THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. ELECTRONICS SCIENCE

DEGREE COURSE
CBCS PATTERN
(With effect from 2012-2013)

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	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	3	Fundamentals of Electricity and Electronics	25	75	100
4	IIII	Core Practical	Practical- 1	3	0		0	0	0
5	III	ALLIED-1	Paper-1	7	4	Basic Mathematics I	25	75	100
6	IV	Environ. Studies		2	2	Environmental Science	10	40	50
				30	**17**		**110**	**340**	**450**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
7	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
8	II	English	Paper-2	4	4	English	25	75	100
9	III	Core Theory	Paper-2	6	3	Electromagnetism and AC Circuits	25	75	100
10	III	Core Practical	Practical-1	3	3		40	60	100
11	III	ALLIED-1	Paper-2	7	6	Basic Mathematics II	25	75	100
12	IV	Value Education		2	2	Value Education	10	40	50
13	IV	Soft Skill		2	1	Soft Skill	10	40	50
				30	**23**		**160**	**440**	**600**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	III	Core Theory	Paper-3	5	4	Physics of Materials	25	75	100
15	III	Core Theory	Paper-4	5	4	Analog Electronics	25	75	100
16	III	Core Theory	Paper-5	5	4	Programming in C	25	75	100
17	III	Core Practical	Practical-2	3	0	A. Computer Programming B. Electronics Experiments	0	0	0
18	III	ALLIED-2	Paper-3	7	4	Basic Physics I	25	75	100
19	IV	Skill based Subject	Paper-1	3	3	Principles and Utilization of Electronic Domestic Appliances	15	60	75
20	IV	Non-major elective	Paper-1	2	2	Basic Electronics	10	40	50
				30	**21**		**125**	**400**	**525**

S.No.	Part	Study Components / Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
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	3	Digital Electronics	25	75	100
24	III	Core Practical	Practical-2	3	3	A. Computer Programming B. Electronics Experiments	40	60	100
25	III	ALLIED-2	Paper-4	7	6	Basic Physics II	25	75	100
26	IV	Skill based Subject	Paper-2	3	3	Trouble shooting and Maintenance of Audio and video equipments	15	60	75
27	IV	Non-major elective	Paper-2	2	2	Fundamentals of Electronic Communication	10	40	50
				30	**25**		**165**	**460**	**625**
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
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	6	Electrical and Electronic Instrumentation	25	75	100
31	III	Core Practical	Practical-3	3	0		0	0	0
32	III	Core Practical	Practical-4	3	0		0	0	0
33	III	Elective	Paper-1	3	3	**(to choose any 1 out of 3)** A. Medical Electronics B. Industrial Electronics C. PCB Design and Fabrication	25	75	100
34	IV	Skill based Subject	Paper-3	3	3	Data Processing and Personal Computers	15	60	75
				30	**24**		**115**	**360**	**475**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
35	III	Core Theory	Paper-12	8	8	Television and Video Engineering	25	75	100
36	III	Core Practical	Practical-3	3	3		40	60	100
37	III	Core Practical	Practical-4	3	3		40	60	100
38	III	Core	Paper-13	7	6	Core: Industrial Training (Internal)	100	0	100
39	III	Elective	Paper-2	3	3	**(to choose any 1 out of 3)** A. Power Electronics B. Digital System Design C. Robotics and Automation	25	75	100
40	III	Elective	Paper-3	3	3	**(to choose any 1 out of 3)**	25	75	100

S.No.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
						A. Microcontroller 8051 and its Applications B. Computer Networks C. Programmable Logic Control			
41	IV	Skill based Subject	Paper-4	3	3	Cellular Phones: Principles and Practice	15	60	75
42	V	Extension Activities		0	1	Extension Activities	50	0	50
		TOTAL		**30**	**30**		**320**	**405**	**725**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	2	4	8	100	200
Part II	English	2	4	8	100	200
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	6	12	100	200
	Electives	3	3	9	100	300
	Core	12	(3-7)	44	100	1200
	Core Internal	1	6	6	100	100
	Core Practical	4	(2-5)	23	100	400
Part IV	Environmental Science	1	2	2	50	50
	Soft Skill	1	1	1	50	50
	Value Education	1	2	2	50	50
	Lang. & Others/NME	2	2	4	50	100
	Skill Based	4	3	12	75	300
Part V	Extension	1	1	1	50	50
	Total	**38**		**140**		**3400**

THIRUVALLUVAR UNIVERSITY

B.Sc. ELECTRONICS SCIENCE

SYLLABUS
UNDER CBCS PATTERN
(With effect from 2012-2013)

SEMESTER I

PAPER - 1

FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

OBJECTIVES:

The students will learn:

a. Basics of electrostatics, Gauss theorem and its applications,
b. Concept of a capacitor, various types of capacitors and dielectric constant,
c. Magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter.
d. Basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits, and
e. Transistor and its three modes of operation, h-parameter model of a transistor 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 - Kelvin's attracted disc electrometer - 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 and high range voltmeters - Calibration of Low range ammeter.

