B.Sc. Electronics

Semester-1

Mathematics-1

Paper Code: BSE-101

Unit-1:

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

Unit-2:

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-3:

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-4:

Complex numbers, modulus - amplitude form, Demoivres theorem (without proof) & its applications, Expansions of sinn θ, cosn θ, sinnθ, cosnθ, tannθ - Expansions of sin θ, cos θ, tan θ in terms of θ.

Unit-5:

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

Suggested Books

- *Allied Mathematics Vol-I, & II; P.Kandasamy, K.Thilagavathy; S.Chand & company Ltd., New Delhi-55.*
- *Allied Mathematics .Vol. I & II; S.P.Rajagopalan and R.Sattanathan; Vikas Publications, New Delhi.*
- *Allied Mathematics; P.R.Vittal; Marghan Publications, Chennai.*
- *Ancillary Mathematics. Vol. I & II; P.Balasubramanian and K.G.Subramanian; Tata McGraw Hill, New Delhi.*

B.Sc. Electronics

Semester-1

Applied Physics

Paper Code: BSE-102

Unit 1:

General Properties of Matter

Conservative forces, Rotational motion, torque, angular momentum, conservation of angular momentum, work and power in rotational motion, KE of rotation, moment of Inertia, theorems of Moment of Inertia, Moment of Inertia of rectangular plate, circular disc, circular ring, sphere (solid and hollow).

Compound pendulum, equivalent simple pendulum, centers of suspension and oscillation, four points of equal time period, conditions for minimum time period.

Elasticity: Hooke's law, different kinds of elastic constants, relation among the elastic constants, Bending of beam fixed at one end and loaded at the other end, torsion of a rod.

Unit 2:

Waves and Sound

Simple Harmonic motion, Differential equation of Simple harmonic motion, total energy of a particle executing SHM, Free, forced and damped vibration, resonance, sharpness of resonance, equation of wave motion, principle of superposition of waves, beats, stationary wave and Doppler's effect.

Acoustics: Basic requirement of good acoustic Halls, Reverberation and time of Reverberation, Sabine's formula, absorption formula and its measurement.

Ultrasonic waves- Production of ultrasonic waves, application of ultrasonic waves, principle of SONAR systems.

Unit 3:

Modern Physics I

Wave and Particle Duality: de-Broglie's hypothesis of matter waves, de-Broglie wavelength, Heisenberg's Uncertainty Principle, Its illustrations and applications, Compton Effect.

Schroendinger's time independent and time dependent equations of waves, wave function, its physical interpretation, particle enclosed in one dimensional box of infinite potential.

Unit 4:

Modern Physics II

Band theory of solids: Origin of Band Theory, types of Band, conductors, insulators and semiconductors, introduction to Superconductivity, its properties and types, BCS Theory, Applications of Superconductivity.

Preliminary ideas on Nanotechnology and its significance, properties of nanoparticles, Carbon Nanotubes and its structure, uses of nanotubes. Fibre Optics: Introduction, Principle, Structures, Types and application of fibre optics.

Suggested Books:

1) *Elements of properties of matter(By D.S. Mathur) : S. Chand.*
2) *A text book of sound- N. Subramanyam and Brijlal.*
3) *Modern Physics (R. Murugeshan and K. Sivaprasath): S. Chand*
4) *Perspective of Modern Physics, A. Beiser.*

B.Sc. Electronics

Semester-1

Basic Electronics

Paper Code: BSE-103

Unit -1:

Introduction to Electronics – Electricity – Electric Field, potential, potential difference and current – units – conventional and electron current flow – Electrical Resistance – Factors affecting Resistance – Temperature coefficient, Resistivity – Load Resistance and load current – concepts of open and short circuit, DC and AC – Ohm's law Resistance in series and parallel – KCL, KVL – Passive components –Types, construction, symbols, specifications, Identification including colour coding and Testing.

Unit -2:

Structure of solids – Conductivity properties of solid – Energy bands – Bonding in solids. Semi conductors – Types of semiconductors – P & N Types – charge carriers – charge concentration – Fermi level – Temperature dependence of carrier concentration – mobility –conductivity – Mass action law- Energy gap – Drift and Diffusion current.

Unit -3:

PN Junction – Depletion layer – Barrier potential - forward and reverse biasing – saturation current. Effect of Barrier potential – Reverse breakdown – junction capacitance – current, voltage relation – characteristics–forward and reverse – Diode current Equation – Ideal diode – static and dynamic Resistance of diode – Types of diodes –construction, characteristics, specifications and applications.

Unit -4:

Transistor –Types, construction, operation –Terminal currents – configurations –characteristics, Current Transfer ratio, leakage current, comparison – Transistor ratings –Base spreading Resistance – heat sinks – Thermal Run away.

Unit -5:

FET – introduction, Types, construction, operation, characteristics – FET Parameters– Comparison between FET and BJT– JFET, MOSFET – Types, Characteristics, features and Applications. SCR, UJT – Construction, operation, characteristics and applications.

Suggested Books:

- *Applied Electronics; R S Sedha; S.Chand and Company LTD.2nd Ed,2009.*
- *Principles of Electronics; V.K. Mehta; S.Chand and Company LTD.*
- *Basic Electronics and Linear Circuits; N.N. Bhargava and Kulsreshta; Tata McGraw-Hill Publishing LTD.*
- *Basic Electronics; B.L. Theraja; S.Chand and Company LTD.2nd Ed,2009(Revised).*
- *Solid State Physics and Electronics – R K Puri and V K Babbar – S.CHAND.2nd Ed,2010.*
- *Electronics Devices and Circuits; J. B. Gupta; Katson Educational Series.4th Ed,2011.*

B.Sc. Electronics

Semester-1

Communicative English

Paper Code: BSE-104

Credit- 4 **Full Marks 100**

OBJECTIVES:

This paper has been divided into four units. The aim of the syllabus is to make students adept in official correspondence, communication skills, grammar and writing skills. The syllabus also gives scope to the students to enjoy, understand and interpret literary texts.

