SAKTHI COLLEGE OF ARTS AND SCIENCE FOR WOMEN, ODDANCHATRAM

(Recognized Under Section 2(f) and 12(B) of UGC Act 1956)

(Affiliated to Mother Teresa Women's University, Kodaikanal)

PG AND RESEARCH DEPARTMENT OF PHYSICS

CURRICULUM FRAMEWORK AND SYLLABUS FOR

OUTCOME BASED EDUCATION IN

SYLLABUS FOR

B.Sc., PHYSICS

FRAMED BY

MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL

UNDER

CHOICE BASED CREDIT SYSTEM

2015 - 2018

SEMESTER-I

CORE-1/PAPER-I BPH12

PROPERTIES OF MATTER

UNIT I Acceleration due to gravity

Acceleration due to gravity-The Simple Pendulum-Borda's Pendulum-Compound Pendulum-Interchangeability of the Centre of Suspension and Oscillation-centre of Percussion-Other points. Variation of the value of g- Determination of the value of g at Sea- Local and Temporal Changes in the value of g.

UNIT II Gravitation

Historical-Kepler's laws-Note on Newton's deductions from Kepler's laws- Newton's law of Gravitation- Determination of the Gravitational Constant- Density of the Earth -Qualities of Gravitation- Law of Gravitation and Theory of Relativity- Gravitational Field -Intensity of the field- Gravitational potential-Potential Energy-Gravitational potential at a point distant r from a body of mass-m-Velocity of escape- Equipotential Surface- Potential at a point Outside and Inside a Spherical Shell- Gravitational field Inside a Spherical Shell or a Hollow Sphere-Potential and Field Intensity due to a Solid Sphere at a point(i) inside the Sphere and (ii)Outside the Sphere.

UNIT III Elasticity

Introductory -Stress and Strain-Hook's law- Three types of Elasticity -Equivalence of a shear to a Compression and an Extension at right angles to each other -Shearing stress equivalent to an equal linear tensile stress and an equal compression stress at right angles to each other-Work done per Unit Volume in a strain -Deformation of a Cube -Bulk Modulus- Modulus of Rigidity Young's modulus- Relation connecting the Elastic Constant- Poisson's Ratio – Determination of Young's modulus -Determination of poisons ratio for Rubber.

UNIT IV Flow of Liquids-Viscosity

Rate of Flow of a liquid-Lines and Tubes of Flow-Energy of the Liquid-Bernoulli's Theorem and its important Applications-Important Applications of Bernoulli's Equation-Viscosity-Coefficient of Viscosity-Fugitive Elasticity-Critical Velocity-Poiseuille Equation for flow of liquid through a tube-Experimental Determination of for a liquid-Poiseulle's Method-Motion in a Viscous Medium-Determination of Coefficient of Viscosity of a Liquid-stokes' Method-Rotation Viscometer-Variation of Viscosity of a Liquid with Temperature-Comparison of Viscosities-Ostwald Viscometer-Determination of Viscosity of gases.

UNIT V Diffusion and Osmosis

Diffusion- Fick's law-relation between Time of Diffusion and Length of Column-Experiment Measurement of Diffusivity-Graham's law for Diffusion of Gases-Effusion-Transpiration and Transfusion-Osmosis and Osmotic Pressure-Laws of Osmotic Pressure-Kinetic Theory of Solutions –Osmosis and Vapour Pressure of a Solution-Osmosis and Boiling Point of a solution-Osmosis and Freezing Point of a Solution.

Books for study

1. Elements of Properties of Matter.,D.S.Mathur., Shyam Lal Charitable Trust Publisher., New Delhi.

Books for References

1. Elements of Mechanics-D.S.Mathur S.Chand&Co.
2. Properties of matter- Brijlal &Subramanium S.Chand &Co.
3. Electricity &Magneism –Brijlal&Subramanian.

SEMESTER-I

CORE-2 / THERMAL PHYSICS

UNIT I Calorimetry

C_v and C_p of a gas-Meyer;s relation experimental determination of C_v by expand method-Specific heat of gas by calendar Barn's method.

UNIT II Transmissions of heat conduction

Condution co-efficient of thermal conductivity-cylindrical flow of heat-K of rubber-K of bad conductor-Lee's disc method. Radiation :Black body –Stefan's law –Experimental determination of Stefan's constant-Mathematical derivation of Stefan's constant-Solar constant temperature of the sun-Solar spectrum.

UNIT III Kinetic theory of gases

Derivation of ideal gas equation-degrees of freedom Maxwell's law of equipartition energy-ratio of specific heat capacities –Maxwell's law of distribution of molecular velocities-Experimental verification-Mean free path-Transport phenomena-Diffusion viscosity and thermal conduction of gases.

UNIT IV Low temperature physics

Joule Kelvin effect-Simple theory of porous plug experimental adiabatic demagnetization-Curie's law-Giauque's method-Superconductivity.

UNIT V Thermodynamics

1st law of thermodynamics-gas equation during an adiabatic determined by element and Desorme's method.

2nd law of thermodynamics and entropy-Change of entropy in reversible and irreversible process-Maxwell's Thermodynamical relation-Application to joule Kelvin effect-Clausius Clapeyron equation.

