ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN
(Autonomous)
(Re-Accredited with 'A' Grade by NAAC)
(A Government Aided College - Affiliated to Mother Teresa Women's University, Kodaikanal)
CHINNAKALAYAMPUTHUR (PO), PALANI -624 615.

DEPARTMENT OF PHYSICS

SYLLABUS

2014-2017

I-B.Sc. PHYSICS SEMESTER - I
PAPER-I MECHANICS, PROPERTIES OF MATTER AND SOUND
(6 – hours & 4 – Credits)

PREAMBLE

The purpose of this paper is to give an introduction to conservation principles, properties of matter and sound.

UNIT-I CONSERVATION LAWS

Impulse and momentum - Conservation of linear momentum- center of mass – collision - Direct and oblique – Final velocities and loss of Kinetic energy.

ROCKET MOTION

Expression for thrust and velocity - multistage rocket – escape velocity.

MOTION OF RIGID BODY

Moment of inertia - Parallel and perpendicular axes theorems -M.I. of circular disc - solid sphere - hollow sphere and cylinder about all axes -compound pendulum - Torque and angular momentum - Relationship between them - K.E. of rotation – conservation of angular momentum - Top processional motion-gyroscopic motion and gyrocompass**.**

UNIT II - GRAVITATION

Kepler's laws of planetary motion and derivation of law of gravitation - Newton's universal law of Gravitation - Boy's method -Acceleration due to Gravity - compound pendulum - Bar pendulum - Minimum time period - variation of g with altitude and depth -variation of g with rotation of the earth - Difference between mass and weight - Gravitational field - Gravitational potential - Gravitational potential energy -Gravitational potential due to uniform solid sphere.

UNIT-III - ELASTICITY

Elasticity-Definitions-yield point, Elastic limit-Elastic fatigue and Elastic moduli - Poisson's ratio-Poisson's ratio for Rubber - work done in deforming a body - Relation between Elastic constants (Y, G, K and γ)- limiting value of γ – Torsion - Twisting of a cylinder-Torsion Pendulum- Bending of beams-Bending moment-Basic assumptions for theory of Bending-Cantilever-Uniform & Non uniform bending (microscopes)- I Section girders-Determination of Y by bending-Determination of elastic constants by Searle's method.

UNIT-IV-VISCOSITY AND SURFACE TENSION

Introduction - Stream line motion and rate of flow-equation of continuity-Energy of a liquid in motion-Bernoulli's theorem & proof- practical applications (Venturimeter and wings of an aeroplane) – viscosity - Stoke's law-Poiseuille's formula for co-efficient of viscosity.

Introduction-surface tension-explanation of surface tension- pressure difference across a spherical surface - surface energy and surface tension-excess of pressure inside a spherical liquid drop (an air bubble inside a liquid) -capillarity-expression for surface tension-experiment to determine surface tension of water.

UNIT-V - SOUND

S.H.M – S.H.M as the projection of uniform circular motion – Composition of two S.H.Ms of the same periods at right angles to each other - Lissajou's figures – Free vibrations of a body – Damped vibrations – Forced oscillations.

Longitudinal and Transverse waves – Relation between wavelength, frequency and wave velocity – characteristics of progressive waves – Intensity of sound – Phase velocity and group velocity – Beats (definition only) – Theory of

Transverse vibrations along a stretched string - Verification of I, II, and III laws using sonometer – Electrically maintained turning fork (Melde's string experiment).

Ultrasonics – Production (Magnetostriction method and Piezoelectric method) - Deduction and Applications.

BOOK FOR STUDY:

- Properties of matter - Brijlal and Subramaniam [Unit I, II, III & IV].
- Mechanics, Properties of matter and Sound - R.Murugeshan [Unit V].
- Waves, Vibrations and Sound – C.L.Arora [Unit V].
- A Text Book of Waves and Oscillations – Ashok K. Ganguli [Unit V]
- Waves and Oscillations - S.R.Shankara Narayana [Unit V]

BOOK FOR REFERENCE:

1. Mechanics, Properties of matter and Sound - R.Murugeshan
2. Elements of properties of matter - D.S.Mathur
3. Engineering physics - G. Senthil Kumar

SEMESTER I CORE PAPER - II

ELECTRICITY AND ELECTROMAGNTISM (6 – Hours & 4 – Credits)

PREAMBLE

This paper deals with static electricity, capacitors, electric circuits, AC current and AC bridges.

UNIT-I-ELECTROSTATICS & CAPACITORS

Electric field and flux – Gauss law – Application of Gauss field due to charge sphere – Coulomb's theorem - mechanical force on the surface of a charged conductor – electric potential – equipotential surface - relation between field and potential energy – Capacity of a condenser – spherical, cylindrical and parallel plate condensers – types of condensers – energy stored in a capacitor.

UNIT-II-ELECTRIC CIRCUITS

Kirchhoff's laws- wheat stone's bridge-Sensitiveness of a Wheat stone's bridge – Carey Foster's Bridge – Potentiometer – Measurement of Potential and Calibration of voltmeter – Measurement of current and calibration of Ammeter – Measurement of Resistance.

UNIT-III-MAGNETIC FIELDS OF ELELCTRIC CURRENTS

Magnetic fields – Magnetic Flux – Biot Savart law- Magnetic induction due to straight conductor - Force on a current element in magnetic field - Torque on a current loop in a uniform magnetic field - Ampere's law - Maxwell's equation III – Magnetic Induction at any point on the axis of a solenoid - Magnetic induction due to circular loop – solenoid and toroid.

Moving coil Galvanometer - Dead beat and Ballistic – Damping correction – Applications – Determination of figure of merit of dead beat Galvanometer – Experiment to determine charge sensitivity of ballistic galvanometer – Experiment to find absolute capacity of a condenser – Experiment to compare the capacities of condensers – Experiment to compare the electromotive forces of the cells.

UNIT-IV- ELECTROMAGNETIC INDUCTION AND TRANSIENT PHENOMENA

Laws of electromagnetic induction - Introduction – self-inductance – Mutual inductance – Determination of self - inductance by using Rayleigh's method – Determination of Mutual inductance (M) – Comparison of Mutual inductances – coefficient of coupling.

Growth and decay of current in a circuit containing inductance L and resistance R with steady emf – growth and decay of charge in a CR circuit – determination of high resistance by leakage – growth and decay of charge in LCR circuit.

UNIT – V - ALTERNATING CURRENT AND AC BRIDGES

Introduction – R.M.S for effective value of A.C – mean value of the alternative e.m.f – Phase difference – Resistance, Capacitance and Inductance are connected to A.C. source - L, C and R in series Resonance - Impedance of an AC circuit – Circuit analysis with complex numbers – Parallel resonance circuit – AC applied to LCR in parallel – Q-factor – Power in AC circuit – Signification of power factor – skin effect – Power losses & uses - Transformers – Detailed theory of Transformer – Transformer losses.

` AC bridges for measuring inductance – Maxwell's bridge – Owen's bridge – Anderson's bridge – Wien's Bridge for measuring capacitance – Desauty's bridge.

BOOK FOR STUDY

Electricity and Electromagnetism – M. Palaniappan

BOOK FOR REFERENCE

1. Electricity and Magnetism – K.K. Tewari
2. Electricity and Magnetism – Brijlal Subramaniam
3. Electricity and Magnetism – Nagarathinam and Lakshmi Narayan

SEMESTER II CORE PAPER III

HEAT AND THERMODYNAMICS (6-hours & 4-Credits)

PREAMBLE

This paper gives a deep knowledge in heat and Thermodynamics, which is essential in everyday life.

