amplitude modulation and detection.
4. Pulse Width modulation and detection.
5. Pulse Position modulation and detection.
6. Half, Full and BCD adders using simple logic gates.
7. Half, Full and BCD adders using NAND gates.
8. Half and Full subtractors using simple logic gates.
9. Half and Full subtractors using NAND gates.
10. Study of 7490 BCD counter, divided by (1 to 10) as scalar.
11. BCD to seven segment decoder using 7447/7448.

Microprocessor Practical Experiments

12. Addition, Subtraction, Multiplication and Division - 8 bit.
13. Picking up the largest/smallest in an array.
14. Ascending/Descending order.
15. Code conversions:

a. Binary to BCD
b. BCD to Binary
c. Binary to ASCII
d. ASCII to Binary
e. BCD to ASCII
f. ASCII to BCD

16. Clock program.
17. Flashing LEDs.
18. Wave generation using DAC interface.

Course Outcome

On completion of this course the students will be able to

- Design and verify the process of amplitude modulation, frequency and phase modulation and detection techniques
- Construct and verify the truth tables of Half, Full and BCD adders and subtractors using simple logic gates and NAND gates
- Demonstrate the working of BCD counter & BCD to seven segment decoder
- Perform operations like arithmetic, Ascending order, Descending order and Code conversions using microprocessor
- Construct and develop a program to interface the peripheral IC's and with 8085 microprocessor

Reference Books:

1. Basic Electronics - A Text Lab Manual - *Zbar, Malvino & Miller*, Tata McGraw Hill Publishing Co. Ltd.

2. B.E.S. Practicals - *R. Sugaraj Samuel & Horsley Solomon* - Department of Electronic Science, C.T.M. College of Arts and Science, Chennai.

3. Fundamentals of Microprocessor 8085 - *V. Vijayendran*, S. Viswanathan Publishers, Chennai.

INTERNAL ELECTIVE

PAPER -2

(to choose one out of 3)

A. POWER ELECTRONICS

Course Objective

The students will learn:

- The working of power semiconductor devices such as power diode, power transistor, TRIAC, MOSFET, IGBT.
- The different types of rectifiers for single phase and three phase controls.
- The working of inverters, choppers and cycloconverters and their application in industry.

UNIT - I

Power Semiconductor Devices: Power diode, Power transistor, TRIAC, MOSFET and IGBT - turn on methods, driver circuits - SCR characteristics - Two transistor analogy - Methods of turning ON and turning OFF - Series and parallel connections of SCRs.

UNIT - II

Phase controlled converters: Single phase controlled rectifier - Half wave controlled rectifier

with 1.Resistive load 2.RL load 3. RL load and battery - Full wave controlled rectifier with above types of loads - Three phase controlled rectifier - HVDC transmission.

UNIT - III

Inverters: Single phase and three phase inverters - Series and parallel inverters - Bridge inverters - Current source inverter.

UNIT - IV

Choppers and Cycloconverters: Various types of DC choppers - Step up chopper - AD chopper - Single phase AC chopper - Step up and step down cycloconverters - Three phase to single phase and three phase to three phase cycloconverters.

UNIT - V

Control circuits and application: Generation of control pluses - Microprocessor based implementation - Static circuit breakers for DC and AC circuits - Regulated power supply - UPS - SMPS.

Course Outcome

On completion of this course the students will be able to

- Describe the fundamentals and key characteristics of power semiconductors Devices
- Analyze the electrical parameters of different phase controlled converters with various loads
- Explain the Principle of various inverter topologies
- Discuss the working of Choppers and Cycloconverters
- Describe the operation various Control circuits and application power semiconductors Devices

Text Books:

1. Power Electronics - *M.H. Rashid,* Prentice Hill of India Private Limited.
2. Power Electronics - *P.C. Sen,* Tata McGraw Hill Publishing Co. Ltd.

Reference Books:

1. Thyristorised Power Controllers - *G.K. Debye*, Wiley Eastern Ltd.
2. An Introduction to Thyistors and Their Applications - *M. Ramamoorthy,* 2/e, East West press.

INTERNAL ELECTIVE

PAPER -2

DIGITAL SYSTEM DESIGN

Course Objective

The students will learn:

- The fundamentals of Boolean algebra and simplification of Boolean functions.
- The combinational logic circuits and their design using HDL.
- The sequential logic circuits and their design using HDL.

UNIT - I

Boolean Algebra and Logic Gates: Review of binary number systems - Binary arithmetic - Binary codes - Boolean Algebra and theorems - Boolean functions - Simplifications of Boolean functions using Karnaugh map and tabulation methods - Logic gates.