Unit 1: Literary Texts (Poetry)

This particular unit will help the students to enjoy, understand and interpret poems and develop a taste for fine poetry. The texts that have been chosen to be included are as follows:

* "The Tiger" by William Blake
* "The Daffodils" by William Wordsworth
* "Ozymandias of Egypt" by Percy Bysshe Shelley

Unit 2: Literary Texts (Prose)

This particular unit will help the students to foster a taste for literary prose pieces. The texts that have been chosen to be included are as follows:

* " A Meditation Upon a Broomstick" by Jonathan Swift
* " The Necklace" by Guy de Maupassant.
* " Shooting an Elephant" by George Orwell.

Unit 3: Grammar and Usage:

* Determiners, Tenses, Voice, Suffix, Prefix, Word Formation, Antonyms and Synonyms, Homophones, One word substitution.
* Idioms and Phrases

Unit 4: Writing Skills:

This part would include areas like official correspondence, Letter to Authority, Circular, Notice, Press Releases, Writing Cvs/ Resume, Letters to Editor, features, articles, essays writing, e-mail writing, blog writing, Paragraph writing.

The second section of this part will include Comprehension and Precise Writing that will enable the students to understand a particular passage and then express their opinions in their own language. This will enhance the student's reading and writing abilities.

Suggested Readings:

1. *Nilanjana Gupta, Communicate With Confidence, Anthem Press.*
2. *V. Shyamala, Effective English Communication for You, Emerald Publisher.*
3. *Krishnamohan and Meera Bannerji, Developing Communication Skills.*
4. *R.K. Madhukar, Business Communication, Vikash Publishing house Pvt. Ltd.*
5. *Shalin Sharma, Concepts of Professional Communication, Acme Learning*
6. *Daniel Jones, English Phonetics.*

7. *R.K. Bansal and Harrison, Spoken English for India, Sec. Ed. Madras Orient Longman.*
8. *Donald Treadwell and Jill B. Treadwell, Public Relations Writing, Sec. Ed. Sage Publications, Inc.*
9. *P.D. Chaturvedi and Mukesh Chaturvedi, Business Communication Concepts, Cases and Applications, Sec. Ed. Manipal Press Limited.*
10. *Sarah Trenholm and Arthur Jensen, Interpersonal Communication, Sixth Ed. Oxford University Press.*
11. *Pulak Bhattacharyya (ed), Musings- II: A Collection of English Prose, Book Land Publishers.*
12. *David V. Erdman(ed), The Complete Poetry and Prose of William Blake, Anchor Publishers.*
13. *Guy de Maupassant, The Complete short stories of Guy de Maupassant: ten volumes in one(1903), P.F. Collier & Son Publishers.*
14. *Edgar Allan Poe, The Complete Tales and Poems of Edgar Allan Poe, Sterling Publishers.*
15. *Henry Reed(ed), The Complete Poetical Works of William Wordsworth, Troutman and Hayes Publishers.*

Percy Bysshe Shelley, The Complete Poetry of Percy Bysshe Shelley, Vol 3, JHU Press.

B.Sc. Electronics

Semester-I

Applied Physics and Basic Electronics Lab

Paper Code: BSE-105

1. Familiarization of components: Active & Passive - Identification (colour coding), Specification & Testing.
2. Familiarization of Equipments: Voltmeter, Ammeter, Multimeter (Analog & Digital), LCR meter, CRO, Function generator, Power supplies.
3. Familiarization of soldering of materials with PCB.
4. Characteristics of PN junction diode.
5. Characteristics of Zener diode.
6. Characteristics of LED.
7. Characteristics of Photo diode.
8. Characteristics of LDR.
9. Common base Transistor characteristics.
10. Common emitter Transistor characteristics.
11. Study of Wheatstone bridge.
12. Study of Potentiometer.
13. Study of Galvanometer.

B.Sc. Electronics

Semester- II

Mathematics-II

Paper code: BSE-201

Unit-1:

Logarithmic differentiation, parametric differentiation, Differentiation of implicit function, Application of differentiation: Maxima and minima, successive differentiation, nth derivative of standard functions Leibnitz Theorem (without proof).

Unit-2:

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-3:

Integration of rational function involving algebraic expressions of the form 1 , 1 , px+q px+q , px+q, ax^2+bx+c ax2+bx+c ax^2+bx+c ax2+bx+c ax2+bx+c integrations using simple substitutions integrations involving trigonometric functions of the form 1 , 1 , a+b cosx a2sin2x+b2cos2x Integration by parts, Bernoulli's formula.

Unit-4:

Properties of definite Integral, Reduction formulae for sinn x dx, cosn x dx, (n +ve integer) Evaluation of 0/2 sinn x dx, 0/2 cosn x dx. Fourier series for a function defined on (0, 2) or (-,).

Unit-5:

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

- *Allied Mathematics Vol-I, II; P.Kandasamy, and K.Thilagavathy; S.Chand & company Ltd., New Delhi-55.*
- *Allied Mathematics .Vol. I & II; S.P.Rajagopalan and R.Sattanathan; Vikas Publications, New Delhi*
- *Allied Mathematics; P.R.Vittal; Marghan Publications, Chennai.*
- *Ancillary Mathematics Vol. I & II; P.Balasubramanian and K.G.Subramanian; Tata McGraw Hill, New Delhi.*

B.Sc. Electronics

Semester-II

Electricity and Magnetism

Paper Code: BSE-202

Unit -1:

Scalars and Vectors, Vector Algebra, Rectangular (Cartesian) Coordinate System, Vector Components and Unit Vector, Vector Field, Products, Cylindrical Coordinates, Spherical Coordinates, Differential Length, Area and Volume, Line Surface and Volume integrals, Del Operator, Gradient of a Scalar, Divergence and Curl of a Vector, the Laplacian. Coulomb's Law and Electric Field Intensity, Field due to Continuous Charge Distribution, Line and Sheet of Charge. Electric Flux Density, Gauss's Law, Applications of Gauss's Law, Divergence Theorem and Maxwell's First Equation. Energy in moving a point Charge in an Electric Field, Line Integral, Potential Difference and Potential, Potential due to a Point Charge, Potential Field of a System of Charges, Electric Field and Potential, the Dipole, Energy Density in an Electric Field.