UNIT-I - KINETIC THEORY OF GASES AND VANDERWALL'S EQUATION

Introduction-Postulates of Kinetic theory of gases-Expression for the pressure of a gas-kinetic energy per unit volume of a gas-kinetic interpretation of temperature-Derivation of Gas equation-Derivation of Gas law-Degrees of freedom and Maxwell's law of Equi-partition of Energy-Atomicity of gases-Maxwell's law of distribution of velocity-Experimental verification of velocity distribution-Mean free path-Transport Phenomena-Viscosity of gases-Thermal conductivity of gases-Behavior of Gases at high pressure-Vander wall's equation of state-critical constants.

UNIT – II - LOW TEMPERATURE PHYSICS

Inter molecular attraction-Porous plug experiment-Theory of porous plug experiment-Joule Kelvin effect-Temperature of Inversion-**Liquefaction of Gases:** Air, Nitrogen & Helium – Helium-I and Helium-II-Production of low temperatures-Adiabatic demagnetization.

UNIT-III-TRANSMISSION OF HEAT

Co- efficient of Thermal conductivity-Rectilinear flow of Heat along a Bar-Lee's method for bad conductors - Accretion of ice in ponds-Wiedmann-Franz law-Convection-Applications of convection-convective equilibrium of the atmosphere-Black body-Stefan's law-Mathematical derivation of Stefan's law-Determination of Stefan's constant (Laboratory method)-Derivation of Newton's law of cooling from Stefan's law - Concept of pyrometer- Distribution of Energy in the spectrum of a

black body. Solar constant -Temperature of the sun - water flow pyrheliometer - Solar spectrum.

UNIT-IV-ZEROTH AND FIRST LAWS OF THERMODYNAMICS:

Thermodynamic system-Thermal Equilibrium and concept of Temperature (Zeroth law of thermodynamics)-concept of Heat-comparison of Heat and Work-First law of thermodynamics -First law of thermodynamics for a change in state of a closed system-Applications of first law of thermodynamics-Isothermal process-Adiabatic process-Gas equation during Adiabatic process-Slopes of Adiabatic and Isothermal-Irreversible process-Reversible process.

UNIT-V-SECOND AND THIRD LAWS OF THERMODYNAMICS:

Second law of thermodynamics-Carnot's reversible engine-Carnot's engine and Refrigerator-Carnot's theorem-Entropy and the second law of thermodynamics-Entropy changes of a closed system during an irreversible process-entropy change in reversible process (Carnot's cycle) change in Entropy in an irreversible process.

Third law of Thermodynamics-Temperature-Entropy diagram-Entropy of a perfect gas-Maxwell's Thermo dynamical relations-Helmholtz function-Thermodynamic potential or Gibb's function-enthalpy-Cp, Cv and γ-Joule Kelvin coefficient-Equilibrium between liquid and its vapour-First order Phase Transitions.

BOOKS FOR STUDY

1. Heat and Thermodynamics-Brijlal & Subramaniam.

BOOKS FOR REFERENCE

1. A text book of heat - J.B. Rajam
2. Thermodynamics and Statistical Mechanics-Sears and Salinger
3. Treatise on Heat-Saha & Srivastava
4. Heat and Thermodynamics-D.S.Mathur.

SEMESTER III CORE PAPER – IV

OPTICS (5 – hours & 4 – Credits)

PREAMBLE

This paper gives a sound knowledge about geometrical optics and Physical optics.

UNIT – I –LENSES AND ABBRATIONS

Lens – Refraction through lenses – Aberration – Chromatic aberration – Spherical aberration – Minimization of aberrations – Coma – Astigmatism.

UNIT- II - EYEPIECES, DISPERSION AND RAINBOWS

Ramsden's eyepiece – Huygen's eyepiece – Oil immersion objective – Dispersion – Dispersion through a prism – Cauchy's dispersion formula – Theory of Rainbows – Primary and Secondary Rainbow.

UNIT – III –INTERFERENCE

Interference in thin films - color of thin films – Air wedge – Determination of diameter of thin wire – Testing of planeness - Newton's rings – Determination of λ and μ of a liquid - Michelson interferometer – Types of fringes - visibility of fringes – Any two applications of Michelson interferometer.

UINT – IV – DIFFRACTION

Fresnel and Fraunhofer classes of diffraction – Fresnel's explanation for the rectilinear propagation of light – Zone plate - Fresnel's diffraction at a straight edge – Fraunhofer diffraction at single slit, double slit and circular aperture – Theory of diffraction grating – Determination of wavelength – Dispersive power of a grating and Rayleigh's criterion for resolving power of a grating.

UNIT – V– POLARISATION

Double refraction – Nicol prism construction and working - Huygen's explanation – Production, Detection and Analysis of Plane, Circularly and elliptically polarized light – Quarter and Half wave plates – Optical rotation – Fresnel's theory of optical rotation - Biot's laws – Laurent's half shade Polarimeter.

BOOK FOR STUDY:

1. Optics – Brijlal and Subramaniam

BOOK FOR REFERENCE:

1. Optics – S.P. Singh and J.P. Agarwal
2. Optics– Sathya prakash
3. Optics & Spsectroscopy – R. Murugeshan

SEMESTER – III CORE ELECTIVE PAPER –I

BASIC ELECTRONICS (4-hours & 3-Credits)

PREAMBLE

The recent developments in the scientific and technological fields are based on electronic principles. The paper provides the basic concepts of electronics.

UNIT – I – NETWORK ANALYSIS

Super position theorem - Thevenin's theorem – Norton's Theorem – Two port Network – Analysis – four types – Filter circuits – general theory – low pass, high pass, Band pass and band elimination filters.

UNIT – II - BAND STRUCTURE OF SEMI CONDUCTOR & REGULATED POWER SUPPLIES

Band structure – carrier energy distribution – carrier concentration in an intrinsic crystal. Donor and acceptor impurities - Fermi level – continuity equation – theory of tunnel diode – Avalanche and Zener breakdown – Zener diode.

Zener voltage regulator, series and shunt voltage regulators – Construction of regulated power supply using IC 7800 & 7900 series – Choke input filter – Capacitance input filter – RL and LC filters – voltage multipliers – clipping and clamping circuits.

UNIT – III –TRANSISTORS

Transistors – biasing the transistor for active region – Transistor action-relation connecting α and β of a transistor – three modes of transistor connection - transistor characteristics in CE, CB and CC modes – load line – Quiescent point – Fixed bias – universal divider bias – emitter feedback bias. Field Effect Transistors (FET) –Junction Field Effect Transistors (JFET) – P channel and N channel JFET - Characteristics of an N channel JFET – applications of JFET –Uni junction transistor (UJT) and its characteristics.

UNIT – IV - AMPLIFIERS

Amplifiers – CE, CB, CC amplifiers – calculation of voltage gain, current gain, input and output impedance in each case – power amplifiers – class A and class B push pull amplifiers – frequency response of amplifiers.

UNIT –V - OSCILLATORS & MULTIVIBRATERS

Feedback – types of feedback – advantage of negative feedback – Barkhausen criterion – Hartley, Colpitt and Phase shift oscillators – Astable Monostable and bistable multivibrators using transistors - relaxations oscillators using UJT.

BOOKS FOR STUDY:

- Elements of solid-state electronics – Ambrose and Devaraj
  [Unit I & II, IV & V].
- Electronics – G.Jose Robin & Ubald Raj [Unit I, II, III , IV & V].

- Electronics I – M.Palaniappan [Unit V].

BOOKS FOR REFERENCE

1. Electronics – Gupta Kumar
2. Electronics – B.L. Theraja

SEMESTER IV CORE PAPER - V

COMPUTER PROGRAMMING IN 'C' (5 – hours & 4 – Credits)

PREAMBLE

This paper helps the students to understand the powerful language 'C'.

UNIT – I INTRODUCTION TO C

The C character set – Identifiers and keywords - data types – Constants – Variables – Declaration – Expressions - Various types of Operators – Bit wise operations - Input and output functions and writing simple programs.