UNIT - II

Combinational Logic: Combinational circuits - Analysis and design procedures - Circuits for arithmetic operations - Code conversions - Introduction to Hardware Description Language (HDL).

UNIT - III

Design with MSI Devices: Decoders and Encoders - Multiplexers and Demultiplexers - Memory and programming logic - HDL for combinational circuits.

UNIT - IV

Synchronous Sequential Logic: Sequential circuits - Flip-flops - Analysis and design procedures - State reduction and state assignments - Shift registers - Counters - HDL for sequential logic circuits, shift registers and counters.

UNIT - V

Asynchronous Sequential Logic: Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables - Race free state assignment - Hazards.

Course Outcome

On completion of this course the students will be able to

- Simplify of Boolean functions using Karnaugh map and tabulation methods.
- Design various combinational circuits using logic gates
- Design MSI Devices and verify its functionality.
- Design and analyze the various synchronous sequential circuits using flip-flops
- Design and implement the asynchronous sequential circuits

Text Books:

1. Digital Logic and Computer Design - *M. Morris Mano,* Prentice Hall of India Private Limited.

2. Digital System design- Morris Mano Hill Published by India Education Service Pvt.
3. A Verilog HDL Premier - *J. Baskar*, Pearson Education.

Reference Books:

1. Analysis and Modeling of Digital Systems - *Zain Allabedin Navabee*, 2/e , McGraw Hill Publishing Co. Ltd., New Delhi.
2. An Engineering Approach to Digital Design - *Fletcher*, Prentice Hall of India Private Limited.
3. Modern Digital Electronics - *R.P. Jain*, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. Digital Fundamentals - *T.L. Floyd*, 8/e, Pearson Education.

INTERNAL ELECTIVE

PAPER -2

C. ROBOTICS AND AUTOMATION

Course Objective

The students will learn:

- To introduce the concepts of Robotic system, its components and instrumentation and control related to robotics. Vision equipment, Image processing, Concept of low level and high level vision.

UNIT - I

CLASSIFICATION OF ROBOTIC SYSTEMS

Basic structure of a robot - Classification of robots: Cartesian, Cylindrical, Spherical, Articulated, SCARA. Accuracy, resolution and repeatability of robots. Robot application in manufacturing: Material transfers - Machine loading and unloading - Processing operations - Assembly and inspection.

DRIVES AND CONTROL

SYSTEMS: Hydraulic and Pneumatic systems: cylinders, control valves, hydro motor. Types of mechanical power drive, rotary to linear motion conversion mechanisms. Robot end effectors. Servomotors – operation, stepper motors - control loops using current and voltage amplifier. Robot controllers - configuration of robot controller.

UNIT - II

SENSORS AND VISION SYSTEMS

Types of sensors, tactile sensors, proximity sensors and speed sensors – Encoder, resolvers. Vision systems: Image processing and analysis, Segmentation, Feature extraction, Object Recognition.

UNIT - III

ROBOT PROGRAMMING & AUTOMATION

Lead through programming - Textual programming, programming examples - Social and Economical Aspects of Robots - Typical layouts of robots in Industries.

AUTOMATION: Advantages of automation, building blocks of automation. Automatic feeding lines, material-handling devices, ASRS, transfer lines,automatic inspection, intelligent automation.

UNIT - IV

PROGRAMMABLE LOGIC CONTROLLERS (PLC)

Basics of PLC, Architecture of PLC, Advantages, Types of PLC, Types of Programming - Simple process control program's using Relay Ladder Logic. Introduction to PLC networking. Introduction to HMI, DCS and SCADA systems.

UNIT - V

COMPUTER NUMERICAL CONTROL (CNC)

Block diagram of a CNC control system, Advantages, Power supply, CPU. CNC and PLC interfacing, Control loops. Feedback devices in CNC machine, analog and digital CNC systems. Introduction to FMS.

Course Outcome

On completion of this course the students will be able to

- Explain the robot technology as their fundamental principles, laws and illustrate the various drive systems with control strategy.
- Discuss the concepts of sensors and vision systems used to control the robots.
- Outline kinematics, programming language and & automation in robot
- Enumerate the usage of Programmable Logic Controllers in robotics
- Describe the process of computer numerical control in robots.

