BANGALORE UNIVERSITY

B.Sc Syllabus (Semester Scheme)

Semester -I Course No PHY-101

(Mechanics, Oscillations and Waves)

Physics

UNIT I

1. Review of vector algebra-Adding vectors geometrically, subtraction and multiplication of vectors, equality of vectors, unit vectors (as treated in Halliday and Resnick and H.C. Verma), Cartesian and polar co-ordinates, Components of velocity and acceleration in plane polar co-ordinates. Application of these to circular motion and area velocity. A few problems to be worked out. ..... (4 hrs)
2. Motion along a straight line-Instantaneous velocity and acceleration, motion with uniform and non-uniform acceleration-Derivations of equations like V=V0 Exp (- kt), and X=V0/k (1- Exp(-kt))
   Ex: Calculation of terminal velocity and displacement of body falling under gravity in resistive and non-resistive medium. .....(2 hrs)
3. Relative motion in one dimension-concept of reference frame-to show that observers on different reference frames that move with a constant velocity relative to each other will measure the same acceleration for a moving particle. Relative motion in two dimensions and the rule that observers on different reference frames moving with constant velocity relative to each other measure the same acceleration. .....(2 hrs)
4. Force and Motion 1: Elements of Newtonian Mechanics-What causes an acceleration ? Newton's First Law of Motion-force-Inertial reference frames-Mass-Concept of inertial mass-Newton's Second Law of Motion and its limitations-forces like Gravitational force-weight of a body. Normal force-Newton's Third Law of Motion-Applying Newton's Laws to solve problems-free body diagrams (to work out problems illustrating the concept of free body diagram)
   .....(7 hrs)

UNIT-II

5. Force and motion 2:- Friction-static and Kinetic friction, rolling friction- Properties of friction, the drag force and terminal velocity. Motion in accelerated frames-rotating frame; concept of pseudo and inertial forces. Coriolis force and applications of Coriolis force to trade winds, cyclones, erosion of ricer banks and foucault's pendulum. Motion along an inclined plane with and without friction-Basic forcers and interactions (problems on bodies connected by spring or string to be worked out)
   .....(9 hrs)
6. Concept of Lagrange and Hamiltonian equations for a particle-Example of pendulum. ….(2 hrs)
7. Energy-Kinetic Energy, work, work and kinetic energy theorem-work done by gravitation force-work done in lifting and lowering objects- work done by a spring force, the work

done by a constant applied force-work done by general variable force Work and kinetic energy theorem with a variable force. Three dimensional analysis-power (problems to be solved) …..(4 hrs)

UNIT-III

8. Potential energy-work and potential energy-conservative and non-conservative forces - path-independence of conservative forces with proof. Determination of potential energy values- Gravitational potential energy, curve-turning points-Equilibrium points-Conservation of energy-Isolated systems-Problems ..... (7 hrs)
9. System of particles-The centre of mass-Solid bodies, Newton's Second Law for a system of particles. Proof of the equation: F(net)=Mxa(com)-Linear momentum-The linear momentum of a system of particles -Conservation of linear momentum-Systems with varying mass-A Rocket-finding the acceleration and velocity of Single stage and Multi-stage rockets-External forces and internal energy changes .....(6 hrs)
10. Elastic and inelastic collisions in 2-dimensions. ..... (2 hrs)

UNIT-IV

11. Dynamics of rotation-Angular velocity and acceleration -Kinetic energy of rotation- MI of a body-Theorem of MI-parallel and perpendicular axes theorems with proofs-Calculation of MI of a disc, ring, solid sphere and solid cylinder-Torques and Newton's Second Law-The Kinetic energy of a body rolling down an inclined plane (translational & rotational)-Newton's Second law in angular form-Angular momentum of a rigid body. Conservation of angular momentum-some examples-Explanation of gyroscopic motion (qualitative).
12. Oscillations-Simple harmonic motion- KE & PE at any instant-Simple and Compound pendulums as examples of S.H.M.- Damped S.H.M, forced oscillations and resonance-Combination of S.H.M and Luscious figures. .....(4 hrs)
13. Transverse and longitudinal waves, their period, frequency-Speed of transverse waves on a string-Energy of motion-Intensity or power-(to derive equation)-Principle of super position-its effects like interference. Beats and stationary waves-Fourier analysis of a saw tooth wave. ..... (hrs)

