

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

DEGREE COURSE

B.Sc. ELECTRONICS

UNDER CBCS

[with effect from 2008-2009]

The Course of Study and the Scheme of Examinations

Year/ Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
I Year I Semester	I	Language	Paper I		6	3	3	25	75	100
	II	English	Paper I		6	3	3	25	75	100
	III	Core	Paper I	Fundamentals of Electricity and Electronics	6	3	3	25	75	100
	III	Core Practical	-		3	-	-	-	-	-
	III	Allied	Paper I	Basic Mathematics I	7	5	3	25	75	100
	IV			Environmental Studies	2	2	3	25	75	100
I Year II Semester	I	Language	Paper II		6	3	3	25	75	100
	II	English	Paper II		6	3	3	25	75	100
	III	Core	Paper II	Electromagnetism and AC Circuits	6	3	3	25	75	100
	III	Core Practical	Practical I		3	6	3	40	60	100
	III	Allied	Paper II	Basic Mathematics II	7	5	3	25	75	100
	IV			Value Education	2	2	2	-	50	50
II Year III Semester	III	Core	Paper III	Physics of Materials	5	3	3	25	75	100
	III	Core	Paper IV	Analog Electronics	5	3	3	25	75	100
	III	Core	Paper V	Programming in C	5	3	3	25	75	100
	III	Core Practical		a. Computer Programming b. Electronic Experiments	3	-	-	-	-	-
	III	Allied	Paper III	Basic Physics I	7	5	3	25	75	100
	IV	Skill Based Elective I	Paper I	Principles and Utilisation of Electronic Domestic Appliances	3	3	3	25	75	100
		Non-Major Elective I	Paper I	Basic Electronics	2	2	3	25	75	100
II Year IV Semester	III	Core	Paper VI	Semiconductor Devices and IC Fabrication Technology	5	3	3	25	75	100
	III	Core	Paper VII	Electronic Communication Systems	5	3	3	25	75	100
	III	Core	Paper VIII	Digital Electronics	5	3	3	25	75	100

B.Sc. Electronics : Syllabus (CBCS)

Year/ Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
	III	Core Practical	Practical II	a. Computer Programming (Internal 30+10=40 marks) b. Electronic Experiments (External 50+10=60 marks)	3	5	3	40	60	100
	III	Allied	Paper IV	Basic Physics II	7	5	3	25	75	100
	IV	Skill Based Elective II	Paper II	Trouble shooting and Maintenance of Audio and video equipments	3	3	3	25	75	100
		Non-Major Elective II	Paper II	Fundamentals of Electronic Communication	2	2	3	25	75	100
III Year V Semester	III	Core	Paper IX	Microprocessor and its Applications	5	5	3	25	75	100
	III	Core	Paper X	Cellular Mobile Communication	5	5	3	25	75	100
	III	Core	Paper XI	Electrical and Electronic Instrumentation	5	5	3	25	75	100
	III	Core Practical	-		3	-	-	-	-	-
	III	Core Practical	-		3	-	-	-	-	-
		Elective I	Paper I	To choose 1 out of 2 1. Medical Electronics 2. Industrial Electronics	6	5	3	25	75	100
	IV	Skill Based Elective III	Paper III	Data Processing and Personal Computers	3	3	3	25	75	100
III Year VI Semester	III	Core	Paper XII	Television and Video Engineering	5	5	3	25	75	100
	III	Core Practical	Practical III		4	6	3	25	75	100
	III	Core Practical	Practical IV		4	6	3	25	75	100
		Core		Core: Industrial Training (Internal)	2	4	-	100	-	100
		Elective II	Paper II	To choose 1 out of 2 1. Power Electronics 2. Digital System Design	6	5	3	25	75	100
		Elective III	Paper III	To choose 1 out of 2 1. Microcontroller 8051 and its Applications 2. Computer Networks	6	5	3	25	75	100
	IV	Skill Based Elective IV	Paper IV	Cellular Phones: Principles and Practice	3	3	3	25	75	100
	V	Extension Activities			-	1	-	-	-	50
				Total	180	140				3600

Elective Subjects (Major)

Candidates shall be offered any three of the following major Elective Subjects one in the fifth Semester and two in the sixth Semester.