Conditional and unconditional control statements – Branching, Looping - Nested control structures – Switch – Break – Continue – Goto.

Sum of n-natural numbers – To find the Fibonacci series – To find the roots of a quadratic equation $ax^2+bx+c=0$. To find and print Armstrong numbers - To find simple interest and Compound interest.

UNIT – II – FUNCTION

Over view – Defining a function – Accessing a function – Passing arguments to a function – Recursion – Library function – the preprocessor directives. Storage classes - Scope of the variables – Automatic variables – Global variables – Static variables – Register variables.

To determine the factorial of a given number – check whether given number is odd or even. Using function to sum integer values between 1-N using recursion techniques.

UNIT – III – ARRAYS

Defining, initialization rules and processing of arrays and subscripted variables – Passing arrays to functions – Multi dimensional arrays – Arrays and strings.

To arrange the given set of numbers in ascending order – To arrange given set of numbers in descending order - To find the largest number in the given set of numbers – To multiply two matrices of order (l x m) And (m x n) – To add and subtract two matrices.

UNIT – IV- POINTERS & FILES

Fundamentals – Declaration - Accessing a variable – Pointers and Arrays – Dynamic memory allocation – Pointers and functions – Pointers and strings.

Introduction – Defining and Opening file – Closing a file – Input & Output operations on files.

UNIT –V – STRUCTURES AND UNIONS

Introduction – Defining and initializing a structure – accessing and giving values to member – structure within structures – arrays of structures – arrays within structures.

Union – declaration and initializing a union – To prepare the salary bill for employees of a company.

BOOK FOR STUDY

1. Programming in C and Application by D. Arulselvam.

BOOK FOR REFERENCE

1. Programming in C – E. Balagurusamy

IV SEMESTER CORE ELECTIVE – II

MATHEMATICAL PHYSICS (3 – hours & 3 – Credits)

PREAMBLE :

To enable the students learn about the various mathematical techniques and apply these techniques to physical problems.

UNIT –I - VECTORS

Introduction – representation of vectors – kinds of vectors- addition of vectors – subtraction of vectors – multiplication of vectors. By a scalar – vectors space or linear space – conditions for a physical quantity to be represent able by a vector – resolution of vectors – linear combination of vectors – product of four vectors – reciprocal system of vectors – vector equations – simple applications of vectors to mechanics.

UNIT –II- VECTOR ANALYSIS

Differentiation of vectors – some rules for differentiation – partial differentiation of vectors – rules for partial differentiation – the scalar and vector fields – directional derivatives – level surfaces – the gradient of a scalar field – the gradient of sun of two scalar point function – the gradient of product of two scalar point functions – the divergence of a vector – point function – the divergence of sum of two vector functions – the divergence of product – the curl or rotation of a vector point function- curl of the sum of gradient of scalar product in terms of curl –to express divergence of vector product in terms of curl.

UNIT –III- MATRICES

Definitions and notations – equality of matrices – addition of matrices – properties of matrix –addition - multiplication of matrices - properties of matrix - multiplication - partitioning of matrices – product of matrices by partitioning – special matrices with their properties – rank of a matrix some theorem on rank – solutions of linear equations – Cramers rule – characteristic matrix and characteristics equations of a matrix.

UNIT – IV- BETA AND GAMMA FUNCTION

Definition – symmetry property of beta function – evaluation and transformation of Gamma function - relation between beta and Gamma function.

UNIT-V- DIFFERENTIAL EQUATION

Introduction – solution of linear differential equation of first order – solution of second order differential equations with constant co-efficient -power series solution- Frobenius' method.

BOOK FOR STUDY:

- MATHETICAL PHYSICS – B.D. GUPTA [Unit I, II & III]
- MATHEMATICAL PHYSICS – SATHA PRAKASH [Unit IV & V]

SEMESTER V CORE PAPER - VI

MODERN PHYSICS (5 – hours & 4 – credits)

PREAMBLE

To have a brief discussion on atom models, photoelectric effect and X-rays and relativity.

UNIT- I - CRITICAL POTENTIALS

Critical potential - Experimental determination of critical potentials - Frank and Hertz's method.

UNIT- II – STRUCTURE OF ATOMS

Review of Bohr atom model - Sommerfield's relativistic model – vector atom model – various quantum numbers – LS and JJ coupling – Pauli's classification – Magnetic dipole moment due to orbit motion and spin motion – Bohr Magneton – Stern and Gerlach experiment-Fine structure of Sodium D lines-Zeeman effect: Normal and Anomalous-Experimental set up-Quantum theory of normal Zeeman effect-Paschen-Back effect –Stark effect.

UNIT- III - PHOTO ELECTRIC EFFECT

Discovery of photoelectric effect – Results on photoelectric effect – Failure of the electromagnetic theory – Einstein's theory of photoelectric effect – Millikan's experiment – Photoelectric cells.

UNIT – IV- X-RAYS

Production of X-rays – X-ray spectra – Characteristic X-rays spectrum – applications of X-rays - Moseley's law - Compton scattering theory – Experimental verification.

UNIT- V- THEORY OF RELATIVITY

Michelson-Morley experiment – Interpretation of the Michelson-Morley experiment –Postulates of special theory of relativity– The Lorentz transformation – Length contraction– Time dilation - variation of mass with velocity - Mass-energy equivalence.

BOOKS FOR STYDY

- Modern Physics – R.Murugesan.

BOOKS FOR REFERENCE

1. Modern Physics - J.B.Rajam
2. Modern Physics - Sehgal, Chopra, Sehgal

SEMESTER V CORE PAPER - VII

NUCLEAR PHYSICS (5 – hours & 4 – credits)

PREAMBLE

A brief discussion on nucleus, radioactivity, cosmic rays and elementary particles.

UNIT- I - NUCLEUS

Nucleus spin, Magnetic dipole moment - Electric quadruple moment - effect on spectral lines (Hyper fine structure).

Nuclear stability - Theories of nuclear composition – Proton – Electron – Hypothesis – Proton-Neutron hypothesis - Nuclear forces - Yukawa's theory - Discovery of π meson - models of the nuclear structure - The liquid drop model - semi empirical binding energy formula – Shell model evidences - collective model.

UNIT- II - NUCLEAR ENERGY

Nuclear fission – energy released in fission – Explanation on the basis of liquid drop model. Nuclear fusion - Thermonuclear reactions - Proton- proton cycle - Carbon nitrogen cycle - Energy release in controlled thermo nuclear reaction – Design of thermonuclear reactor.

UNIT- III - PARTICLE ACCELEARATORS AND DETECTORS

Particle accelerators and detectors – Synchrocyclotron - Betatron - Electron Synchrotron - Proton synchrotron (Bevatron).

Ionization chamber - The Wilson cloud chamber - Bubble chamber - Photographic emulsion technique - G.M.counter.

UNIT- IV - RADIO ACTIVITY & NUCLEAR REACTIONS

Alpha rays – Range - Geiger Nuttal law - Experimental determination by Geiger Nuttal experiment - α - Disintegration energy – Theory of α - decay (Qualitative).

Beta- Rays - Beta rays spectra – Origin - Neutrino theory of β decay - Electron capture - Gamma rays - Determination of wavelength by Dumond method - Origin of Gamma rays - Internal conversion.

Q value - threshold energy - nuclear transmutation by alpha particles, protons, deuterons, neutrons and electrons - Photo disintegration – Cross-Section.

UNIT- V- COSMIC RAYS AND ELEMENTARY PARTICLES

Cosmic rays – discovery - origin of cosmic rays - latitude effects – east-west effect - altitude effect – north - south effect - primary & secondary cosmic rays - cosmic rays showers - positron discovery - pair production & annihilation of matter - Van Allen belts.

Classification of Elementary particles - properties of Elementary particles-Antiparticles.