Books for Study:

1. Heat and thermodynamics-D.S.MATHUR

Books for Reference:

1. Thermal physics-A.B.Gupta and H.P.Roy-Books and Allied. (p).Ltd
2. Heat and thermodynamics-Brijlal subramaniyam-Sichand &company Ltd.
3. Thermal physics-S.C.Garg.,R.M.Bansal; .,L.K. Glosh-TATA McGraw Hill

SEMESTER-I

CORE-3 / ELECTRICITY AND MAGNETISM

UNIT I Electrostatics

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

UNIT II Current electricity

Current-current density-experession for current density-Krichofff's laws-Wheat stone's network-Carey Fosters bridge-Determination of resistivity and temperature coefficient of resistance-potentiometer; Principle-calibration of ammeter,voltmeter.

UNIT III Magnetic fields of electric current

Magnetic field-flex-Biot Savart law-magnetic induction due to straight conductor –force on a current element-torque on current loop-ampere's law-Maxwell's equations-magnetic induction due to circular loop-solenoid and toroid moving coil galvanometer's dead beat and ballistic. properties of magnetic material; the three magnetic vetors-dia-para-ferro magnetism.

UNIT IV Electromagnetic induction

Law of electromagnetic induction-Maxwell equation self and mutual induction-determination of L by Rayleigh's methods-determination of M coefficient of coupling –Eddy current –uses.

UNIT V Alternating currents

AC circuits RC, RL series, parallel-power of an ac circuit-Q factor-Bridges-Owen-Anderson's Maxwell bridges.

Books for study

1. Basic electrical, electronic and computer engineering-R.Muthusubramaniam, S.Salivahanan. K.A.Muraleedharan.

Books for References

1. 1. Electricity and Magnetism-D. Chattopadhyay& P.C. Rakshit-New Central Book Agency –(Pvt)

SEMESTER-II

CORE-4 / OPTICS AND SPECTROSCOPY

UNIT I Geometrical optics

Lens-refraction through lenses-aberration-chromatic aberration-spherical aberration-mimimization of aberrations-comaastigmatism. Ramsdens eyepiece-Huygens eyepiece-oil immersion objective-dispersion-dispersion through a prism-Cauchy's dispersion formula-Theory of rainbows-primary and secondary rainbow.

UNIT II

Photographic camera-depth of focus-f number shutter speed-j photographic film-photographic process. Colours of thin film Air Wedge-determination of diameter of a thin wire-Newton's rings determination of refractive index for liquid-michelson's interferometer-Determination of λ and d. λ -uses.

UNIT III Diffraction

Frenel and Fraunhofedr classes of diffraction- Frenel's explanation of r the rectilinear propagation of light zone plate-Frenel's diffraction at a straight edge-Theory of diffraction grating –determination of wavelength-dispersive and Rayleigh's criterion for resolving power of a grating –comparison between prism and grating spectra.

UNIT IV Polarisation

Double refraction Huygen'sexplanaion-production,detection and analysis of plane, circularly and elliptically polarized light-quarter and half wave plates –optical rotation-Biot's law-Laurent λ half shade polarimeter- Frenel's of optical rotation.

UNIT V Spectroscopy

Classification of line, band and continuous spectra-Infra red spectroscopy-application of Raman effect experimental set up characteristics of Raman lines –basic concepts of resonance spectroscopy-nuclear magnetic resonance-nuclear quadrupole resonance-electron spin resonance-Experimental set up and any one of the applications(Quantitative treatment only)

Books for study

1. Optics and Spectroscopy –Brijlal and Subramanian

Books for References

1. Optical fibre Communications principles and practices-john Senior, PHI1984

2. Fundamental of fiber optics in telecommunications and sensor systems. B.P.Pal, Wiley Eastern, 1992.

SEMESTER-II

CORE-5 / MATHEMATICAL PHYSICS

UNIT I Vectors

Gradient of scalar field-line, surface and volume integrals-divergence of a vector function-curl of a vector function and its physical significance-gauss divergence theorem- Stroke's theorem-green's theorem

UNIT II Matrices

Algebraic operation on matrices-transpose of matrix-the conjugate of a matrix- the conjugate transpose of a matrix-symmetric and anti-symmetric matrix-hermitian and skew hermition matrix-determinant of matrix-co factor of determinant-minors of a matrix-singular and non singular matrix –adjoin matrix-invertible matrix-inverse of a matrix-orthogonal matrix-unitary matrix

UNIT III Fourier series

Fourier series-change of interval form-complex form of Fourier series-Fourier series- Fourier series of a function f(x)-Fourier series in interval-uses of Fourier series –physical examples of Fourier series-properties of Fourier series.

UNIT IV Beta and Gamma Function

Definition-Symmetry property of Beta function-Evaluation of Beta function-Transformation of Beta function-Evaluation of transformation of Gamma function-relation between Beta and Gamma function.

UNIT V Differential equation

Partial differential equation

Books for study

1. Mathematical Physics- Sathyaprakash
2. Mathematicl Physics-H.K.Doas

Books for References

1. Mathematical physics- P.K.Chattopadhyyar-Wiley Eastern Ltd.,

SEMESTER-II

CORE-6 / ELECTRONICS 1

UNIT I Band structures of semiconductor

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 break down-zener diode-Photodiode.