1. Medical Electronics
2. Industrial Electronics
3. Power Electronics
4. Computer Networks
5. Opto Electronics
6. Digital System Design
7. Microcontroller 8051 and its Applications

THIRUVALLUVAR UNIVERSITY

B.Sc. ELECTRONICS

SYLLABUS

UNDER CBCS

[with effect from 2008-2009]

I SEMESTER

PAPER I

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 - Relative 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. Murugesan*, 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 I
PAPER I
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.

ENVIRONMENTAL STUDIES

(For all UG Degree Courses)

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES :

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

[6 hours]

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

[6 hours]

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

[6 hours]

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

[6 hours]

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

[2 hours]

REFERENCES

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004. ENVIRONMENTAL STUDIES, BHARATHIDSAN UNIVERSITY PUB, 1, TRICHY
2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHY
3. KALAVATHY,S. [ED.] 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHY

II SEMESTER

PAPER II

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. Murugesan*, 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 Thalpathi*, Comtek Publishers, Kanchipuram.

**ALLIED I
PAPER II
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

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

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.

VALUE EDUCATION
(For all UG Degree Courses)

UNIT-I

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Reference Books

1. T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)
2. Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
4. Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
5. S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.

WEBSITES AND e-LEARNING SOURCES:

www.rkmissiondhe.org/education.html/

www.clallam.org/lifestyle/education.html/

www.sun.com/./edu/progrmws/star.html/

www.infoscouts.com

www.secretofsuccess.com

www.1millionpapers.com

<http://militaryfinance.umuc.edu/education/edu-network.html/>

III SEMESTER

PAPER III

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

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

UNIT-IV

Energy bands 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 Publishers, 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 IV
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 V
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** - *Yashwant Kanetkar*, BPB Publications, New Delhi, 3/e.
5. **The Spirit of 'C'** - *H. Mullish & H.L. Cooper*, Jaico Publishing House.

**ALLIED II
PAPER III
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 force - 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 Jaeger’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. Murugesan, 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 I

PAPER I

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 I

PAPER I

BASIC ELECTRONICS

UNIT-I: Basic components used in Electronics

Resistor, 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 - Barkhausen 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.

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

IV SEMESTER

PAPER VI

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 | 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 VII

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 wave 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 Publications, 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 VIII

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 :

- a. the generation of electric pulses, their width and duration,
- b. characteristics of semiconductor devices such as UJT, JFET and SCR,
- c. 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 II
PAPER IV
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. Murugesan*, 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. Murugesan*, 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 II

PAPER II

**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 International (P) Ltd. New Delhi.

NON-MAJOR ELECTIVE II

PAPER II

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

V SEMESTER

PAPER IX

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 - Instruction 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 X

CELLULAR MOBILE COMMUNICATION

Objectives

The students will learn :

- a. basics of digital cellular system, cordless telephony and cell structure
- b. GSM wireless protocol and mark up 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** - *Rappaport*, Pearson Education, 2001.

PAPER XI

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 I

(to choose 1 out of the given 2)

PAPER I.1

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 plethsmographic 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.

PAPER I.2

INDUSTRIAL ELECTRONICS

Objectives

The students will learn :

- a. the applications of devices such as thyatron, 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 Thyatron, 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 | 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. Raj*, 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.

**SKILL BASED SUBJECT III
PAPER III**

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*.

VI SEMESTER

PAPER XII

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 II

(to choose 1 out of the given 2)

PAPER II.1

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 pulses - 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.

PAPER II.2

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.

ELECTIVE III

(to choose 1 out of the given 2)

PAPER III.1

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.

PAPER III.2

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, Inter networking - 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 Stewart*, 2/e, Pearson Education, 2002.

SKILL BASED SUBJECT IV

PAPER IV

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 hopping. 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 middleware (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).

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.