BOOKS FOR STYDY

- Modern Physics – R.Murugesan [Unit I, II, III, IV & V].
- Nuclear Physics – M.Palaniappan [Unit V].

BOOKS FOR REFERENCE:

1. Modern Physics - J.B.Rajam
2. Modern Physics - Sehgal, Chopra

SEMESTER – V CORE PAPER VIII

ENERGY PHYSICS (5 – hours & 4 – credits)

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PREAMPLE

As India like developing countries are having increasing demands for energy. To make the students to know about the energy and their sources, this paper deals with the study of different non-conventional energy sources.

UNIT- I – AN INTRODUCTION TO ENERGY SOURCES

Energy consumption as a measure of prosperity – World Energy Future – Energy Sources and their availability – Commercial or Conventional energy sources – NonConventional sources – Renewable energy sources – other forms of solar energy – wind – Biomass – Geothermal and OTEC.

UNIT- II - SOLAR ENERGY COLLECTION AND STORAGE

Introduction – Physical Principles of the conversion of solar radiation into heat – Flat plate collectors – Concentrating collectors – Focusing type – Advantages and disadvantages of concentrating collectors over flat plate collectors. Solar energy storage – Solar energy storage systems – Solar pond.

UNIT- III – SOLAR PHOT VOLTAIC CELLS

Introduction **-** Solar thermal electric conversion – Solar electric power generation – Solar photo voltaic – Solar cell principle – Basic Photo voltaic system for power generation – Solar cell connecting arrangements – Battery storage – Applications of photo voltaic system − Advantages and disadvantages of photo voltaic conversion .

UNIT- IV – APPLICATION OF SOLAR ENERGY

Introduction -Solar water heating – Space heating – Passive and active heating systems —– Agriculture and industrial applications - Solar distillation – Solar pumping – Solar furnace – Solar cooking – Design principles and constructional details of box type solar cooker – Solar green house – Advantages of solar green house.

UNIT – V- ENERGY FROM BIOMASS

Introduction – Biomass conversion Technologies – Wet processes – Dry processes – Biomass generation – Classification of Biogas Plants – Types of Biogas plants.

ENERGY FROM OCEAN

Introduction – Ocean Thermal Electric conversion – Methods of ocean thermal electric power generation – Energy from Tides.

BOOKS FOR STUDY

- G.D. Rai – Non- Conventional Sources of Energy, (IV Edn) Unit-I: ch: 1& 2, Unit-II: ch: 3 & 4, Unit-III: ch: 5, Unit-IV: ch: 7 & 9,
  Unit-V: ch: 15.

BOOKS FOR REFERENCE

1. G.D. Rai – Solar Energy Utilization
2. H.C. Jain – Non-Conventional Sources of Energy
3. M.P. Agarwal – Solar Energy

SEMESTER V – CORE PAPER - IX

DIGITAL ELECTRONICS (5 – hours & 4 – credits)

PREAMBLE

The foundation level of understanding of integrated and digital electronics is dealt in this paper.

UNIT – I – BINARY NUMBER SYSTEM

Binary addition – Binary to Decimal conversion – Decimal to Binary conversion – Binary Subtraction – Multiplication – 4 bit BCD codes – Hexadecimal code.

UNIT – II – LOGIC GATES

OR, AND & NOT gates – Positive and negative logic – their implementation – calculation of output voltages - OR, AND, NOT gates – Boolean logic diagrams and truth tables for these – Boolean equations of logic circuits – NOR, NAND gates – DeMorgan's theorem – NAND, NOR as universal building blocks – laws and theorems of Boolean algebra – two input TTL NAND gates – DTL, RTL circuits – logic cards – Experimental investigation of equivalence of Boolean expressions of exclusive OR function and investigation of logical properties of the exclusive OR - Half adder and Full adder properties and their implementation with EX-OR.

UNIT – III – MULTIVIBRATORS USING ICS

The RS Flip Flop - clocked RS Flip Flop, JK Flip Flop. The Schmitt trigger (using 555 timer) - Astable and Monostable multivibrators using IC 555 - working (No derivations) and uses - Duty cycle.

UNIT – IV OPERATIONAL AMPLIFIER

OP-AMP characteristics resistance feedback – expression for gain (inverting and non-inverting modes) – virtual earth – application as adder, subtractor, integrator and differentiator – analog computer.

UNIT – V – COUNTERS AND REGISTERS

Binary counter – decade counter – four bit binary counter – shift register – ring counter – A/D conversion – D/A conversion.

BOOKS FOR STUDY:

- Digital Electronics – A. Ubal Raj & G.Jose Robin [All Units]
- Digital Principles and computer design – Malvino and Leach [Unit III & V]

BOOKS FOR REFERENCE:

1. Integrated electronics – Milman & Halkins
2. Digital Principles and computer design – Morris Mano.

SEMESTER – V- CORE ELECTIVE – III
MICROPROCESSOR – 8085 (3 – hours & 3 – credits)

PREAMBLE

Microprocessor technology is an exciting, challenging and growing field. To meet the challenges of this growing technology one has to be conversant with programmable aspect of microprocessor.

UNIT I - MICROCOMPUTER ORGANISATION AND 8085 MICROPROCESSOR

Microcomputer arrangement – Memory, a general discussion – Read Only Memory (ROM) – Random Access Memory (RAM) – Microprocessor as CPU – Input unit – Output unit – System bus and bus structure – Execution of an instruction.

Introduction to Intel processors – Pin functions of 8085 – Architecture of 8085.

UNIT II – INSTRUCTION SET OF 8085 - I

Machine language and Assembly language – Programmer's model of 8085 – Data transfer instructions –I – Arithmetic instructions – Logic instructions - Special instructions – Assembly language to Hex code.

UNIT III – INSTRUCTION SET OF 8085 - II

Data transfer instructions-II – Branch instructions – Stack and Stack related instructions – I/O and Machine control instructions – 8085 addressing Modes.

UNIT IV – ASSEMBLY LANGUAGE PROGRAMS

Addition, Subtraction, Multiplication and Division (for 8-bits and BCD only)– Square and Square root – Sorting and Searching – Debugging a program.

UNIT V – ASSEMBLY LANGUAGE PROGRAMS- CASE STUDIES

Assembly Language Programmes - N- Factorial, largest among two numbers, generating the Fibonacci (binary), Ascending and descending order and Code Conversion.

BOOKS FOR STUDY

Fundamentals of Microprocessor-8085 – V.Vijayendran.

BOOKS FOR REFERENCE

Microprocessor – Ramesh S. Gaonkar

Microprocessor Principles and Applications – Ajit Pal

Microprocessor and Its Applications – A.Nagoor Kani

SEMESTER - VI - CORE PAPER - X

ADVANCED MECHANICS (5 – hours & 4 – credits)

PREAMBLE

The classical, quantum, statistical and wave mechanics deal with problems ranging from structure of atom to that of stellar system.

UNIT – I – CLASSICAL MECHANICS - LAGRANGIAN

Generalized coordinates – Generalized velocities – Generalized momentum – Degrees of freedom under constraints – D'Alembert principle – Lagrangian function – Lagrangian equation (Derivation)

Application of Lagrangian's equation – simple pendulum – compound pendulum – Atwood's machine- Simple Harmonic Oscillator.

UNIT- II - CLASSICAL MECHANICS - HAMILTONIAN

Hamiltonian – Hamiltonian equation with derivation –Physical significance of Hamiltonian function– General features of motion under inverse square law – Kepler's problem

Applications of Hamiltonian equations of motion – Simple pendulum - compound pendulum – linear harmonic oscillator –motion of a particle in a central force field.

UNIT – III – STATISTICAL MECHANICS

Microscopic and Macroscopic descriptions – Ensembles – phase space – probability – fundamental postulates to statistical mechanics – thermodynamic probability – Boltzmann's theorem on entropy and probability – statistical equilibrium.