UNIT II

Two part network analysis-H parameter-transistor –input and output characteristics-load line-quiescent point-fixed bias-universal divider bias-emitter feedback bias-amplifiers-C.E. Amplifiers-class A and class B-push pull amplifiers-frequency response of amplifiers

UNIT III Oscillators

Feedback-types of feedback-advantage of negative feedback-Barkhausan criterion-hartley,colpitt and phase shift oscillators-multivibrators using transistors.

UNIT IV Modulation and detection

Amplitude modulation-percentage of modulation AM spectrum-AM modulating circuits-filtering of AM signals-suppressed components envelope detector-single side band transmission-methods of amplitude modulation-frequency modulation(Qualitative)-digital modulation(Qualitative)-AM detectors

UNIT V

Op-amp characteristics-expression for gain (inverting mode only)-application as adder, subtractor, integrator and differentiator-analog computer.

Books for study

1. Electronic devices and circuits-S.Salivahana,N,Suresh kumar and Villa Raj,Mc Graw Hill publishing co.Ltd.,New Delhi 1998.

2. Principles of electronics-V.K.Mehta

Books for References

1. Antennas- Electronic communication system-george Kennedy.

2. Text book of applied electronics-R.S.Sedha.

3. Electronics principles-MalvinoT.M.H.Edition

4. Basic electronics for scientist and engineer J.J.Brophy-TMH.

5. Basic elecyronics=Ubald Raj and Jose Robin.

6. Electronic fundamentals and application-millman and Halkkias.

7. Transistors circuit approximations-malvino,TMH

SEMESTER-III

CORE-7 / CLASSICAL AND STATISTICAL MECHANICS

UNIT I D Alembert's principle and lagrange's equations

Mechanics of system of particles-constraints-D'Alembert's and langrange's equation-velocity dependent potential and dissipation functions-application of lagrange's formulation.

UNIT II Variational principles and lagrange'sequation:

Hamiltonian's principle-some techniques of the calculus of variations-derivation of lagrange's equation from hamiltonian's principle-extension of hamilton's principles to non holonamic systems.Advantag3es of the variation principles formulation-conservation theorem-symmetry properties

UNIT III Two-body central force problem

The Kepler problems-detection of Kepler's law(I,ii,iii law)-center of mass-motion of the center of mass of a system of particle-two body problem and the reduced mass-kinetic energy of a system of particle.

UNIT IV Statistical Physics

Equilibrium of distribution and partition function-molecular energies in an ideal gas-equipartition theorem-Einstein and Debye's theory of specific heat capacity-thermal properties of non metals (no derivations) and metals.

UNIT V Classical and quantum statistics

Phase space-probability of distribution-Maxwell's Boltzmann's statistics-Bose Einstein statistics-Planck's radiation-Bose-Einstein condensation-Fermi Dirac statistics-Fermi energy-electron gas in metals.

Books for study

1. Classical Mechanics, H. Goldstein, Narusa publisher.
2. Statistical Mechanics –B.B.Laud

Books for References

1. antennas- Electronic communication system-george Kennedy.
2. Text book of applied electronics-R.S.Sedha.
3. Electronics principles-MalvinoT.M.H.Edition
4. Basic electronics for scientist and engineer J.J.Brophy-TMH.
5. Basic elecyronics=Ubald Raj and Jose Robin.
6. Electronic fundamentals and application-millman and Halkkias.
7. Transistors circuit approximations-malvino,TMH

SEMESTER-III

CORE-8 / QUANTUM MECHANICS

UNIT I Origin of the quantum mechanics

Limitations of classical physics-Planck's quantum hypothesis-Einstein's theory of photoelectric effect-Compton effect-quantum theory of specific heat- Bohr model of hydrogen atom- existence of stationary states-Wilson Somerfield quantization rule-elliptic orbits of hydrogen atom-the harmonic oscillator -the rigid rotator- particle in the box-the correspondence principle- The Stern Gerlach experiment -inadequacy of quantum theory.

UNIT II Wave mechanical concepts

Wave nature of particles- the uncertainty principle- the principle of superposition-wave packet- Time-dependent Schrödinger equations-interpretation of the wave function-Ehrenfest's theorem - Time -independent Schrodinger equation- stationary states - admissibility conditions on the wave function.

UNIT III General formalism of quantum mechanics

Linear vector space- linear operator - Eigenfunctions and eigenvalues -Hermitian operator - postulates of quantum mechanics- simultaneous measurability of observables- general uncertainty relation-Dirac's notation -equations of motion -momentum representation.

UNIT IV One dimensional energy Eigenvalue problems

Square –well potential with rigid walls-square –well potential with finite walls-square potential barrier-alpha emission-block waves in a periodic potential –kronig-penney square-well periodic potential-linear harmonic oscillator:schrodinger method-linear harmonic oscillator:operator method-free particle

UNIT V Three-dimensional energy eigenvalue problems

Particle moving in Spherically Symmetric potential- System of Two Interacting Particles - Rigid Rotator- Hydrogen atom- Hydrogenise orbital's- the free particle- Three dimensional square well potential -The deuteron

Books for study

1. Quantum mechanics-G. Aruldhas second edition-PHI learning private limited, new Delhi

Books for References

1. Quantum mechanics-Leonard I.Schiff-3rd edition-TATA McGraw Hill Edition.

2. Introduction to quantum mechanics-David J.Griffiths-2nd Edition-publishing by Dorling Kindersley (India) PVt. Ltd.,

SEMESTER-III

CORE-9 / FIBER OPTICS

UNIT I

Advantages of optical fiber communication- Optical fiber waveguide-Single mode fiber-Step index fiber-graded index fiber transmission-Characteristic of optical fiber.