Unit -2:

Current and Current Density, Continuity of Current, Metallic Conductors, Conductor Properties and Boundary Conditions, Method of Images. Polarization in Dielectrics, Dielectric Constant, Linear, Homogeneous, Isotropic and Anisotropic Dielectrics, Boundary Conditions, Capacitance, Capacitance Examples, Capacitance of Two Wire Line, Derivation of Poisson's and Laplace's equation, Uniqueness Theorem, Examples of Solution of Laplace's Equation: Cartesian, Cylindrical and Spherical Coordinates.

Unit -3

Biot Savert's law, Ampere's Circuital Law, Curl and Stoke's Theorem, Maxwell's Equation, Magnetic Flux and Magnetic Flux Density, The scalar and Vector Magnetic Potentials, Derivation of Biot Savert's and Ampere's Law. Force on a moving Charge, Force on a Differential Current Element, Magnetic Torque and Momemt, Magnetic Dipole. Magnetization in Materials and Permeability, Anisotropic materials, Magnetic Boundary Conditions, Inductors and Inductances, Magnetic Energy, Magnetic Circuits.

Unit -4:

Faraday's and Lenz's Laws of Electromagnetic Induction: a stationary circuit in a time varying Magnetic Field, Transformer, a moving conductor in a Static Magnetic Field. Displacement Current, Maxwell's Equations: point and Integral form. Time Varying Potentials and Lorentz condition (Lorentz Gauge).

Suggested Books:

1. Engineering Electromagnetics; W. H. Hayt and J. A. Buck; Tata McGraw Hill

2. Elements of Electromagnetics; M. N. O. Sadiku; Oxford University Press

3. Field and Wave Electromagnetics; D. C. Cheng; Pearson Education

4. Electormagnetics; J. A. Edminster; Schaum Series, Tata McGraw Hill

B.Sc. Electronics

Semester-II

Semiconductor Devices & Circuits

Paper Code: BSE-203

Unit -1:

Energy band in solids (metal, semiconductor and insulators), concept of effective mass, density of states, carrier concentration at normal equilibrium in intrinsic semiconductors, derivation of Fermi level for intrinsic semiconductors, donors, acceptors, majority carriers (electrons and holes), dependence of Fermi level on temperature and doping concentration. p-n junction diode, formation of depletion layer, space charge at a junction. Derivation of electrostatic potential difference at thermal equilibrium, depletion width and depletion capacitance of abrupt p-n junction. Diode equations and the I-V characteristic. Zener and Avalanche mechanism, Zener diode.

Unit- 2:

Concepts of Ohmic & Rectifying Contacts; PNP and NPN transistors, basic transistor action, energy band diagram of transistor in thermal equilibrium, Early effect, input and output characteristics of CB, CE and CC configurations; Construction, working and I-V characteristics of UJT; Basic construction and Characteristics of Thyristor, Semiconductor Controlled Device (SCR), Characteristics and two transistor model of SCR.

Unit -3:

Construction of JFET, idea of channel formation, pinch-off voltage, Transfer and output characteristics, MOS Diode, Basic Construction of MOSFET and working, I-V characteristics, enhancement and depletion modes. Complimentary MOS (CMOS).

Unit- 4:

Introduction to semiconductor technology. Basic fabrication steps: Wafer, epitaxial growth, oxidation, photolithography, etching, diffusion, ion implantation, film deposition and metallisation. Moore's Law, Medium Scale Integration (MSI), Large Scale Integration (LSI),

Very Large Scale Integration (VLSI), Ultra Large Scale Integration (ULSI), Giant Scale Integration (GSI).

Suggested Books:

1. Semiconductor Devices: Physics and Technology; S. M. Sze; John Wiley & Sons

2. Solid State Electronic Devices; Ben Streetman and S. Banerjee; Pearson Education

3. Semiconductor Devices: Basic Principles; Jasprit Singh; John Wiley and Sons

4. Semiconductor Devices; Kanaan Kano; Pearson Education

5. Semiconductor Device Fundamentals; Robert F. Pierret; Pearson Education

B.Sc. Electronics

Semester-II

Environmental Studies

Paper Code: BSE-204

(Common for all under Graduate Program)

Unit 1: Multidisciplinary nature of environmental studies:

- Definition, scope and importance
- Need for public awareness.

Unit 2: Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.

• Introduction, types, characteristic features, structure and function of the following ecosystem :-

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4 : Biodiversity and its conservation

• Introduction – Definition: genetic, species and ecosystem diversity.

• Biogeographical classification of India

• Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values

• Biodiversity at global, National and local levels.

• Inida as a mega-diversity nation

• Hot-sports of biodiversity.

• Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

• Endangered and endemic species of India

• Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit 5: Environmental Pollution

Definition

• Cause, effects and control measures of:-

a. Air pollution

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

• Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

• Role of an individual in prevention of pollution.

• Pollution case studies.

• Disaster management: floods, earthquake, cyclone and landslides.

Unit 6: Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

Unit 7: Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

Unit 8: Field work

- Visit to a local area to document environmental assets-river/ forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural

• Study of common plants, insects, birds.

• Study of simple ecosystems-pond, river, hill slopes, etc.