Maxwell – Boltzmann distribution law – Maxwell – Boltzmann distribution in terms of temperature – molecular energies in an ideal gas – Maxwell Boltzmann velocity distribution law – quantum statistics – Bose-Einstein statistics – Bose Einstein distribution law - photon gas – Plank's law of radiation – deduction of Wien's and Rayleigh-Jeans laws.

Fermi – Dirac statistics - Fermi-Dirac distribution law – electron gas – Fermi energy – comparison of three statistics.

UNIT – IV – WAVE MECHANICS

Matter waves – De Broglie's theory – De Broglie wavelength – experimental verification – Davission and German experiment – G.P.Thomson's experiment with relativistic correction.

Wave velocity and group velocity – particle velocity and group velocity – Heisenberg's uncertainty principle – Illustrations (i) diffraction of electron in a grating and (ii) electron viewed through a microscope.

UNIT – V – QUANTUM MECHANICS

Basic postulates of wave mechanics – Momentum operators – Energy operators - The Schrodinger wave equation – wave function – interpretations to ψ – application of Schrodinger particle in one dimensional box – Linear harmonic oscillator – zero point energy – the barrier penetration problem and tunnel effect.

BOOK FOR STUDY

- Elements of theoretical physics – R.Murugeshan

BOOKS FOR REFERENCE

1. Classical Mechanics – Gupta Kumar
2. Quantum Mechanics – Schiff
3. Classical Mechanics – Goldstein
4. Thermal Physics – Garg Bansal & Gosh

SEMESTER – VI – PAPER - XI

SOLID STATE PHYSICS (5 – hours & 4 – credits)

PREAMBLE

To study crystalline state, lattice vibrations, free electron theory of metals. To know about the fundamental concepts of magnetism of materials and superconductivity.

UNIT- I - CRYSTAL STRUCTURE

Introduction – Basic concepts of crystallography - Symmetry elements – Bravais lattice – Crystal planes and Miller indices – Crystal structures – Basic definitions of crystal structure – Simple cubic (SC) structure – Body centered cubic (BCC) structure - Face centered cubic (FCC) structure – Hexagonal close packed (HCP) structure – Important crystal structures.

UNIT- II – DIFFRACTION OF X- RAYS BY CRYSTALS

Introduction – Bragg's law - Bragg's law and crystal structure – Expermental methods in X – ray diffraction – The Laue method of X – ray diffraction – Reciprocal lattice – Interpretation of Bragg's law – Van Laue equations – The rotating crystal method – The powder method (Debye – Scherrer method).

UNIT-III – SPECFIC HEAT CAPACITY OF SOLIDS

Lattice vibrations – Vibrations of monoatomic one dimensional lattice – Vibrations of diatomic one dimensional lattice – Phonons – Basic definitions – Dulong and Petit's law – Classical theory of specific heat capacity – Einstein's theory of specific heat – Debye's theory of specific heat.

UNIT- IV – MAGNETIC MATERIALS

Introduction – Basic definitions – Classification of magnetic materials – Diamagnetic materials – Classical theory of diamagnetism (Langevin theory) - Paramagnetic materials - Langevin theory of Para magnetism – Weiss theory of Paramagnetism - Ferromagnetic materials - Weiss theory of Ferromagnetism - Domain theory of ferromagnetism - distinction between magnetic materials.

UNIT – V - SUPERCONDUCTIVITY

Introduction – Properties of superconductors – Critical temperature - Critical field - Isotope effect - Meissner effect – Entropy – Specific heat - Types of superconductors - Type-I superconductors – soft superconductors - Type-II superconductors – hard superconductors – Intermediate or vortex state – BCS theory of superconductors – Electron – Lattice – Electron interaction – Cooper pair – Existence of energy gap - London equations – First order London equation – Second order London equation – penetration depth – Superconducting materials - Applications of superconductors.

BOOK FOR STUDY:

- Solid state Physics – Dr.K.Illangovan [Unit I, II and III].
- Solid state Physics - S.O.Pillai [Unit IV and V].

BOOKS FOR REFERENCE:

1. Solid state Physics - C.M. Kachhava
2. Solid state Physics - C.Kittal

SEMESTER – VI –CORE PAPER-XII

LASER, FIBRE OPTICS AND SPECTROSCOPY (5- hours & 4-credits)

PREAMBLE

In this paper, the principles of Laser and Fibre Optics are discussed. The paper also deals with IR, UV, Raman and Mossbauer Spectroscopy.

UNIT- I - LASER

Introduction – Attenuation of light in an optical medium – thermal equilibrium – Interaction of light with matter – absorption – Spontaneous emission – Einstein's prediction – stimulated emission – Einstein relations – light Amplification - condition for stimulated emission to dominate spontaneous emission to dominate absorption transition – population inversion – active medium – pumping meta stable states- principal pumping schemes – optical resonant cavity.

UNIT – II – LASER TYPES AND ITS APPLICATIONS

Types of laser – ruby laser – Nd – YAG – laser –He - Ne laser – co_2 laser – theory of LED – LED materials – types of LED –laser diode –Ga-As –laser – Ga-Al-As - Laser – comparison chart for all the lasers – applications of laser Based on their properties – material processing holography – difference between a photography & holography.

UNIT – III – FIBRE OPTICS

Introduction – Optical fiber – features of optical fibers – principle of light ray propagation through optical fiber – propagation of light in optical fibers.- types of optical fibers- single and multimode fibers –difference between single and multimode fiber – step index and graded index (grin) fibbers – differences between step – index fiber and graded index fiber – fiber optics communication system –engineering and

industrial applications of optical fibers –fiber optics sensors – applications of fiber optic sensors – phase and polarization fiber sensors – liquid level sensors – laser Doppler velocimeter sensor – displacement sensor.

UNIT – IV – IR, UV AND RAMAN SPECTROSCOPY

Types of spectra - absorption and emission spectra – IR spectra sources – detectors –Wadsworth prism-mirror spectrograph - application IR spectroscopy - UV spectroscopy – sources – detectors – quartz spectrograph – application UV spectroscopy - Raman effect – experimental study of Raman - quantum theory of Raman effect – Raman fluorescent spectra - applications of Raman effect.

UNIT – V- RESONANCE AND MOSSBAUER SPECTROSCOPY

Resonance spectroscopy – nuclear magnetic resonance (NMR) – introduction – theory – experimental arrangement – applications of NMR – Nuclear quadrupole resonance – introduction –instrumentation – applications of NQR – electron spin resonance spectroscopy (ESR) - introduction and theory - instrumentation – applications of ESR - Mossbauer spectroscopy – introduction – principles – Experimental method – the effect of magnetic field applications.

BOOK FOR STUDY

- Optics and spectroscopy – R.Murugeshan and Kiruthiga Sivaprasath [Unit I, II, III and IV].
- Fundamentals of molecular spectroscopy – Colin.N.Banwell and Elaine.M .Mccash [Unit III & V].
- Engineering Physics – I – G. Senthil Kumar [Unit II & III]

SEMESTER - VI – CORE PAPER XIII

COMMUNICATION ELECTRONICS (5 – hours & 4 – credits)

PREAMBLE

The recent developments in the scientific and technological fields are based on electronic principles. The paper provides the basic concepts of electronic communications.

UNIT- I – MODULATION

Introduction – Modulation – Methods of modulation – Amplitude modulation – Percentage modulation – Upper and lower frequencies - Upper and lower side bands – Forms of amplitude modulation – Generation of SSB – Methods of amplitude modulation – AM modulating circuits – Frequency modulation (qualitative), digital modulation(qualitative).

UNIT- II – DEMODULATION

Introduction – Essentials of AM detection – Diode detector for AM signals – Transistor detectors for AM signals – FM detection – Quadrature detector – Frequency conversion – Super heterodyne AM receiver – FM receiver – Comparison between AM and FM – The four fields of FM.