UNIT II

Attenuation-Material absorption losses-linear scattering losses-Non –linear scattering losses-Dispersion-Intramodel dispersion-Inter model dispersion.

UNIT III

Prepaation of optical fibers- Liquid phase techniques-Vapour phase deposition techniques-Cable design-Fiber splices-fiber connection.

UNIT IV

Lasers-induced absorption-Spontaneous and stimulated emission-Ruby laser-He-Ne laser-Semiconductor laser-Properties of laser beam.

UNIT V Optical sources

Semi-conductor injection laser - longer wave length injection lasers-Light emitting diode (LED) structures-LED characteristics - optical detectors - P_N photo diode - P-I-N photo diode - Avalanche photo diode - planar wave guides.

Book for study

Optical fiber communications-Gerd Kerser.

Book for references:

Optical Fiber Communication Principles and Practice-John M.Senior.

SEMESTER-III

CORE-10 / LASER PHYSICS

UNIT I Introduction

Directionality- Intensity-Monochromacity-Coherence.

UNIT II Einstein's Quantum Theory of Radiation

Einstein coefficients-Momentum transfer-Life-time- Possibility of amplification.

UNIT III Interaction of Radiation with matter

Time Dependent Perturbation Theory- Electric Dipole Interaction- Quantum Electrodynamics-Creation and annihilation operators- Fock States- Quantization of the field-Zero-point energy-Coherent- state description of the electromagnetic field- Interaction of radiation with matter.

UNIT IV Masers

The two-level Maser system: Ammonia maser-Hydrogen maser-The three-level maser system.

UNIT V Theory of Some Simple Optical Processes

Waves and interference- Coherence- Coherence of the field and the size of the source-Visibility and the size of the source- Coherence and monochromacity- Kinetics of optical absorption- Shape and width of spectral lines- Line broadening mechanisms- Natural or intrinsic broadening –Collision broadening Doppler broadening.

Book for study:

1. Laser &Nonlinear Optics-B. B. Laud., New Age International Publisers.

Books for References:

1. Optics & spectroscopy – Murugesan.
2. Fundamental of Optics- Jerkins& White.
3. Laser Theory & Applications-K. Thyagarajan&AjoyGhatak.

SEMESTER-VI

CORE-11 / DIGITAL ELECTRONICS

UNIT I Binary Number system

Number system-conversion of decimal number into binary number- binary to decimal conversion-binary addition-binary subtraction -1's complement methods-binary multiplication and divisions-hexa decimal numbers –binary coded decimals.

UNIT II Logic gates

Basic logic gates-implementation-OR and AND gates using diodes and transistors-NOT using transistors-characteristics of logic gates-Calculation of input voltage in OR and AND gates-Logic family TTL and DTL universal logic gates NOR and NAND logic gate-Exclusive OR gates.

Demorgan's Law and applications:

Boolean Algebra-Demorgan's law –applications-different expression for EX-OR gate-binary adders-Half adder-full adder.

UNIT III Multivibartors

Schmit trigger(555 timerr) monostable and astable Multivibrators using 555 timer-logic gate Flip-Flops-R.S-Flip flop-J.K Flip Flop-R.S Master Slave Flip Flop-J.K. Master slave Flip Flop.

UNIT IV Counters and Registers

Types of counters-Binary counter-Decade counter-four bit binary counter-shift register-ring counter-memory systems in computers-magnetic core as memory device-magnetic disc memories-floppy disc.

UNIT V D/A and A/D converter

Binary weighted resistor-D/A converter-R2R resistive ladder D/A converter-Counter type A/D converter-Successive approximation A/D converter-Dual slope A/D converter-Parallel comparator A/D convertor.

Books for study:

1. Digital circuits and design-S.Salivahanan and S.Arivazhagan.
2. Digital principles and computer design-Malvino and Leech

Books for References:

1. Integrated Electronics-Milman and Halkies.
2. Digital principles and computer design-Morria Mano
3. Digital Electronics-A.Ubald Raj and G.Jose Robin.
4. Introduction to computer and Internet-D.S.Saxena.

5. Using information technology-brief version, a practical introduction to computers and communication-Sawyer Brain K.Williams.

SEMESTER-VI

CORE-12 / NUCLEAR PHYSICS

UNIT I Structure &Properties of Nucleus

Nuclear mass-Bridge,Aston's-mass spectrum-Radius,mass defect-Binding energy-Einstein's mass energy relation-nuclear moments isotopes –isobars.

UNIT II Radio Activity

Neutral radioactive series, age of earth-carbon dating-successive radio activity transient& secular equilibrium, Gieger- Nuttal rule-Decay Gamov's theory of decay-Spectrum of rays-neutrino hypothesis.