Magnetic Effect of Current: Biot-Savart's law [Force on a conductor carrying current placed in a magnetic field - 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 - h parameters.
Basis logic gates AND, OR, and NOT - Construction of basic logic gates using diodes and transistors.

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.

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

Objectives:

To explore the fundamental concepts of Mathematics.

UNIT-I

Partial fractions, Binomial, Exponential, logarithmic series (No proof) summation problems.

UNIT-II : THEORY OF EQUATIONS

Relation between the roots and coefficients, solution under simple conditions, formation and solution of equations with imaginary roots, transformation of equation by increasing, decreasing or multiplying the roots by a constant, Reciprocal Equation.

UNIT-III : MATRICES

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

UNIT-IV : TRIGONOMETRY

Complex numbers, modulus - amplitude form, Demoivres theorem (without proof) & its applications, Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ

UNIT-V: HYPERBOLIC FUNCTIONS

Definition, Relation between circular & hyperbolic functions - Separation into real & imaginary parts, Logarithm of a complex number, Simple problems.

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

SEMESTER II

PAPER - 2

ELECTROMAGNETISM AND AC CIRCUITS

Objectives:

The students will learn:

a. The concepts of electromagnetic induction and its applications and eddy currents,
b. Resonant circuits with RC, LR and LCR combinations and the power factor of an AC circuit,
c. Power generation, three phase AC, DC motors and induction motors,
d. 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 - Induction and its uses - 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 - Wattless current - Chock coil - AC circuit having capacitance and resistance - AC circuit having LCR - Resistance and Impedance - Series and parallel resonant circuits.

UNIT-III

AC Circuits: Construction and working of transformers - Losses - Skin effect - 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 - High resistance by leakage - 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, Shunt and Compound wound dynamos and their characteristics - DC Motor - Principles of Induction Motor.

UNIT-V

Maxwell's Equation: Full electromagnetic theory of electromagnetic waves- Maxwell's equations - Derivations in integral and differential forms.

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 I

Objectives:

After performing these experiments, the students will understand the concepts and working of various instruments like potentiometer, Post Office box, B.G., galvanometer and its conversion into voltmeter and ammeter, Zener diode, transistor, construction of power supply, logic gates, wave shaping circuits.

1. Potentiometer - Calibration of low range ammeter.
2. Potentiometer - Calibration of high range voltmeter.
3. Cary-Foster Bridge - Determination of specific resistance.
4. Post Office Box - Temperature coefficient of resistance.
5. Study of series resonant circuit.
6. Study of parallel resonant circuit.
7. Conversion of galvanometer into voltmeter, ammeter and ohmmeter.
8. Characteristics of Zener diode.
9. Transistor characteristics in CE mode.
10. Regulated power supply using Zener diode.
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 (6 V to 9 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.

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

ALLIED - 1

PAPER - 2

BASIC MATHEMATICS II

Objectives:

To explore the fundamental concepts of Mathematics.

UNIT-I : DIFFERENTIAL CALCULUS

Logarithmic differentiation, parametric differentiation, Differentiation of implicit function, Application of differentiation: Maxima and minima, successive differentiation, nth derivative of standard functions Leibnitz Theorem (with out proof).

UNIT-II: DIFFERENTIAL CALCULUS (CONTD)

Polar coordinates - Angle between the radius vector and the tangent, Angle of intersection of 2 curves, Pedal equation of a curve. Partial differentiation: Euler's theorem on homogeneous functions Jacobians.

UNIT-III: INTEGRAL CALCULUS

Integration of rational function involving algebraic expressions of the form

$$\frac{1}{ax^2+bx+c}, \frac{1}{\sqrt{ax^2+bx+c}}, \frac{px+q}{ax^2+bx+c} \frac{px+q}{ax^2+bx+c} \frac{\sqrt{px+q}}{\sqrt{ax^2+bx+c}}$$

integrations using simple substitutions integrations involving trigonometric functions of the form

$$\frac{1}{a+b\cos x}, \frac{1}{a^2\sin^2 x+b^2\cos^2 x},$$

Integration by parts, Bernoulli's formula.

UNIT-IV : INTEGRAL CALCULUS (CONTD)

Properties of definite Integral, Reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, (n +ve integer) Evaluation of $\int_0^{\pi/2} \sin^n x\,dx$, $\int_0^{\pi/2} \cos^n x\,dx$. Fourier series for a function defined on $(0, 2\pi)$ or $(-\pi,\pi)$.

UNIT-V : ORDINARY DIFFERENTIAL EQUATION

Second order linear differential equation with constant coefficient,
Partial differential equation : Formation of equation by elimination of constants and arbitrary functions. Complete intergrals & general intergrals, Four standard types.