(Field work Equal to 5 lecture hours)

SIX MONTHS COMPULSORY CORE MODULE COURSE IN ENVIRONMENTAL STUDIES: FOR UNDERGRADUATES

Teaching Methodologies:

The core Moudle Syllabus for Environment Studies includes class room teaching and Field Work. The syllabus is divided into eight units covering 50 lectures. The first seven units will cover 45 lectures which are class room based to enhance knowledge skills and attitute to environment. Unit eight is based on field activites which will be covered in five lecture hours and would provide student first hand knowledge on varios local environmental aspects. Field experience is one of the most effective learning tools for environmental concerns. This moves out of the scope of the text book mode of teaching into the realm of real learning in the field, where the teacher merely acts as a catalyst to interpret what the student observes or discovers in his/her own environment.

Field studies are as essential as class work and form an irreplaceable synergistic tool in the entire learning process.

Course material provided by UGC for class room teaching and field activities is utilized.

The universities/colleges can also draw upon expertise of outside resource persons for teaching purpose.

Environmental Core Module shall be integrated into the teaching programmes of all undergraduate courses.

Annual System: The duration of the course will be 50 lectures. The exam will be conducted along with the Annual Examination.

Semester System: The Environment course of 50 lectures will be conducted in the second semester and the examination shall be conducted at the end of the second semester.

Credit System: The course will be awarded 4 credits.

Exam Pattern: In case of awarding the marks, the question paper should carry 100 marks. The structure of the question paper being:

Part-A, Short answer pattern - 25 marks

Part-B, Essay type with inbuilt choice - 50 marks

Part-C, Field Work - 25 marks

REFERENCE

a) Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.

b) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,

Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)

c) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

d) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

e) Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p

f) De A.K., Environmental Chemistry, Wiley Eastern Ltd.

g) Down to Earth, Centre for Science and Environment (R)

h) Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p

i) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)

j) Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.

k) Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.

l) Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.

m) Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)

n) Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)

o) Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p

p) Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.

q) Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut

r) Survey of the Environment, The Hindu (M)

s) Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)

t) Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards, Vol I and II, Enviro Media (R)

u) Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)

v) Wanger K.D., 1998 Environmental Management. W.B. Saunders Co.

Philadelphia, USA 499p

(M) Magazine

(R) Reference

(TB) Textbook

B.Sc. Electronics

Semester-II

Electronics Circuits Lab-1

Paper Code: BSE-205

- Diode clipper circuit and characteristics.
- Clamper circuit and characteristics.
- Voltage doubler circuit and its characteristics.
- Common Collector input and output characteristics of BJT.
- Zener diode as voltage regulator circuit.
- Application of Diode as Half wave rectifier.
- Application of Diode as Full wave rectifier.
- Design of Power supply (±5, ±12v).
- Half wave rectifier filter circuit.
- Full wave rectifier filter circuit.

B.Sc. Electronics

Semester -III

Digital Electronics

Paper code: BSE-301

Unit -1:

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 -2:

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 -3:

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 -4:

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 -5:

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.

Suggested Books:

- *Digital Design by M Morris Mano and M D Ciletti, PHI Pvt. Ltd, 4th Edition, 2007.*
- *Digital Electronics Circuit and System by V.K. Puri; Tata McGraw Hill; 1st edition, 1997.*
- *Introduction to Digital Electronics by NIIT; Prentice-Hall India; 1st edition, 2004.*
- *Digital Electronics: Principles And Integrated Circuits; Anil K. Maini; Wiley India (P) Ltd.*
- *Electronic Principle; A. Malvino and D. J. Bates; Tata McGraw Hill education. Modern Digital Electronics; Bijendra N Jain, R P Jain, Jain R P; McGraw-Hill Science.*
- *Fundamental of Digital Circuits by A. Anand Kumar; PHI; 2nd Ed.; 2009*

B.Sc. Electronics

Semester -III

Analog Electronics

Paper code: BSE-302

Unit -1:

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 -2:

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 -3:

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

Unit -4:

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 -5:

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

Suggested Books:

- *Electronic Devices and Circuits by David A. Bell, PHI, 5th Edition, 2008.*
- *Physics of semiconductor devices by S.M Sze, John Wiley.*
- *Semiconductor devices- J. Singh, Mcgrawhill.*
- *Solid State Electronic Devices by Ben G. Streetman and Benerjee, PH, 5th Ed., New Delhi, 2006.*
- *Electronic Devices and circuit Theory by Boylestad and Nashelsky, PHI, 9th Ed., 2006.*
- *Electronic Circuits Analysis and Design by D.A. Neamen, Tata Mcgrow Hill, 4th Edition, 2007.*
- *Basic Electronics and Linear Circuits; N.N. Bhargava and Kulsreshta; Tata McGraw-Hill Publishing LTD.*
- *Basic Electronics; B.L. Theraja; S.Chand and Company LTD.*
- *Principles of Electronics; V.K. Mehta; S.Chand and Company LTD*
- *Electronics Devices and Circuits by J. B. Gupta, Katson publishers, 5th Edition, 2012.*

B.Sc. Electronics

Semester-III

Signals and Systems

Paper code: BSE-303

Unit -1:

Signals and Systems: Continuous and discrete time signals, Transformation of the independent variable, Exponential and sinusoidal signals, Unit impulse and unit step functions, Continuous-Time and Discrete- Time Systems, Basic System Properties.

Unit -2:

Linear Time-Invariant Systems (LTI): Discrete time LTI systems, the Convolution Sum, Continuous time LTI systems, the Convolution integral. Properties of LTI systems, Commutative, Distributive, Associative, LTI systems with and without memory, Invertibility, Causality, Stability, Unit Step response. Differential and Difference equation formulation, Block diagram representation of first order systems.

Unit -3:

Fourier Series Representation of Periodic Signals: Continuous-Time periodic signals, Convergence of the Fourier series, Properties of continuous-Time Fourier series, Discrete-Time periodic signals, Properties of Discrete-Time Fourier series. Frequency-Selective filters, Simple RC high pass and low pass filters, Discrete-Time filters, Recursive, Non-recursive filter.