UNIT III Accelerators& Detectors

Cyclotron-bunching effect- synchro Cyclotron-Betetron- linear accelators-basic ideas on GM counter-cloud chamber-photographic emulsion.

UNIT IV Nuclear reactor

Four factor formula-moderator-cooler reactor assembly thermo nuclear reaction-Bathe's theory for fusion energy-hydrogen cycle-atom bolm-hydrogen bomb

UNIT V Sub nuclear reactions

Cosmic ray shower-pair production-annihilation-Van Allan belt-mesons-Mu meson (munium atom)-classification of elementary particles –conversation laws.

Book for study

1. Nuclear physics D. C. Tayal., Himalaya Publishing House.

Book for References

1. Nuclear Physics and Particle Physics.,SatyaPrakash.,Sultan Chand&Sons .,Educational Publishers., New Delhi.

SEMESTER-VI

CORE-13 / ATOMIC PHYSICS

UNIT I Structure of the Atom

Critical potentials-Franck and Hertz experiments-Davis and goucher's method: Discovery of photo electric effect-results on photo electric effect-failure of the electromagnetic theory-Einestein's photo electric effect-Milliken's experiment-photo electric cell

UNIT II X-rays

Diffraction of X-rays-Bragg's law –X-ray spectrometer-X-ray spectra-characteristic of X-ray spectrum-Moseley's ;aw-Compton scattering-theory of experimental verification.

UNIT III Atom models

Review of Bohr atom model-Sommerfield's relativistic model-vector atom model-Various quantum number-LS and JJ coupling-Pauli's exclusion principle-electronic configuration of elements-magnetic dipole moment due to orbital motion and spin motion-Bohr magnetron.

UNIT IV Theory of Relativity

Michelson-Morley experiment-Interpretation of the Michelson Marley Experiment-Relative time-the Lorentz transformation-the relativistic velocity transformation-time dilation-illustation of time dilation- the twin paradox-length contraction-relativity mass-mass energy equivalence.

UNIT V Wave mechanics

De-broglie's concept of matter wave-De Broglie wavelength characteristics of De Broglie matter waves-Davisson and Germer's Experiment-G.P.Thomson's experiment –Heisenberg uncertainity principle. Basic postulates of wave mechanics.

Book for study

Modern physics-Richmare,Kooper

Books for Reference

Modern physics-segal, chopra.

ELECTIVE PAPER I / SOLID STATE PHYSICS

UNIT I Crystal structure

Introduction-lattice translation-vectors-lattices-the basis-crystal structure, Fundamentals-Types of lattices-Three dimensional lattice types-simple crystal structure-Miller indices.

UNIT II Electron theory of solids

Introduction-classical free electron theory, quantum theory-Thermionic emission-photo electric emission-Electric work function in metals-field emission-schottky Richardson equation-Tunnel diode.

UNIT III Crystal bindings

Crystal of inert gases-vander walls-London interaction-Repulsive interaction-cohesive energy, covalent crystals-Hydrogen bonded crystals.

UNIT IV Thermal properties of solids

Anharmonic crystal interaction-Thermal expansion, thermal conductivity-Lattice thermal resistivity-Umklapp processes-Imperfections.

UNIT V Dielectrics and Ferroo Electrics

Macroscopic electric field-Depolarisation field-Local electric field at an atom-Lorentz field dielectric constant and polarisability-Electronic polarisability.

Ferro Electric crystals

Classification of ferro electric crystals.

Book for study

Solid state physics-S.O.Pillai

Books for Reference

1. Introduction to solid state physics-c.Kittel, wiley Esteen Limited N.D
2. Solid state physics principles and applications-R.Asokamani, Anamaya publishers, New Delhi.

ELECTIVE PAPER II / ENERGY PHYSICS

UNIT I /Potential Energy

Introduction-conservation and non-conservation forces-potential energy-gravitational energy-Elastic potential energy-internal work and internal energy-Mass and energy.

UNIT II / Types of Energy

Introduction-Mechanical Energy-Nuclear Energy-transmission of Energy- other forms of energy-chemical energy-wave energy-photo cells-laws of conservation of energy-efficiency-collisions-Energy and transport-Future trends in energy production.

UNIT III / Solar Energy

Solar cell-solar radiation- solar energy collectors-storage of solar energy.

UNIT IV / Renewable energy

Energy-Energy changes and energy conservation-Internal Energy and state functions-Expansion of work energy and Enthalpy-the themodynamic standard scale- enthalpies of physical and chemical changes-calorimetry and heat capacity-Heiss law

UNIT V / Nuclear Energy

Introduction-Neutron induced Fission-A symmetrical fission-Mass yield-Emission of decayed Neutrons by fission fragments- energy released in the fission of U235-Fission of Lighter Nuclei-Fission chain Reaction-Neutron cycle in a thermal nuclear reactor-Nuclear Reactor.

References

1.Physics-Gilbert Rowell

2. Advanced Universisty physics-second Edition Mircea S.R.Oglasis and stuart B palmer.

3. principles of physics-p.v.Naik

4. Chemistry-Fouth edition John Mary Robert C.Fay

5. Nuclear Physics- S.B.Patel

6. Non-conventional Energy Resources- D.S.chauhan, S.K..Srivastava

ELECTIVE PAPER III / ASTRO PHYSICS

UNIT I Introduction

Sunlight and spectroscopy-Atoms and Matter a Model of the Atom-Simple spectroscopy-Analyzing sunlight-Kirchhoff's Rules-The conservation of energy-electromagnetic spectrum.