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

SEMESTER III

PAPER - 3

PHYSICS OF MATERIALS

Objectives:

The students will learn**:**

a. Structure of crystals and their characterization using X-rays.

b. Electron theory and energy bands in solids.

c. Basics of PN junction, expression for potential barrier.

d. Hall effect and its applications.

UNIT-I

Boding 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 - Wiedman-Franz law - Phonons - Matheissen's rule - Effective mass.

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.
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.

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

Objectives:

The students will learn:

a. the design and working of RC coupled amplifiers, transformer coupled amplifiers and power amplifiers,

b. the concept of negative and positive feedback,

c. pulse shaping and Schmitt trigger, and

d. 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, bistable and astable multivibrators - Schmitt trigger.

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

Objectives:

The students will learn the rudiments of computer programming using 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, goto 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 - Multifile 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.

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

Objectives:

Physics is the basis for all the advanced technologies like electronics, communication, nanotechnology, embedded system, VLSI design, etc. To have a thorough knowledge about general Physics, "Basic Physics" is introduced as Allied Subject II.
In Basic Physics I, students will learn Kinematics, Gravitation, Properties of matter, Heat and thermodynamics and Sound.

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 forge - Centrifuge - Banking of curved tracks.
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

Kinetic theory of gases: Vander Waal's equation of state - Critical constants - Joule-Kelvin effect - Temperature of inversion - Production of low temperatures - Liquefaction of gases - Linde's process.
Thermal Conductivity: Coefficient of thermal conductivity - Thermal conductivity of a bad conductor by Lee's disc method.
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's string - Frequency of vibrator.
Acoustics of Buildings and Ultrasonics: Reverberation - Time of reverberation - Sabine's formula - Absorption coefficient - Production and uses of ultrasonic waves.

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

PRINCIPLES AND UTILISATION OF ELECTRONIC DOMESTIC APPLIANCES

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.

BOOKS FOR STUDY:

1. Consumer Electronic - S.P. Bali, Pearson Education, New Delhi, 2005.

NON-MAJOR ELECTIVE

PAPER - 1

BASIC ELECTRONICS

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 feed back amplifiers.

UNIT-IV: Oscillators & Switching circuits

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

Books for study:

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

Book for Reference:

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

Objectives:

The students will learn:

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

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

Objectives:

The students will learn:

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

UNIT-I

Antenna - Effective resistance - Efficiency - Directive gain - Bandwidth, Beam width and polarization - Dipole - Folded dipole - Arrays - Yagi - Uda - Helical - Discone - Parabolic - Dish Antennas - Ground wave, sky wave and space ware propagation - Skip distance - Maximum usable frequency.

UNIT-II

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-III

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-IV

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

UNIT-V

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

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.

PAPER - 8

DIGITAL ELECTRONICS

Objectives:

The students will learn:

a. number systems and the interconversion between them, Boolean algebra and the simplification of logic circuits using Karnaugh map,
b. arithmetic circuits, multiplexing and demultiplexing operations and a few logic families,
c. various flip-flops, design of registers and counters, and the architecture and applications of Timer 555, and
d. 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.

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

Objectives:

The students will learn to write simple programs in C language. After performing the electronics experiments, the students will understand:

1. The generation of electric pulses, their width and duration,
2. Characteristics of semiconductor devices such as UJT, JFET and SCR,
3. 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.

Reference 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.
3. **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

Objectives:

Physics is the basis for all the advanced technologies like electronics, communication, nanotechnology, embedded system, VLSI design, etc. To have a thorough knowledge about general Physics, "Basic Physics" is introduced as Allied Subject II.

In Basic Physics II, students will learn Optics and Spectroscopy, Modern Physics, 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.

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

TROUBLE SHOOTING AND MAINTENANCE OF AUDIO AND VIDEO EQUIPMENTS

UNIT-I

Recording and reproduction principles - Optical recording - Different types - Methods of recording and reproduction - Optical recording on compact disc - play back process - Advantage of compact disc - Trouble shooting in compact disc.

UNIT-II

Stereophony - Stereophonic recording on disc and reproduction - Hi-Fi Stereo reproducing system - Block diagram of Public Addressing system - Requirement of Public Addressing system - Typical PA installation planning for a public meeting - PA system for an auditorium troubleshooting in PA system.

UNIT-III

Monochrome, PAL colour TV transmitters Faults in TV transmitter - Testing of TV transmissions monochrome TV receiver - Fault in monochrome TV receiver - PAL colour TV receiver - Faults in colour TV receiver - Testing of TV receiver.

UNIT-IV

Video disc format - Video recording on disk - Very High density disk - High definition TV system - Block diagram of MAC encoder - MAC receiver - Advantages.