UNIT- III –RADIO RECEIVERS

Introduction – Super heterodyne receivers – Choice of intermediate and oscillator frequencies – Image rejection – Adjacent channel selectivity – Spurious responses – Tracking – Automatic gain control – Double conversion receivers.

UNIT- IV – ANTENNAS, TV TRANSMISSION & RECEPTION

Types of antennas – Dipole antenna – Yogi antenna – Parabolic reflection – Introduction to transmission lines – Characteristic impedance – Principles of transmission & reception of colour TV signals.

UNIT - V – DIGITAL COMMUNICATION

Communication – starting along the high way – the practical uses of communications connectivity – telephone related communication services – video/voice communication, video conferencing and picture phones – on line information services – the internet – shared resources work group computing – electronic data interchange and intranets – telecommunicating the virtual offices – using a micro computer to communicate analog and digital signals – modems, ISDN levels and cables – modems communications channels – communications data transmission.

BOOKS FOR STUDY

UNIT I & II

Basic Electronics (Solid state) by B.L.THERAJA (IIIrd Edition 1988)

UNIT III, IV & V

- Electronic communication by (IIIrd edition DENNIS RODDY and JOHN COOLEN.
- Basic electronics and applied electronics by A.UBALD RAJ & G.JOSE ROBIN.

BOOKS FOR REFERENCE

- Principles of electronics – V.K.METHA
- Electronic communication system by KENEDDY & DAVIS.

SEMESTER - VI CORE ELECTIVE - PAPER IV

PLASMA PHYSICS & NANO SCIENCE (3 – hours & 3 – credits)

Preamble: This paper deals with fundamentals of nano science and plasma science.

UNIT I – PLASMA PHYSICS

INTRODUCTION

The forth state of matter - plasma in nature - Saha equation - comparison between real gaseous and plasma, plasma examples.

DEFINITION

Plasma definition - collective behavior - plasma quasineutrality - concept of plasma temperature - Debye shielding - plasma frequency - criterion of plasma.

UNIT II – PLASMA APPLICATIONS

Controlled thermonuclear fusion, Equations of thermonuclear fusions, Lawson criteria, confinement systems, Gravitational confinement, Magnetic confinement, Inertial confinement, open magnetic field confinement system, closed magnetic field confinement system - Gas discharger, Ionizations in gases - M.H.D systems for energy conversion and Ion propulsion.

UNIT III - CONCEPTS OF NANOTECHNOLOGY

Introduction - nanomaterials – different forms of nanaomaterials – synthesis of nanomaterials- top-down and bottom-up approach – techniques for synthesis of nanomaterials – applications of nanotechnology.

UNIT IV – MOLECULAR NANOTECHNOLOGY (MNT)

Introduction - principle of molecular assembly - nanomolecular self assembly-new self assembly system-components of self assembly - equilibrium and nano equilibrium self assembly - AFM (Atomic Force Microscope) – working (no theory) – Imaging modes – force - distance measurement –identification of individual surface atoms – advantages and disadvantages of AFM.

UNIT V - NANOMATERIALS

Introduction - Size Concept materials used in nanotechnology— nanoparticles – properties of nanophase particle - fullerence - carbon – carbon nanotubes (CNT) – types of CNT- fabrication of crbon nanotubes – electric arc discharge method – pulsed laser deposition – chemical vapour deposition – properties of CNT – Applications of CNT.

BOOKS FOR STUDY

- Elements of Plasma Physics by S.N.Gowswami [Units I & II].
- Space Plasma Physics by A.C.Das [Units I &II].
- Origin and Development of NanaoTechnology by P.K.Sharma [Units III, IV and V].
- Engineering Physics–II by Dr.P.Mani [Units III, IV and V].

BOOKS FOR REFERENCE

- Basics of Nano Physics – G.P.Singh
- Nanotechnology and Micromachines - Dr.N.L. Kaushik

I B.Sc Physics SEMESTER II

CORE PRACTICAL PAPER-I (5 – hours & 4 – credits)

LIST OF EXPERIMENTS - Any 12 Experiments

LIST OF EXPERIMENTS

1. Estimation of errors
2. Acceleration due to gravity & Moment of inertia – Compound Pendulum
3. Rigidity Modulus – Static Torsion apparatus
4. Rigidity Modulus of a wire – Torsion Pendulum
5. Young's Modulus – Uniform bending – Pin and Microscope
6. Young's Modulus – Uniform bending – Scale and Telescope
7. Young's Modulus – Non-Uniform bending – Pin and Microscope
8. Young's Modulus – Non-Uniform bending – Scale and Telescope
9. Thermal Conductivity if a bad conductor – Lee's disc method
10. Voltmeter Calibration (Low Range) – Potentiometer
11. Voltmeter Calibration (High Range) – Potentiometer
12. Ammeter Calibration – Potentiometer
13. Resistance & Resistivity – Potentiometer
14. Temperature co-efficient of resistance – Carey – Foster's bridge
15. Laws verification – Sonometer
16. Surface Tension – Capillary rise method
17. Viscosity of a liquid – Capillary flow method
18. Comparison of viscosities – Ostwald Viscometer
19. Conversion of Galvanometer into Ammeter and its calibration
20. Frequency of a Fork − Sonometer

II – B.Sc. Physics SEMESTER IV

CORE PRACTICAL PAPER – II (5 – hours & 4 – credits)

LIST OF EXPERIMENTS - Any 12 Experiments

1. Sonometer –AC frequency
2. Determination of refractive index of a prism – spectrometer
3. Airwedge – Thickness of wire – Microscope
4. Newton's Rings – Radius of curvature – Microscope
5. Prism – I-d curve, to find n – spectrometer
6. Prism – I-I' curve, to find n – spectrometer
7. Grating – Normal incidence Dispersive power – Spectrometer
8. Resolving power of grating – Spectrometer
9. Field along the axis of the coil – H determination
10. Voltage sensitivity and current sensitivity – B.G
11. Charge sensitivity –B.G
12. Comparison of e.m.fs – B.G
13. Comparison of capacitances – B.G
14. Comparison of capacitances – Desauty's bridge (A.C)
15. Frequency of the Fork – Melde's String
16. Resolving power of telescope
17. Dispersive power of a prism – Spectrometer
18. Temperature co-efficient of resistance of a coil – Potentiometer
19. Newton's Rings – 'n' of a lens
20. Half shade Polarimenter

III-B.Sc Physics SEMESTER - V

CORE PRACTICAL - PAPER III (5 – hours & 4 – credits)

LIST OF EXPERIMENTS - Any 12 Experiments

1. LCR – Series Resonance Circuits
2. LCR – Parallel Resonance Circuits
3. Determination of self inductance L – Maxwell's bridge
4. Determination of self inductance L – Owens's bridge
5. Determination of self inductance L – Anderson's bridge
6. M1/M2 – comparison of Mutual Inductance – B.G
7. Determination of Mutual Inductance – B.G
8. Solar Spectrum – Fraunhoffer lines – Spectrometer
9. Cauchy's constants – Spectrometer
10. Hartmann's Interpolation formula – Spectrometer
11. Resolving powers of a prism – Spectrometer
12. Small angled prism – Spectrometer
13. Determination of absolute capacity of a condenser –B.G
14. Boltzmann's constant using transistor
15. E.m.f of thermocouple – Potentiometer
16. Biprism – Determination of wavelength of spectral lines of sodium light – Spectrometer
17. Determination of wavelength of spectral lines of mercury – Grating minimum deviation - Spectrometer
18. Impedance and power factor - LR – Circuit

III-B.Sc Physics SEMESTER - VI

CORE PRACTICAL - PAPER IV (5 – hours & 4 – credits)