UNIT II Our star: The sun

Ordinary Gases-the sun's continuous spectrum-The solar absorption line spectrum- energy flow in the sun-the solar interior- the active sun.

UNIT III The Universe of stars

Birth of stars-energy generation and the chemical composition of stars-stellar Evolution and the hertz sprung (Russwell Diagram)-Stellar Anatomy -s tar models- theoretical Evolution of solar mass star observational Evidence for stellar Evolution.

UNIT IV SOLAR SYSTEM

The Earth and the Moon

History of the Earth-Temperature of a planet-the atmosphere-pressure and temperature distribution-the magnetosphere-the moon-the Lunar surface- the lunar interior.

Galaxies

Introduction-classification of Galaxies-Milky way Galaxies-Over view-differential galactic rotation –Rotation and Mass distribution-rotation curve and Doppler shift- Determination of the Rotation curve-Average gas distribution-spiral structure in the milky way –optical traces of spiral structure-Radio tracers of spiral structure-the galactic center-Distribution of material near the center-A massive black hole.

UNIT V Cosmology

Introduction-cosmological models-steady state model-Big Bang theory.

References

1.Astronomy-The Evolving Universe-Micheal Zeilik

2.Astronomy-A physical perspective-Mark L. Kutner.

ELECTIVE IV / MEDICAL PHYSICS

UNIT I Human physiological systems

Cells and their structure-transport of ions through Membrane-resting and action potential-bioelectric potentials-nerve fissures and organs-difference systems of Human body.

UNIT II X-ray and Radio Isotope Instrumentation

Generation of Ionizing Radiation-Detection of Radiation-Detection of Radiation-Instrumentation for diagnostic X-rays-visualization of X-rays-X-ray machines-special techniques-instrumentation for the medical of radio isotopes-NMR principles, scanning systems-MRI, CT.

UNIT III Measurements in the Respiratory system

The physiology of the Respiratory system-Tests and instrumentation for the Mechanics of breathing-Mechanical Measurements-Instrumentation for Measuring the mechanics of breathing-measurement of residual volume- intra-alveolar and intra-thoracic pressure measurements.

UNIT IV Patient care and monitoring

The elements of intensive care monitoring-patient monitoring display-Diagnosis calibration and repairability of patient monitoring equipment-the organization of the hospital for patient care monitoring.

UNIT V Operation theater equipments

Surgical diathermy-short wave diathermy-microwave diathermy-ultrasonic diathermy

Bio –telemetry

Basic and design of a bio-telemetry system-Radio telemetry systems -single channel telemetry system-transmission of bioelectric variables-active and passive measurements-tunnel diode FM transmitter-Radio telemetry with sub carrier-multiple channel telemetry system.

References

1. Biomedical Instrumentation-M.Arumugam
2. Biomedical Instrumentations and Measurements-Leslicromwell
3. Principles of applied biomedical instruments-Geddes&Bakker
4. Medicine and clinical Engineering-Prentice Hall of India
5. Bio Medical Technology-Mackay, Stuart& John willey
6. Bio Medical Instrumentation-Chandpur.

SKILL BASED ELECTIVE PAPER I / COMPUTER PROGRAMMING IN C

UNIT I

Introduction to computer-types of programming language-introduction to C-The C character set-identifiers and keywords-data types-constants variables-declaration expressions-various types of operators.

UNIT II

Overview defining a function – accessing function-function proto types-passing arguments to function-recursion-library function macros the C preprocessor

UNIT III

Storage classes-automatic variable-global variables-static variables-register variables-multiple programming bit wise operation.

UNIT IV

Defining and processing of array-passing arrays-functions-multi dimensional arrays – arrays and strings.

UNIT V

Fundamental declaration-passing pointers to function-Usage in one dimensional and multi dimensional arrays-dynamic memory allocation-operations on pointers-passing function to other functions.

Books for study

1. Theory and problems of programming with C-Bryon S.Fotfried. H. edition 1998
2. Programming in C-Balagurusamy.

SKILL BASED ELECTIVE PAPER II / COMPUTER PROGRAMMING IN C++

UNIT I

Soft crisis-software evolution-basic concepts of object oriented programming, benefits of OOPs-Application of oriented languages-application of OOP-Application C++ statements-structure of C++ program-creating of source file-compiling and linking tokens-Keywords identifiers

UNIT II

Basic data types-User defined data types-derived data types –symbolic constants-type compatibility-declaration of variable-dynamic initialization of variable-reference variables-operators of C++ conversions operator overloading.

UNIT III

Control structures of main function-function proto typing-inline. Inline functions-function overloading friend and virtual function.

UNIT IV

Specifying a class-defining member functions-marketing an outside function inline-nesting of number functions-private member functions-private member functions-arrays within a class-Memory allocation for objects-Static data members static member functions-arrays of objects-objects as function arguments friendly functions-returning objects constant member functions.

UNIT V

Pointers to members-Constructions-parameterized constructors-multiple-constructors in a class-constructors with default arguments-dynamic initialization of objects –copy constructor-constructing two dimensional arrays-destructors.