UNIT-V

Digital TV system - Cable TV concepts set top box - Dish TV and connections - Closed circuit television - Introduction to FLAT LCD and Plasma television systems.

TEXTBOOKS:

1. Electronic Instruments and systems, Principles, Maintenance and Troubleshooting - R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.
2. Colour Television Theory and Practice - S.P. Bali, Tata Mc Graw Hill Publishing Co.Ltd.

REFERENCE BOOKS:

1. Audio and Video systems - R.G. Gupta Tata Mc Graw Hill Publishing Co.Ltd.
2. Monochrome and Colour Television - R. Gulati. New Age Interbational (P) Ltd. New Delhi.

NON-MAJOR ELECTIVE

PAPER - 2

FUNDAMENTALS OF ELECTRONIC COMMUNICATION

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-IV: 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.

Books for Study and Reference:

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

Objectives:

The students will learn:

a. Architecture of 8085 microprocessor, instruction sets, addressing modes and programming exercises
b. Stacks and stack operations
c. Interfacing memory devices
d. Interfacing 8085 microprocessor with input/output devices, and
e. 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.

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

Objectives:

The students will learn:

a. basics of digital cellular system, cordless telephony and cell structure

b. GSM wireless protocol and markup language fundamentals

c. 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

Third generation mobile services - Wireless local loop - Bluetooth technology.

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

Objectives:

The students will learn:

a. Basic concepts of indicating instruments.
b. Various electronic instruments such as CRO, storage oscilloscopes, function generators, spectrum analyzer etc.,
c. 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 Analysers: Instrumentation amplifier - Electronic Voltmeter and Multimeter - Digital Voltmeter - Function Generator - Wave Analyser - Fundamentals of Spectrum Analyser.

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.

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.

ELECTIVE

PAPER -1

A. MEDICAL ELECTRONICS

Objectives:

After studying this paper, 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 isotopes 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.

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.

B. INDUSTRIAL ELECTRONICS

Objectives:

The students will learn:

a. the applications of devices such as thyratron, ignitron, thyristor, SCR, UJT in industry
b. the construction of power supplies
c. the working of motors and their control
d. 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 Ultrasonics - Application of LASER in Industry.

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.

C. PCB DESIGN AND FABRICATION

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.

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, NewDelhi.

SKILL BASED SUBJECT

PAPER - 3

DATA PROCESSING AND PERSONAL COMPUTERS

Objectives:

The students will learn:

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

UNIT-I

The 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

The 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.

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*.

SEMESTER VI

PAPER - 12

TELEVISION AND VIDEO ENGINEERING

Objectives:

The students will learn:

a. Principles of TV system, and overall view of complete TV system such as picture tube, transmitter, receiver, etc.,
b. World TV transmission standards.
c. Working of a black and white and colour TV receiver electronics.
d. 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.

Text Books:

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

Objectives:

After performing these experiments, the students will understand:

a. the construction of dual power supply using Zener diode and IC

b. application of Op-amp

c. Universality of NAND and NOR gates and verification of Boolean identities using them

d. Multi-vibrators and their applications

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. Universality of NAND gate.
10. Universality of NOR gate.
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.

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

Objectives:

After performing these experiments, the students will understand:

a. AM, FM and PM modulation and detection techniques.

b. Adder, subtractor circuits and counters using logic gates.

c. Application of microprocessor in basic mathematical function, code conversion and DAC.

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.

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.

ELECTIVE

PAPER - 2

A. POWER ELECTRONICS

Objectives:

The students will learn:

a. The working of power semiconductor devices such as power diode, power transistor, TRIAC, MOSFET, IGBT.

b. The different types of rectifiers for single phase and three phase controls.

c. 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.

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.

B. DIGITAL SYSTEM DESIGN

Objectives:

The students will learn:

a. The fundamentals of Boolean algebra and simplification of Boolean functions.

b. The combinational logic circuits and their design using HDL.

c. 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.

Text Books:

1. **Digital Logic and Computer Design -** *M. Morris Mano,* Prentice Hall of India Private Limited.
2. **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.

C. ROBOTICS AND AUTOMATION

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.

TEXT BOOK

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

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.

ELECTIVE

PAPER - 3

A. MICROCONTROLLER 8051 AND ITS APPLICATIONS

Objectives

The students will learn:

a. the architecture of 8051 Micro-controller

b. the interrupts, counter, timer and serial data transmission

c. the instruction set and simple programs

d. 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.

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.

B. COMPUTER NETWORKS

Objectives:

The students will learn:

a. provides a general introduction to computer networking that would be useful to all personnel who deal with distributed systems,
b. encompassing both technical and managerial aspects.
c. to help students better understand the challenges and opportunities faced by modern business,
d. 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.

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.

C. PROGRAMMABLE LOGIC CONTROL

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.

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:

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

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), WCMA (G).

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.

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