Fourier Transform: Aperiodic signals, Periodic signals, Properties of Continuous-time Fourier transform, Convolution and Multiplication Properties, Properties of Fourier transform and basic Fourier transform Pairs.

Unit -4:

Laplace Transform: Laplace Transform, Inverse Laplace Transform, Properties of the Laplace Transform, Laplace Transform Pairs, Solving Differential Equations with Intial conditions, Laplace Transform Methods in Circuit Analysis, Step response of RL, RC and RLC circuits, Impulse response of series RC, Sinusoidal response of RL circuit.

Suggested Books:

1.Signals and Systems by P. R. Rao; Tat McGraw Hill.

2. Signals and Systems by S.Sharma, Katason Publication, 2011,2nd ed.

B.Sc. Electronics
Semester -III

Digital Electronics Lab

Paper code: BSE-304

1. Design of Digital Logic Gates NOT, AND, OR using IC
2. Design of Digital Logic Gates NAND, NOR and EX-OR using IC
3. Design of Half Adder and Full Adder using ICs.
4. Design of Subtractors using IC.
5. Design of Comparators using IC.
6. Design of 4:1 Multiplexers using common gates.
7. Design of 1:4 Demultiplexers using common gates.
8. Study of Decoders, Encoder & Seven Segment Displays

B.Sc. electronics
Semester -III

Electronics Circuits Lab-II

Paper code: BSE-305

1. Study of capacitor filter, inductor filter and π filter.
2. Diode clipper & diode clamper.
3. Schmitt trigger measurement of UTP and LTP.
4. RC Differentiator & Integrator.
5. Transistor biasing circuits.
6. RC coupled amplifier.
7. Emitter follower.
8. Common source JFET amplifier.
9. Class AB power amplifier.
10. Tuned amplifier
11. RC phase shift oscillator using BJT.
12. Crystal oscillator.
13. UJT Relaxation Oscillator.
14. Astable Multivibrator using BJT.
15. Monostable Multivibrator using BJT.

B.Sc. Electronics

Semester-IV

Electronics Instrumentation

Paper code: BSE-401

Unit -1:

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 -2:

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 -3:

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 -4:

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

Unit -5:

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

Suggested Books:

1. *A course in Electrical and Electronic Measuements and Instrumentation by A. K. Sawhney, Dhanpat Rai Co (P) Ltd.; 18th Ed.; 2007.*

2. *Instrumentation, Measurements and Feedback by B. E. Jones, Tata McGraw Hill; Reprint 2010.*

3. *Principles of Electrical Machine by V. K. Mehta and Rohit Mehta; S. Chand, 2nd Edition, Reprint 2011.*

B.Sc. Electronics

Semester-IV

Electronics Communication

Paper code: BSE-402

Unit -1:

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

Unit-2:

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-3:

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

Unit -4:

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 -5:

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

Suggested Books

1. *Electronics Communication System by Kennedy; Tata McGraw Hill ; 4th Ed., 37th Reprint 2009*
2. *Electronics Laboratory Primer by S. Poorna Chandra and B. Sasikala; S. Chand,*
3. *An Introduction to Analog and Digital Communications,* Willey Eastern, New York, 1989.
4. *Modern Digital and Analog Communication Systems* by B.P. Lathi, 3/e, Oxford University Press, 1998.
5. *Electronic Communication 4th edition;* Dennis Roddy and John Coolen, PHI, 1989. .

B.Sc. Electronics

Semester-IV

Network Analysis

Paper code: BSE-403

Unit-1:

Basic Circuit Concepts: Voltage and current sources, Resistance, Capacitance, Inductance, Mutual Inductance, Series and Parallel elements, Duality, voltage division and current division.

Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node analysis, Mesh analysis, Star-Delta conversion.

Network Theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, Maximum power transfer theorem.

Unit-2:

DC Transient Analysis : Initially charged RC circuit, RL circuit with initial current, time constant, RL and RC circuits with sources, DC response of series RLC circuits (using differential equations).

Unit-3:

AC circuit analysis: Sinusoidal voltage and current, Definition of instantaneous, peak, peak to peak, root mean square and average values. Voltage-current relationship in resistor, inductor and capacitor. Phasor, complex impedance, power in AC circuits: instantaneous power, average power, reactive power, power factor. Sinusoidal circuit analysis for RL, RC and RLC circuits. Mesh analysis, node analysis and network theorems for AC circuits. Resonance in series and parallel RLC circuits, frequency response of series and parallel RLC circuits, Quality (Q) factor and bandwidth. Passive filters: low pass, high pass, band pass and band stop.

Unit-4:

Two Port Networks: Impedance (Z) parameters, Admittance (Y) parameters, Transmission (ABCD) parameters, Hybrid (h) parameters.

Suggested Books:

1. *Circuits and Networks by Analysis and Synthesis by A Sudhakar, McGraw Hill, 4th Edition, 2011.*
2. *Network Analysis by G. K. Mithal; Khanna publishers. 3rd Reprint, 2001.*
3. *Networks and Systems by D Roy Choudhury; Wiley Eastrn Ltd.; Reprint 2012.*
4. *Introduction to Circuit by Guillemin, E. A; John Wiley and Sons.*
5. *Circuit Theory and Design by Stewart, J. L; John Wiley and Sons.*
6. *White Electromagnetic. A Handbook on Electrical Filters. White Electromagnetic, Inc.*
7. *Network Analysis and Synthesis by C L Wadhwa; Reprint 2012.*

B.Sc. Electronics

Semester-IV

Wave Propagation and Antenna Theory

Paper code: BSE-404

Unit-1:

Transmission Lines: Typical transmission lines- Co-axial, Two Wire, Microstrip, Coplanar and Slot Lines, Description of Transmission Line Propagation, Transmission Line Parameters, Distrbuted Line Parameters at High Frequencies for Co-axial, Two Wire and Planar Lines.