TEXT BOOK

1. Mikell P. Groover, "Automation Production systems and Computer Integrated, Manufacturing", Prentice-Hall, India, New Delhi, 1987. / Pearson Education, NewDelhi

REFERENCES:

1. W. Bolton, "Mechatronics", Pearson Education Asia, 2002.

2. K.S. Fu, R.C. Gonzalez and C S G Lee, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, New Delhi, 1987.

3. Mikell P. Groover, "Industrial Robotics - Technology, Programming and Applications", McGraw Hill, New Delhi, 1986.

INTERNAL ELECTIVE

PAPER - 3

(to choose one out of 3)

A. MICROCONTROLLER 8051 AND ITS APPLICATIONS

Course Objective

The students will learn:

- the architecture of 8051 Micro-controller
- the interrupts, counter, timer and serial data transmission
- the instruction set and simple programs
- interfacing peripherals

UNIT - I

Microprocessor and Micro-controller - 8051 Micro-controller hardware: 8051 oscillator and clock - Program counter and data pointer - A and B CPU register - Flags and PSW - Internal memory - Internal RAM - Stack and stack pointer - Special function registers - Internal ROM. Input / output pin, ports and circuits - External memory.

UNIT - II

Counter and Timer: Counter / Timer interrupts - Timing - Timer modes of operation - Counting. Serial data input / Output: Serial data interrupt - Data transmission - Data reception - serial data transmission modes. Interrupts: Timer flag interrupt - Serial port interrupt - External interrupt - reset - Interrupt control - Interrupt priority - Interrupt destination - Software generated interrupts.

UNIT - III

Introduction - Addressing modes - Byte level logic operations - Bit level logic operations - Rotate and swap operations - Simple program. Arithmetic Operations: Introduction - Flags - Incrementing and Decrementing - Addition - Subtraction - Multiplication and Division - Simple Program.

UNIT - IV

Introduction - External data move - code memory read only data move - PUSH and POP - Opcodes - Data exchange - Simple Programs. Jump and Call instructions: Introduction - Jump and call program range - Jumps - Calls and subroutine - Interrupt and returns - more detail on interrupts - Simple programs.

UNIT - V

Keyboard interfacing - Display interface - 7 segment and LCD display - D/A conversion - A/D conversion - Stepper motor Interface.

Course Outcome

On completion of this course the students will be able to

- Explain the basic architecture of 8051 with its associated components.

- Demonstrate the functions of Counter, Timer, Serial data input / Output and Interrupts of 8051
- Illustrate the Instruction set, addressing modes and programming of 8051 microcontroller.
- Discuss the data move operations, jump and call instructions programs of 8051.
- Describe the functions and interfacing of different peripheral ICs with 8051

Text Books:

1. The 8051 Microcontroller and Architecture, Programming and Applications - *Kenneth J. Ayala,* 2/e, Penram International.

2. The 8051 Microcontroller and Embedded System - *Mohamed Ali maszidi & Janice Gillespie Maszidi*, Pearson Education.

Reference Books:

1. The 8051 Microcontroller and Architecture - *Predko Mic, 2/e*, Tata McGraw Hill Publishing Co. Ltd., New Delhi.

INTERNAL ELECTIVE

PAPER - 3

B. COMPUTER NETWORKS

Course Objective

The students will learn:

- provides a general introduction to computer networking that would be useful to all personnel who deal with distributed systems,
- encompassing both technical and managerial aspects.
- to help students better understand the challenges and opportunities faced by modern business,
- topics include LAN and WAN implementations, the Internet and internet applications.

UNIT - I

Network structure Point to Point, Broadcast, Multicast - Horizontal and vertical distribution - Star, Mesh, tree, bus structures - OSI 7 layer model - Architecture - Functions of layers - Packet switches, circuit switching and message switching.

UNIT - II

Physical layer - Transmission media - Channel allocation methods - ALOHA, S-ALOHA, FINITE ALOHA - LAN Protocols IEEE802.3, 802.4, 802.5, 802.6 and 802.11.

UNIT - III

Data link layer - Framing - Error detection - Error correction - CRC - Stop and wait - Go band N - Sliding window Protocol - Selective repeat.

UNIT - IV

Network layer - Routing algorithms and congestion control algorithms - Repeaters, Bridges, Routers and Gateways, Internetworking - Introduction to transport layer and session layer.

UNIT - V

Presentation layer - coding, compression and cryptography - Introduction to Application layer - High performance networks - ATM, Fast Ethernet, FDDI, DQDB, SONET and SDH.

Course Outcome

On completion of this course the students will be able to

- Illustrate various Network structures and explain ISO OSI layers
- Describe the role of communication and physical layer protocols in computer networks
- Describe the concepts of data link layer services and protocols with various connecting devices
- Analyze the operations of the network layer protocols and its applications.
- Explain the Presentation layer and application layer protocols and various other networks.

Text Books:

1. Computer Networks - *Andrew S. Tanenbaum*, 4/e, Pearson Education, 2005.
2. Data and Computer Communication - *W. Stallings*, 7/e, Pearson Education, 2006.