LIST OF EXPERIMENTS - Any 14 Experiments

1. Zener diode as a voltage regulator
2. Logic gates using Discrete components.
3. Transistor characteristics – CE mode.
4. Transistor characteristics – CB mode.
5. Bridge rectifier- RC & LC filter
6. Diode characteristics.
7. Single stage amplifier.
8. Zener diode characteristics.
9. Operational amplifier as an adder
10. Operational amplifier as a subtractor.
11. Hartley oscillator.
12. Colpitt's oscillator.
13. FET characteristics.
14. Astable multivibrator using transistor.
15. Verification of truth tables of logic gates using ICs
16. NAND and NOR as Universal gates
17. XOR and XNOR using discrete components
18. D/A convertor

PART –IV

Sem	Sub Code	Course	Title	Duration		Marks			Credit
				T	P	Int	Ext	Total	
I		VBE	Yoga & Meditation	1		40	60	100	3
II		SBC	Environmental studies	2		40	60	100	2
III		SBC Paper -I	Biomedical Instrumentation	2		40	60	100	2
IV		SBC Paper -II	Computer Fundamentals & MS Office	2		40	60	100	2
V		SBC Paper -III	Project		2	40	60	100	2
VI		SBC Paper -IV	Computer ‘C’ programming practical		2	40	60	100	2
III		Non Major Elective- I	Astrophysics	2		40	60	100	2
IV		Non Major Elective II	Types of Energy & Their utilization	2		40	60	100	2

SEMESTER – III –SBC- I

BIOMEDICAL INSTRUMENTATION (2 – hours & 2 – credits)

PREAMPLE

To understand the design and functioning of various medical equipments.

UNIT – I: BIOPOTENTIALS AND ELECTRODES

Transport through all membrane – Resting and Action potential – Bioelectric potentials – Design of Medical instruments – Components of the Biomedical instrument system.

UNIT – II: TRANSDUCERS

Active transducers – Magnetic induction type transducer – Piezoelectric type transducer – Piezoelectric transducer as a pulse sensor – Photoelectric type transducer – Thermoelectric type transducer.

UNIT – III: BIOPOTENTIAL RECORDERS - I

Characteristic of a recording system – Electrocardiography origin of cardio Action potential – Ecocardiography – Electroencephalography (EEG) – Analysis of EEG

UNIT – IV: BIOPOTENTIAL RECORDERS - II

Electromyography (EMG) – Electro - retinography (ERG) and Electro - oculography (EOG) – Recorders with high accuracy – Pacemaker – Different types.

UNIT – V: ADVANCES IN BIOMEDICAL INSTRUMENTATION

Computes in medicine – Lasers in medicine – Endoscopes – Computer Tomotography(CT) (Principle only) – Medical application of CT.

BOOKS FOR STUDY

- Biomedical instrumentation - Dr.M.Arumugam – Anuradha Agencies – Chennai, Edition – 2006.

BOOKS FOR REFERENCE

- Aston, R.Principles of Biomedical instrumentation and measurement, ohio: Merrill publishing company, 1990.
- Handbook of Biomedical instrumentation by R.S.Khandpur. New Delhi: Tata Mc Graw – Hill publishing company Ltd 1990.

SEMESTER – IV –SBC- II

COMPUTER FUNDAMENTALS & MS- OFFICE

(2 – hours & 2 – credits)

PREAMPLE

This paper deals with fundaments of computer and MS Office.

UNIT – I: COMPUTER FUNDAMENTALS

Introduction – History of computers – Characteristics of computers – Need for a computer – Computer applications – Concept of computer – Structure of computer (Block Diagram & components) – Classification of computers – Types of computer.

UNIT –II: INPUT & OUTPUT DEVICES

Input devices – Keyboard – Mouse – Bar code Reader – Output devices – Monitor – Printer Impact of non – impact printers – Main memory – Secondary storage devices.

UNIT – III: WINDOWS

Introduction – Elements of window – Various types of icons – Run through on window – Windows basic – Program manager – The file manager – Control panel.

UNIT – IV: MS WORD

Windows Layout – Menus – File – Edit – View – Insert tools – Tables – Windows – Saving & exiting – Spell check – Table creation – Inserting pictures.

UNIT – V: EXCEL

Building a Worksheet – Selecting Worksheet items – Using Autofill – Adding rows and columns – Copying and Moving information – Creating and Copying formulas –Naming ranges s– Using functions – Improving the appearance of worksheet – Changing column Width – Formatting Text and Numbers – Using auto format – Spell Checking – Using Chart Wizard – Creating, Enhancing and Printing a chart.

BOOKS FOR STUDY:

MS Office 2000 for every one – Sanjay Saxena

III - B.Sc Physics

SEMESTER VI- SKILLED BASED COURSE - III

COMPUTER PROGRAMMING 'C' PRACTICALS (2 – hours & 2 – credits)

LIST OF PROGRAMMES - Any 10 Programmes

1. Arranging data in ascending / descending order.
2. Finding area of a triangle.
3. Finding standard deviation of a collection of data.
4. Fahrenheit to Celsius conversion.
5. Upper and lowercase conversion.
6. Sum of the digits.
7. Sum of the given series. Sum = $x+x^2+x^3+\ldots+x^{15}$.
8. Reversing the numbers.
9. Reversing the string.
10. Compound interest calculation.
11. Simple interest calculation using function.
12. Factorial of a number.

SEMESTER III - NME–I

ASTROPHYSICS (2 – hours & 2 – credits)

PREAMPLE

To make the students know about fundamentals of telescopes, solar system, stars and galaxies.

UNIT – I: TELESCOPES

Reflecting and refracting telescopes - telescope mountings - equatorial and azimuth mounting.

Coordinate systems:

Geographic longitude - latitude system , celestial right ascension - declination system - Alt – azimuth system - Rising and setting of celestial bodies - stars and constellations -annual motion of the sun, motion of the planets, time and calendar.

UNIT – II: EARTH AND MOON

Earth - diameter, motion, spin, as a clock, interior, surface, atmosphere. Moon - motion, interior, surface, solar and lunar eclipses.

UNIT – III: SOLAR SYSTEMS

Planets orbital periods and distance - Bode's law - Asteroids, comets, meteors and meteorites, satellites, scales and regularities of planets.

UNIT – IV: STARS

Distance by parallax method, motion of stars, intrinsic properties of stars , sun and stars comparison , determination of mass , radius , luminosities and atmospheric temperature of stars - Hertzsprung – Russel diagram , binary stars , stars clusters , pulsating stars , white dwarfs , exotic stars.

UNIT – V: GALAXIES

MILKY WAY GALAXY:

Size of the galaxy, inter stellar medium, radio astronomy and interstellar gas, structure of the Milky Way galaxy - motions, rotations and mass evaluation of Milky Way galaxy, density wave theory of spiral arms

GALAXIES:

Shapes of galaxies, stellar population distances to galaxies, cluster of galaxies - properties of the universe - Red shift and radio wave emission. Big bang theory of cosmology, density of the universe.

BOOKS FOR STUDY:

1. Astrophysics : K.S.Krishnaswamy,
   New age international Ltd.,publishers(1996).
2. Astronomy : S.Kumaravelu & Susheela Kumaravelu,
   Muruga Bhavonam , chidambaranagar,
   Nagercoil - 2.
3. Discovering Astronomy: R.D.Chopman,
   W.H.Freeman CO., 1978.
4. The Frontier Between Physics & Astronomy. : J.V.Narliker , IIT,
   Madras series 1989,

SEMESTER IV - NME–II

TYPES OF ENERGY & THEIR UTILIZATION (2 – hours & 2 – credits)

PREAMBLE

The paper deals with energy sources and their availability.

UNIT-I-INTRODUCTION TO ENERGY

Introduction -work-energy-exchange of energy-power-units for energy.