Transmission Line Equations: Propagation of Sinusoidal Voltages, Complex Analysis of Sinusoidal Waves and Phasor, Characteristic Impedance, Lossless, Distortionless, low loss lines, Wave Reflection at Discontiniuties, Reflection Coefficient, Voltage Standing Wave Ratio, Input Impedance, Power, Shorted Line, Open-Circuited Line, Matched Line, Transmission Line Applications.

Unit-2:

Electromagnetic Wave Propagation: Maxwell's Equations, Time Harmonic Fields, Waves in general, Uniform Plane Wave, Wave propagation in free space, Wave propagation in Dielectrics, Poynting's Theorem and Power, Propagation in Good Conductors, Skin Effect.

Plane Waves in Dispersive Media: Dispersion, phase velocity and group velocity, pulse broadening in dispersive and lossy media.

Unit-3:

Reflection of Plane Waves: Reflection of uniform Plane Waves at normal incidence, Plane Wave Propagation in General Direction, Plane Wave Reflection at Oblique Incidence, parallel and perpendicular polarizations.

Waveguides: Description of and dielectric, various waveguides- metallic Parallel Plate metallic Waveguide, TE and TM Modes, Rectangular Waveguide, TE and TM Modes, Cutoff and Dominant Mode, Waveguide Resonators. Mention of Dielectric Waveguides.

Unit-4:

Antennas: Wire and Aperture Antennas**,** the Retarded Potential, Hertzian Dipole, Power radiated, Radiation Resistance, Antenna Characteristics, Antenna Patterns, Radiation Intensity, Directive Gain, Power Gain. Effective Area and Friis Equation, The Radar Equation.

Some Practical Antennas: Half-wave Dipole Antenna, Quarter-Wave Monopole Antenna, Small Loop Antenna, Aperture Antenna, Antenna Arrays.

Suggested Books

1. Microwaves by K.C.Gupta; New Age International Publishers.

2. Electromagnetic waves and Radiation system by E.C.Jordan and K.G.Bamain; Prentice-Hall India2nd Ed, 2009.

3. Microwave circuits and passive Devices by M.L.Sisodia and G.S.Raghuvanshi; New Age International Publishers.

4. Elements of Engineering Electromagnetics by N.N.Rao;PHI, 6^{th} Ed,2007.

5. Antenna Theory and Practice by Rajeswari Chatterjee

6. Antennas and Wave Propagation by G.N.Raju

7. Antenna Theory by Balanis

B.Sc. Electronics

Semester-IV

Electronics Communication Lab

Paper code: BSE-405

- Design of Amplitude Modulator and Demodulator
- Design of Frequency Modulation and Demodulation
- Design of Frequency Response of IF Amplifier
- Design of Mixer
- Design of Balanced modulator
- Design of Pulse Amplitude Modulation
- Design of Pulse Amplitude Demodulation
- Design of Pulse width Modulation
- Design of ASK, FSK and PSK
- Design of VCO

Suggested Reading

1. Electronics Communication System by Kennedy

B.Sc. Electronics

Semester-V

Microprocessors and Microcontroller

Paper code: BSE-501

Unit-1:

Introduction to 8-bit Microprocessor: History of microprocessor, 8085 Microprocessor architecture, buses, registers, flags, 8085 pin configuration and function of each pin. Fetch, decode and execute operations. Op-code fetch, execute cycle, T state, machine cycle, addressing modes of 8085.

Unit-2:

Intel 8085 Microprocessor Instruction Set and Programming: Data transfer, Arithmetic, Logical, Rotate, Branch and Machine control instructions. Development of 8085 assembly language programs, time delays, and 8085 interrupts, RST, SIM, RIM instructions. Subroutine and conditional call instruction.

Peripheral Devices: 8255-Programmable Peripheral Interface, 8253- Programmable interval Timer, 8259- Priority Interrupt Controller, 8279-Programmable Keyboard/Display Interface, 8251- USART, 8237/8257- Programmable DMA Controller.

Unit-3:

Introduction of Advance Microprocessor: Intel 8086 microprocessor architecture, addressing modes, 8086 pin configuration and function of each pin. 8086 programming using Data movement instructions, Arithmetic instructions, Program control instructions, operation of real mode and protected mode interrupt, interrupt flag bits, Hardware interrupts.

Unit-4:

Other Microprocessors: Introduction to 80186/286/386/486 and Pentium microprocessors. **Introduction to Microcontrollers:** Advantages and Applications of 8051 Microcontrollers.

Suggested reading

- *Introduction to microprocessors by Aditya P Mathur. 3 rd edition Tata Macrgew Hills*
- *The 8085 Microprocessor: Architecture, Programming and Interfacing, 1/e pearson*
- *Microprocessor Architecture, Programming & Applications with 8085 4th edition Ramesh Gaonkar,2ND ed,2009. .*
- *Advanced Microprocessors and Peripherals by A. K. Ray & K M Bhurchadi; Tata McGraw Hill.2nd Ed., 13th Reprint 2009.*
- *Microprocessor 8085 and Its Interfacing by Sunil Mathur; 2nd Ed., Reprint 2011.*
- *Microprocessor & Microcontroller; A.P. Godse, D.A. Godse; Technical Publication Pune.*

B.Sc. Electronics

Semester-V

Microwave Theory

Paper code: BSE-502

Unit -1:

Introduction - Frequency spectrum, Micro wave bands, Applications of microwaves in different fields. Guided waves - wave guides, Introduction, rectangular wave guides, TE and TM waves, Transverse electromagnetic waves.

Unit-2:

Transmission lines and wave guides - Review of transmission lines – Impedance matching, strip transmission lines, microwave guides, propagation through wave guides, cut off frequency, wave and group velocity, cavity resonators.