Book for study:

1. Object Oriented programming with C++-E.Balagurusamy, Tata McGraw Hill Publishing company Ltd 1998.

SKILL BASED ELECTIVE PAPER III BIOMEDICAL INSTRUMENTATION

UNIT I Bio –Potential Electrodes

Electrodes-half of potential-purpose of electrode paste-Electrode material-types of electrode.

UNIT II

Micro electrode-Metal micro electrode, Micro piper, depth and needle electrodes, surface electrodes.

UNIT III

Metal plate electrode, multi point electrode, chemical electrode, hydrogen electrode.

UNIT IV

System characteristic, ECG, EEG, EMG, ERC -EOC.

UNIT V

Pace Maker-Pace Maker batteries-defibrillators, synchronized and square pulse defibrillators-nerve and muscle stimulators.

Books for study:

1. Bio medical Instrumentations- M.Arumugam-Anuradha agencies, Kumbakonam.

SKILL BASED ELECTIVE PAPER IV / HOME APPLAIANCES

UNIT I

Electric circuit, open circuit-close and short circuit, switches, types of switches.

UNIT II

Fuses-Two types of switches circuit breaker-Relays.

UNIT III

Introduction using materials accessories-types of wiring- basic principles of earthing.

UNIT IV

Heating-resistance welding-scan welding-induction heaters.

UNIT V

Uninterrupt power supply(UPS)-high voltage transmission.

References:

1. Allied physics-R.Murugesan
2. Electricity and Electromagnetism-R.Murugesan
3. Industrial Electronics-K.Mittal.

SKILL BASED ELECTIVE PAPER V / ENTERTAINMENT ELECTRONICS

UNIT I

Television, Tape recorder and Loud speaker.

UNIT II

DVD, cameras

UNIT III

VCD and computer

UNIT IV

i-pod, i-phone, cell phone and Laptop

UNIT V

Intenet and its applications.

Books for study:

1. How things work, Vol I and II
2. The Universal encyclopedia of machines, Harper Collin, Pub. India Pvt Ltd 1992.

SKILL BASED ELECTIVE PAPER VI / MICROPROCESSOR

UNIT I

Architecture of 8085-Register organization-concept of buses-control signals.

UNIT II

Pin configuration of 8085-Addressing mode of 8085 with examples.

UNIT III

Instruction Set-Types of Instruction-Classification of Instruction.

UNIT IV

Data Transfer Instruction-branch Instructions-Arithmetic and Logic instruction.

UNIT V

Sub-routines-Assemble Language-Programming simple programs.

Books for study:

1. Microprocessor-B.ram
2. Microprocessors, Architecture, Programming and applications-Ramesh Goanker, wiley Eastern Ltd.

NON –MAJOR ELECTIVE / PAPER I / FUNDAMENTALS OF PHYSICS

UNIT I

Kepler's law- I Law-II Law-III Law

UNIT II

Newton's Law-I Law-II Law-III Law- Cououmb,s Law

UNIT III

Gravitational force-Newton,s law of gravitation.

UNIT IV

Electromagnetic force-Nucear force-Central force-Conservative force-Non conservative force.

UNIT V

Work-Work done by a varying force-Energy-Kinetic energy, potential Energy-Power.

Reference:

1. Mechanics-D.S.Mathur.

NON-MAJOR ELECTIVE / PAPER II / PHYSICS IN DAILY LIFE

UNIT I

Fan-Grinder-Mixie-Refrigerator-Washing machine.

UNIT II

Induction stove-Electric cooker.

UNIT III

Telephone-Cellular phone-satellite

UNIT IV

Fax- Xerox machine

UNIT V

Scanner-Projector-OHP-LCD

Book for study:

1. How Things Work, Vol I and Vol II

PHYSICS PRACTICAL-I

Any 12 experiments

1.Estimation of Errors

2. Young's Modulus-uniform bending pin and microscope method

3. Young's Modulus-uniform bending optic lever method

4. Young's Modulus-Non uniform bending-pin and microscope method

5. Young's Modulus-Non uniform bending optic lever method

6. Compound pendulum-g and K

7. Torsional oscillations-n,I

8. Spectrometer-Dispersive power of a prism

9.Spectrometer-Grating minimum deviation

10. Potentiometer-Low range voltmeter calibration

11.Potentiometer-Low range ammeter calibration

12. Sonometer-Laws verification(I&II law)

13. sonometer-frequency of the tuning fork

14. Determination of coefficient of viscosity-stokes method

15. Meldes string-frequency of the electronic tuning fork

16.Thermal conductivity of rubber

17.House wiring-Two bulb controlled by a single switch-go down switch

18.House wiring-two bulb method

19.Thermal conductivity of card board-Lee's disc method

20. Newton's law of cooling.

PHYSICS PRACTICAL- II

Any 12 Experiments

1.Spectrometer angle of the prism

2. zener diode charcteristics

3.Spectrometer-Grating resolving power&dispersive power

4. Galvanometer/B.G conversion Ammeter

5. Galvanometer/B.G conversion-voltmeter

6. Galvanometer EmF

7.Comparision of EMF-potentiometer

8. Carey foster Bridge-p and r

9. Carey foster bridge – temperature coefficient

10.IC- logic gates-Demorgan's theorem

11.IC-logic gate-verification of truth t ables for AND, OR, NOT

12. IC-logic gates-Boolean algebra

13. NAND as a universal gates

14.NOR as a universal gate

15.spectrometer-cauchy's constant

16.Spectrometer –Hartmann's constant

17.pn Junction diode characteristics

18. Resistance of the Galvanometer

MAJOR PRACTICAL- III

Any12 Experiments

1. LCR- series Resonance
2. LCR-Parallel Resonance
3. Spectrometer-i-d curve
4. Spectrometer-i-I'curve
5. L-Anderson's bridge
6. L-Maxwell's Bridge
7. L-Rayleigh's bridge
8. Potentiometer-high range ammeter.
9. Spectrometer-small angled prism
10. c1/c2 –Desautey's bridge
11. L-Owen's bridge
12. Impedance and power factor –LR circuit
13. B.G –absolute capacity of a condenser
14. Field along the axis of a coil-determination of B& M
15. M.G-emf of a thermocouple
16. M1/M2 –B.G

CORE PRACTICAL-IV

ELECTRONICS PRACTICAL

Any 12 Experiments

1.Zener diode-breakdown voltage

2.Zener diode-voltage regulation

3.Transistor characteristics-CE mode

4. Transistor characteristics-CC mode

5. Transistor characteristics-CB mode

6.Voltage Doubler

7.Dual power supply-IC 7812 and IC 7912

8.Astable multivibrator-Using 555 timer/transistor

9.R.s Flip Flop

10. J.K Flip Flop

11. Design of Half adder

12. Design of Full adder

13. Design of Half subtractor

14. Design of full subtractor

15.Logic gates-Using discrete components

16.Single stage amplifier

17.Bi-stable multivibrator using R.S flip flop(transistors)

18. Op-amp Ic 741 characterristics

19. Op-amp Ic 741-adder and subtractor

20. Op-amp Ic 741-Integrator and differentiator

ANCILLARY PHYSICS

SEMESTER I

MECHANICS , PROPERTIES OF MATTER, ELECTRICITY,ELECTRONICS AND MODERN PHYSICS (APH1)

UNIT I

Force, work, power and energy-forces in nature-central force-gravitational and electromagnetic –conservative and non-conservative forces- examples-nuclear force- friction-angle of friction- motion of bodies along an inclined plane-work donoe by a varying force-expression for kinetic energy-expression for potential energy-Power.

Rotational Motion

Angular velocity-normal acceleration(no derivation) centrifugal and centripedal forces-torque and angular acceleration-work and power in rotational motion-angular momentum-K>E of rotation.

UNIT II Gravitation

Kepler's law of planetary motion-Law of gravitation-Boy's method-determination of g-compound pendulum-expression for period experiment to find g-variation of g with latitude, attitude and depth-artificial satellites

UNIT III Electrostatics

Gauss law (no proof)-application field due to a charged sphere and an infinite plane sheet-field near a charge conducting cylinder coulomb's theorem-electric potential –capacitors-expression for parallel plate capacitor.

UNIT IV Electronics

Junction diodes-forward and reverse bias-diode characteristics-types of diodes- LED and Zener diode –Bridge rectifier using junction diodes-II filter -Basic gates-Universal gates-Demorgan's theorem.

UNIT V Photo electricity

Laws of photo electricity, Einestein's equation photo cells and their uses, photo conductive , photo emissive and photo voltaic cells-solar cells-photo detectors- fiber optics-light propagation in fibers-fiber optic communication systems

References

1. Mechanics-D.S.Mathur S.chand and co
2. Properties of matter-Brijlal and subramanium s.chand and co
3. Solid state electronics-B.L.Therajs
4. Electricity and Magnetism- Brijlal and subramaniam

5. Ancillary physics-M.Palaniappan
6. Ancillary physics-N.Venkatachalam
7. Univerrsity physics-sears zemansky and ground
8. Modern physics-R.Murugeshan
9. Optics and spectroscopy-R.Murugeshan.

ANCILLARY PHYSICS PRACTICAL

Any 18 Experiments

1. Estimation of Errors
2. compound pendulum- g and unknown mass determination
3. Young's Modulus-uniform bending pin and microscope method
4. Young's Modulus-uniform bending optic lever method
5. Young's Modulus-Non uniform bending-pin and microscope method
6. Young's Modulus-Non uniform bending optic lever method
7. Rigidity Modulus-searle's method
8. Surface tension-capillary rise
9. Viscosity-Stoke's Method
10 viscosity-surface tension
11. Melde's string
12. Sonometer-frequency of the tuning fork
13. Calibration of voltmeter-potentiometer
14. Calibration of ammeter-potentiometer
15. Resistance and resistivity-potentiometer
16. Comparison of capacitances-B.G
17. Comparison of EMF
18. Newton's law of cooling
19. LCR-series resonance
19. LCR-parallel resonance
20. Bridge rectifier
21. Op amp –adder
22. Op amp-subractor
23. IC-logic gates verification
24. IC logic gates-verify Demorgan's law
25. NAND as a Universal gate
26. NOR as a Universal gates
27. Spectrometer-Angle of prism
28. Diode characteristics
29. Zener diode characteristics
30. Hartley oscillator.