UNIT-II-CONVENTIONAL ENERGY SOURCES AND THEIR AVAILABILITIES

Introduction-fossil fuels-coal-petroleum-searching petroleum source-refining petroleum-agricultural and organic wastes-magneto hydrodynamic generation.

UNIT-III-NONCONVENTIONAL ENERGY SOURCES -I

Introduction-solar energy-heating of building -cooling of building-solar electric power generation: stream generation-solar photovoltaic cell.

UNIT-IV-NONCONVENTIONAL ENERGY SOURCES -II

Energy from biomass and biogas-wind energy-energy from hydropower-energy from ocean –tidal energy-ocean thermal energy-geothermal energy-storage of energy.

UNIT-V-ENERGY AND ENVIRONMENT

Introduction-disadvantage of fossil fuels –burning of fuels-effect of emission of Co_2 & Co-pollution due to heating effects-effect of radioactive element.

BOOKS FOR STUDY

Non Conventional Energy Sources – G.D.RAI.

ANCILLARY PHYSICS

ANCILLARY PHYSICS I MATHS/ II CHEMISTRY

SEMESTER –I - PAPER I

PREAMBLE

This paper gives the basic concepts of Mechanics, Properties of matter, Thermal physics, Electricity, Electronics and Physical Optics.

UNIT – I- ROTATIONAL MOTION, GRAVITATION & ELASTICITY

Angular Velocity - Torque and Angular acceleration - Work and Power in rotational motion - Angular Momentum - Kinetic Energy of rotation - Moment of Inertia - laws of parallel and perpendicular axes theorems - Compound Pendulum - Expression for period - Experiment to find 'g' - Elastic moduli - Poisson's ratio - beams - expression for bending moment - Determination of Young's modulus by uniform and non uniform bending - I Section girders – Torsion – Torsion pendulum determination of G

UNIT - II THERMAL PHYSICS

Conduction - Lee's method of determining thermal conductivity of a bad conductor - Analogy between heat flow and current flow - Wiedmann's - Franz law.

Convection in atmosphere - Lapse rate (no theory) - Stability of atmosphere - Green house - Atmospheric pollution.

Radiation - Stefan's law - Determination of Stefan's constant.

UNIT - III ELECTRICITY

Kirchhoff's laws - Applications of Kirchhoff's laws to Whetstone's bridge - Carey Foster's bridge - Potentiometer - Measurement of potential and calibration of voltmeter - Measurement of current and calibration of ammeter.

UNIT - IV ELECTRONICS

Introduction to semiconductors - Junction diode characteristics - Zener diode characteristics - Boolean algebra - Demorgan's theorems - Basic gates AND, OR

& NOT gates - NOR & NAND gates - NOR & NAND gates as universal building blocks - XOR gate.

UNIT - V PHYSICAL OPTICS

Interference in thin films - Airwedge - Newton's rings (reflected beam only) - **Diffraction** - Theory of plane transmission grating (normal incidence only) - Experiment to determine wavelength - **Polarisation**- Brewester's laws - Double refraction - Nicol prism construction, action & uses.

BOOKS FOR STUDY

- Ancillary Physics (Mechanics & Properties of matter) – M.Palaniappan
- Ancillary Physics (Thermal Physics) – M.Palaniappan
- Ancillary Physics (Electricity and Electronics) – M.Palaniappan
- Ancillary Physics (Optics and Modern Physics) – M.Palaniappan

BOOKS FOR REFERENCE

- Ancillary Physics (Mechanics & Properties of matter) – Venkatachalam
- Ancillary Physics (Thermal Physics) - N.Venkatachalam
- Ancillary Physics (Mechanics & Properties of matter) – R.Murugeshan
- Ancillary Physics (Thermal Physics) - R.Murugeshan
- Ancillary Physics (Electricity and Electronics) – N.Venkatachalam
- Ancillary Physics (Electricity and Electronics) – R.Murugeshan
- Ancillary Physics (Optics and Modern Physics) – R.Murugeshan
- Ancillary Physics (Optics and Modern Physics) – N.Venkatachalam

II – B.Sc CHEMISTRY / I – B.Sc MATHS- SEMESTER I/III

ANCILLARY PHYSICS PRATICALS

LIST OF EXPERMENTS - ANY 12 EXPERMENTS

1. Uniform bending – Pin and Microscope
2. Non uniform bending – Scale and telescope
3. Torsion pendulum
4. Compound pendulum
5. Estimation of errors
6. Carey Foster's Bridge – Resistance and Resistivity
7. Potentiometer – Calibration of low range voltmeter
8. Diode characteristics
9. Potentiometer – Calibration of Ammeter
10. Air wedge – thickness of a wire
11. Non - uniform Bending – pin and microscope
12. Non - uniform Bending – scale and telescope
13. Newton's Rings.
14. Zener diode characteristics
15. XOR & XNOR gates
16. NAND, NOR – logic gates – verification of truth tables
17. AND, OR, NOT logic gates using discrete components
18. Bridge Rectifier
19. IC – Logic gates
20. Demorgen's laws Verification using IC logic gates.

Extra Credit Paper – I INSTRUMENTATION

ELECTRICAL APPLIANCES

UNIT – I

1. ELECTRICAL FANS
2. WASHING MACHINE
3. OHP AND TAPE RECORDER GENERAL PRINCIPLES AND WORKING

UNIT – II

1. REFRIGERATORS
2. AIR CONDITIONER – GENERAL PRINCIPLES AND WORKING

UNIT – III

1. INTRODUCTION – WIRING MATERIALS AND ACCESSORIES – TYPES OF WIRING – BASIC PRINCIPLES OF EARTHING

BOOKS FOR STUDY

1. INSTRUMENTATION – K. ARUMUGAM
2. ELECTRICITY AND MAGNETISM – R. MURUGESAN

B.Sc Physics Degree Course *(Semester)*

Pattern of question paper for Physics Major and Ancillary subjects-

Part – III - External (Theory) for the Academic Years 2014-17

Time: 3hrs **Max.Mark**:60

SECTION – A

Answer all ten questions **10x1=10**
All Questions carry equal marks.

SECTION – B

Answer any **FOUR** out of **6** (open choice) **4x5=20**
All Questions carry equal marks.

SECTION – C

Answer any **THREE** questions out of **5** (open choice) **3x10=30**
All Questions carry equal marks.

INTERNAL (Theory)

SECTION – A

Answer all the Questions:
Objective type Questions: **10x1=10**

SECTION – B

Answer any **TWO** Questions out of **four** paragraph questions. **2x5=1 0**

SECTION –C

Answer any **ONE** Question out of two essay type question. **1x10=10**

Scheme for 40 marks for Internal

Test	:	30marks
Seminar	:	5marks
Assignment	:	5marks
Total	:	40marks

INTERNAL (PRACTICAL)

Attendance	:	5marks
Preparation	:	5marks
Observation & Calculation	:	25marks
Record	:	5marks
Total	:	40marks

B.Sc Physics (Semester) Degree Course

Pattern of Questions paper for B.Sc Physics

Part – IV – SBC & NME INTERNAL (Theory)

SECTION – A

Answer any five out of eight short Questions: **5x2=10**

SECTION – B

Answer any **two** Questions out of **four** paragraph questions. **2x5=10**

SECTION –C

Answer any **ONE** Question out of two essay type questions. **1x10=10**

Scheme for 40 marks for Internal

Test	:	30marks
Assignment	:	10marks
Total	:	40marks

EXTERNAL –Theory

Time : 3hrs **Max.Mark**:60

SECTION – A

Answer any **5** out of **8** **5x2=10** .
(each carries 2 marks)

SECTION – B

Answer any **4** out of **6** questions. **4x5=20**
(each carries 5 marks)

SECTION – C

Answer any **3** out of **5** questions. **3x10=30**
(each carries 10 marks)