Unit-3:

Microwave tubes - Introduction, Multicavity Klystron, Velocity modulation and beam bunching, reflex klystron, magnetron, working of magnetron, travelling wave tubes, other micro wave tubes.

Unit-4:

Microwave Semiconductor devices - Schottky diodes, Point contact diodes, Varactor diodes, IMPATTT, TRAPATT, Gunn diode, Applications.

Unit-5:

Radar systems - Basic principles, Fundamentals, performance factor, Antennas and scanning, display methods, pulsed radar systems, MTI, Beacons, CW Doppler radar, CW.

Suggested Reading

1. *Microwave Theory and Applications by Stephen Adam.*

B.Sc. Electronics

Semester-V

Microwave Test Benches

Paper code: BSE-503

1. Study of the characteristics of Klystron tube and to determine its electronics tuning range.
2. To determine the Standing Wave Ratio and Reflection Co-efficient.
3. To study VI characteristics of Gunn Diode.
4. Study of Magic Tee.
5. Study of Circulator/Isolator.
6. To study the attenuators (Fixed and variable types).

B.Sc. Electronics

Semester-V

Microprocessor Lab

Paper code: BSE-504

- Write program for Addition of 8 bit and16 bit
- Write program for Subtraction of 8 bit and 16 bit
- Write program for Multiplication
- Write program for Array addition (multibyte)
- Write program for Logical operators – AND, OR NOT
- Write program for Decimal to ASCII and ASCII to Decimal conversion
- Write program for Decimal to Hexa and Hexa to Decimal conversion

Suggested book:

Microprocessor Architecture, Programming & Applications with 8085, 4th edition, by Ramesh S. Gaonkar ; Prentice Hall of India.

B.Sc. Electronics

Semester-V

Elective paper

Photonics and Optoelectronics Devices I

Paper code: BSE-505 A

Unit-1:

Introduction to Light:

Nature of light, wave nature of light- polarization, principle of superposition, scattering, interference, diffraction, light sources- black body radiation, units of light

Unit -2:

Optical Sources:

LED, LED material, commercial LED materials- GaP, GaAsP, double hetero-junction LED, LED characteristics- optical output power, output spectrum, modulation bandwidth

Unit -3:

Laser-I

Introduction to LASER, Spontaneous and stimulated emissions, Einstein's A and B coefficients, necessary and sufficient conditions for laser action (population inversion and saturation intensity), Classification of lasers, rate equations for three and four level systems, pumping, optical feedback and laser oscillation, laser modes- axial mode and transverse mode, frequency switching, Q-switching, mode locking.

Unit -4:

Classification of Laser:

Doped insulator laser- Nd-YAG laser, Nd-glass laser, Ruby laser, Gas laser-He-Ne laser, Molecular laser-CO_2 laser, and semiconductor laser.

Suggested book:

1. *Fundamentals of photonics by B.A.Saleh*
2. *Optical Communication by M.M. Rao; University Press India Ltd.*
3. *Opto- Electronics, An Introduction- J. Wilson and J.F.B. Hawks, PHI*
4. *Optics (Fourth edition)- Eugene Hecht, Pearson Education.*
5. *Optical information processing- Mir Mojtaba Mirsalehi*
6. *The Handbook of Optical Communication Networks by Mohammad Ilyas Ilyas, Hussein T. Mouftah; Taylor and Francis e- Library publication.*

B.Sc Electronics
Semester-V
Elective paper
Bioelectronics-I
BSE-505 B

Unit-1:
Introduction to bioelectronics, Scope and Application. Physiological systems of the body, Sources of Biomedical signals, Basic medical instrumentation system. Origin of bioelectric signals and electrodes. Electrical conductivity of electrode jellies and creams.

Unit -2:
Physiological transducer: classification of transducers, performance characteristics of transducer, displacement, position and motion transducer, pressure transducer, strain gauge,LVDT,thermocouple, thermistors.

Unit -3:
Biomedical Recorders: Electrocardiograph(ECG),Phonocardiograph(PCG), Electroencephalograph(EEG), Electromyograph(EMG). Electrodes for ECG,EEG,EMG.

Unit -4:
Biomedical Electronics: Series and parallel circuits,DC capacitive and inductive circuits, reactance and impedence, Bridge circuit : Wheatstone bridge, Kelvin's bridge, Maxwell bridge, Schering, Wein bridge,semiconductor diode rectifier.

Suggested books:

1. *Biomedical Instrumentation: Technology and Applications; R S Khandpur ; McGraw-Hill Professional Publishing.*
2. *Biomedical Instrumentation Systems: Shakti Chatterjee,Aubert Miller*
3. *Medical Instrumentation Application and design, 4th Edition, John G.Webster*
4. *Biosensors and Environmental Monitoring; Author: U Bilitewski,A Turner; Publisher: Taylor and Francis.*

B.Sc. Electronics

Semester-VI

Programming in C

Paper Code: BSE-601

Unit-1

Program Concept, Characteristics of Programming, Various Stages in Program Development, Algorithms, Flow Charts, Programming Techniques – Top Down, Bottom Up, Modular, Structured, Features, Merits, Demerits and Their Comparative Study. Programming Logic - Simple, Branching, Looping, Recursion, Programming Testing & Debugging.

Unit-2

Introduction to C Language, C Language Standards, Features of C, Structure of C Program, Introduction to C Compilers, Creating and Compiling C Programs, IDE, Features of Turbo C Compiler. Keywords, Identifiers, Variables, Constants, Scope and Life of Variables, Local and Global Variable, Data Types, Expressions. Operators - Arithmetic, Logical, Relational, Conditional and Bit Wise Operators, Precedence and Associativity of Operators, Type Conversion. Basic Input/Output Library Functions ,Character Input/Output getch(), getchar(). getche(), putchar(). Formatted Input/Output - printf() and scanf(), Mathematical & Character Functions.