Reference Books:

1. Introduction to Data Communications and Networking - *Behrouz & Forouzan*, 4/e, McGraw Hill Book Company, 2004.

2. Telecommunication Networks - Protocols Modeling and Analysis - *Misha Stewartz*, 2/e, Pearson Education, 2002.

INTERNAL ELECTIVE

PAPER - 3

C. PROGRAMMABLE LOGIC CONTROL

Course Objective

- To learn about the programmable logic control and circuit and describe the general type of application in which a programmable logic controller would best be used, and give examples.

UNIT - I

Programmable Logic Introduction, programmable Logic structures Programmable Logic Arrays (PLAs), Programmable Array Logic (PALs), Programmable Gate Arrays (PGAs), Field Programmable Gate Arrays (FPGAs) Sequential network design with Programmable Logic Devices (PLDs) Design of sequential networks using ROMs
and PLAs Traffic light controller using PAL.

UNIT - II

Programmable Logic Controllers (PLCs) Introduction Parts of PLC Principles of operation PLC sizes PLC hardware components I/O section Analog I/O section Analog I/O modules, digital I/O modules CPU Processor memory module Programming devices Diagnostics of PLCs with Computers.

UNIT - III

PLC programming Simple instructions Programming EXAMINE ON and EXAMINE OFF instructions Electromagnetic control relays Motor starters Manually operated switches Mechanically operated and Proximity switches Output control devices Latching relays PLC ladder diagram Converting simple relay ladder diagram in to PLC relay ladder diagram.

UNIT - IV

Timer instructions ON DELAY timer and OFF DELAY timer counter instructions Up/Down counters Timer and Counter applications program control instructions Data manipulating instructions math instructions.

UNIT - V

Applications of PLC Simple materials handling applications Automatic control of warehouse door Automatic lubricating oil supplier Conveyor belt motor control Automatic car washing machine Bottle label detection Process control application.

Course Outcome

On completion of this course the students will be able to

- Discuss the configuration different types of Programmable Logic Devices.
- Understand the basics of PLC system and its components.
- Develop the basic programming techniques of PLC and ladder logic.
- Use Timer instructions to build basic programming of PLC

Text Books:

1. Charles H. Roth, Jr “Fundamentals of Logic Design ", Fourth Edition, Jaico Publishing house, 1999.
2. Frank D. Petruzella " Programmable Logic Controllers ", McGraw- Hill book, company, 1989.
3. Siemens “PLC Handbook ".

Reference Books

1. William I. Fletcher “An Engineering Approach to Digital Design ", Prentice, Hall of India Ltd., New Delhi, 1999.

SKILL BASED SUBJECT

PAPER - 4

CELLULAR PHONES: PRINCIPLES AND PRACTICE

Course Objective

- The basic principles of the modern mobile and wireless communication systems and their generation

UNIT - I

THE CELLULAR SYSTEM

Background - The cellular concept - interference Vs capacity, cell splitting, sectorisation. The cellular system-mobile location, in call handover and power control in cell planning. TACS standard. The cellular network - Base stations, MSC, services.

UNIT - II

INTRODUCTION TO MOBILE DEVICES

Device overview - Input mechanisms - keypad input, pen-based input and voice input. Mobile phone classifications - web enabled phones - Low end smart phones - palm sized PDA - High end smart phones.

UNIT - III

CELLULAR TECHNOLOGY

Introduction - RF issues - Digital modulation - Power control - Frequency hoping. Signal processing - Digital speech coding - Channel coding and decoding. Software - Radio system software, network management software.

UNIT - IV

MESSAGING AND SECURITY

Mobile messaging – SMS, EMS,MMS, instant messaging. Message value chain – Wireless carrier, mobile message oriented middlewere (MOM). Security threats – spoofing, sniffing, tampering, theft.

UNIT - V

MOBILE STANDARDS

WPAN standards - IrDA, Bluetooth, 1G, 2G standards, 2.5G applications. 3G devices and applications. Network protocols - TDMA (2G), GSM (2G), CDMA one (2G), PDC 2(G), GPRS (2.5G), CDMA 2000 1x (2.5G), EDGE (3G), CDMA 2000 1xEV (3G), WCDMA (G).

Outcome Course

On completion of this course the students will be able to

- Explain the functioning of basic cellular communications systems
- Discuss the components of mobile devices and it's working.
- Elaborate the concept of Cellular Technology

- Describe the process of messaging and security features in cell phones.
- Outline the Mobile Standards in practice.

Text books:

1. Martyn Mallick, Mobile and Wireless Design Essentials, Wiley Publishing, Inc, New Delhi. 2006.
2. R.C.V.Macario, Personal and Mobile Radio Systems, IEE Telecommunications series 25, 1996.

Reference books:

1. Principles of Modern Wireless Communication Systems' by Aditya K Jagannatham-2017

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