Unit-3

Declaration Statement, Conditional Statement - if Statement, if else Statement, Nesting of if... .else Statement, else if Ladder, The ?: Operator, switch Statement. Iteration Statements - for Loop, while Loop, do-while Loop. Jump Statements: break, continue, goto, exit(). Arrays - Concept of Single and Multi Dimensional Arrays Strings : Declaration, Initialization, Functions

Unit -4

The Need of C Functions, User Defined and Library Function, Prototype of Functions, Prototype of main() Function, Calling of Functions, Function Arguments, Argument Passing: Call By Value and Call By Reference, Return Values. Nesting of Function, Recursion, Array as Function Argument, Command Line Arguments, Storage Class Specifier - Auto, Extern, Static, Register.

Unit-5

Defining Structure, Declaration of Structure Variable, Type def, Accessing Structure Members, Nested Structures, Array of Structure, Structure Assignment, Structure as Function Argument, Function that Return Structure, Union.

Text & Reference Books:

- *Balaguruswamy, "Programmingin C ", TMH Publications*
- *Gottfried Schaums Outline Series, "Programming with C ", TMH Publications*
- *Mahapatra, " Thinking in C ", PHI publications*
- *Anurag Seetha, "Introduction to Computers and Information Technology", Rain Prasad & Sons, Bhopal*
- *S.K. Basandra, "Computers Today", Galgotia Publications.*
- *Peter Juliff "Program Design" PHI Publication*

B.Sc. Electronics

Semester-VI

Cellular Mobile Communication

Paper Code: BSE-602

Unit -1:

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

Unit -2:

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 -3:

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

Unit -4:

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

Unit -5:

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

Suggested reading

- *Cellular and mobile communication by V.Jeyasri Arokiamary*
- *Principle of Mobile Communication by Gordon Stuber. Communication Networks; Leon Garcia and Widjaja; Tata McGraw Hill, second edition.*
- *Data Communication and Networking; Forouzan; Tata McGraw Hill, 3rd Ed.,*
- *Wireless Communication Principles and Practice by T S Rappaport; PHI; 2nd Ed.; 2002.*
- *Mobile Cellular Telecommunication by W C Y Lee;*

BSE -603 PROJECT & SEMINAR 200 marks

B.Sc Electronics
Semester-VI
Elective paper
Photonics and Optoelectronics Devices- II
Paper code: BSE-604 A

Unit-1:
Displays Devices
Concepts of optoelectronic display devices. Semiconducting polymers – luminescence, photoluminescence and electroluminescence. Liquid crystals - nematic, smectic and cholosteric phases; director and order-parameter.

Unit -2:
Optical Detectors
Optical detection principles, photon devices- photoemissive devices, vacuum photodiodes, photomultipliers, photoconductive detectors, absorption coefficient, direct and indirect absorption: Si and Ge, semiconductor photodiodes- pn photodiode, pin photodiode.

Unit -3:
Fibre Optics Communications
Introduction to fiber optic cables, optical fiber communication spectrum, advantage and disadvantage of optical communication, Ray theory transmission- total internal reflection, acceptance angle, numerical aperture, modes, mode coupling, step index fibers, graded index fibers.

Unit -4:
Transmission Characteristics of Optical Fibers
Attenuation, material absorption, losses in silica glass fibers, linear scattering losses, non linear scattering losses, fiber bend losses, mid-infrared and far- infrared transmission, dispersion, chromatic dispersion, intermodal dispersion, overall fiber dispersion.

Suggested books:

1. *Optical Fiber Communications - Gerd Keiser, Mc.Graw hill International*
2. *Opto- Electronics, An Introduction- J. Wilson and J.F.B. Hawks, PHI*
3. *Fundamentals of Fiber optics in Telecommunication and Sensor system.-Bishnu Pal, New*

Age

International (P) Ltd.

4. *Optical information processing- Mir Mojtaba Mirsalehi*
5. *Semiconductor Optoelectronic Devices - Pallab Bhattacharya, Pearson Education*
6. *Semiconductor Optoelectronics - Jasprit Singh, John Wiley*
7. *Optical Properties of Semiconductor Quantum Dots - V Woggon*
8. *Nonlinear Optics of Organic Molecules and Polymers - H S Nalwa, S Miyata*
9. *Practical Design and Production of Optical Thin Films - Marcel & Dekker*

B.Sc Electronics

Semester-VI

Elective paper

Bioelectronics-II

Paper code: BSE-604 B

Unit-1:

Basic Bioelectronics **:** Semiconductor materials, intrinsic and extrinsic SC, carrier mobility, drift and diffusion, generation and recombination process, Boltzman equation, PN junction diode. Bipolar junction transistor, Field effect transistor, Basic fabrication process, operational amplifier.

Unit-2:

Analogy between semiconductor and biological material: Water and electrolyte solution, biological materials, proteins and nucleic acid, phospholipids, DNA,RNA, electron-electrolyte interface, Poisson Boltzmann equation.

Unit-3:

Biosensor and bioelectronics recorders: Introduction to biosensor, principal components of biosensor, types, application, skin blood flow sensor, sensor for pressure pulses & movement, physiology of heart, ECG,EMG,EEG, study of biomedical signals.

Unit-4:

Biology of the neuron, Biophysics description of action potential, Synapes, neuronal networks.

Suggested books:

1. *Bioelectronics Handbook, MOSFETs, Biosensors,& Neurons, Author: Massimo Grattarola, Giuseppe Massobrio, Publisher: McGraw Hill.*
2. *Semiconductor physics & devices by Donald A Neuman.*
3. *Handbook of biomedical instrumentation, R S Khandpur*
4. *Metin, A. Neural Engineering (Wiley/IEEE Press, (Vol 1-6))*