Reference Books

1. Fundamentals of Physics sixth edition-Halliday and Resnick, wiley, 2001
2. Physics-Classical and modern-F.J. Keller, E.Gettys and J.J. Skove McGraw-Hill Second edition.
3. Classical Mechanics-K.N. SreenivasRao, Universities Press-Orient Longman
4. Physics-P.A. ____ Vol I, CBS Publications, 2000 Edition.
5. Concepts of Physics Vol I H.C. Verma.
6. University Physics- F.W. Sears and Zemansky and H.D. Young, Nervosa Publications-Delhi
7. Mechanics-J.C. Upadhaya-Ramaprasad and Co,Agra.

COURSE:PHY 102; Physics Lab I

1. Verification of parallel and perpendicular axes theorems.
2. Verification of principle of conservation of energy.
3. Verification of conservation of linear momentum.
4. Oscillation of a spring to determine spring constant. To determine the effective the spring and hence *g*
5. Coupled Oscillations-Measurement of the periods of normal modes.
6. Bar pendulum- *g* by graphical method.

7. Mode constants.
8. Helmholtz Resonator.
9. MI of disc using tensional pendulum.
10. MI of fly wheel.
11. Study of stationary waves on a stretched string.
12. Damping of rigid pendulum.
13. Determination of Coefficients of static, kinetic and rolling frictions

(A minimum of ten experiments should be performed)

References:

1. B.Saraf etc: Physics through Experiment. Vikas pub.

II –Semester

Course No: PHY 201

Properties of Matter, Heat and Thermodynamics

UNIT I

Properties of Matter

1. Elasticity: Review of elastic behavior of solids in general. Origin of elastic force-strain diagram, elastic limit and Hooke's law. Moduli of elasticity and Poisson Derivation of relation connecting elastic constants, limiting values of Poisson's ration done (energy stored) in stretching a wire, resilience, thermal stresses. Factors at elasticity, factor of safety. Beams, bending of beams, expression for bending moment. Single cantilever with the section girders, couple per unit twist. tensional oscillations. Rigidity modulus of a mate static method and dynamic method with theory. Determination of elastic constants by S double bar method. …..(6 hrs)
2. Kinematics of Moving Fluids: Review of Equation of continuity Euler's of motion. Bernoulli's theorem. Some applications of Bernoulli's equation: (1) Torricelli theorem. (2) the Venturimeter. (3) The curved flight of a spinning (Magnus effect), (4) the lift on an air craft wing (all qualitative). Society: Coefficient of viscosity, stream line and turbulent flow, critical velocity, Reynolds's number and its significance, Derivation of Pustule's formula for the flow of a viscous fluid through a narrow tube. Motion of a body in a viscous medium, Stokes law with derivation and expression for terminal velocity, factors affecting viscosity. .....(6 hrs)

UNIT II

Surface Tension: Surface tension and surface energy, molecular interpretation of surface tension. Angle of contact and wetting. Pressure difference across a curved liquid surface, capillary ascent, interfacial surface tension, drop-weight method with necessary Theory, force between two plates separated by a thin layer of liquid, ripples and waves, factors affecting surface tension-surfactant temperature and impurity. .....(5 hrs)

THERMAL PHYSICS: Review of gas laws, degrees of freedom and principle of equipartition of energy based on kinetic theory of gases, atomicity of gases, derivation of U-3/2 RT, Introduction to atomic neat of solids, mean free path, transport phenomena like diffusion, viscosity and thermal conductivity of gases with derivation. Relation between coefficient of viscosity and the coefficient of thermal conductivity of gas. Maxwell's law of distribution of velocity (without derivation) - calculation of most probable velocity, mean velocity and root mean square velocity. Change of state, real gases, Andrews experiments on carbon dioxide, critical constants, Van derwaals equation of state and correction. Comparison of van der Walls isothermals with Andrew's isothermals.
.....(10 hrs)

UNIT III

Thermodynamics:

The zeroth law-definition and explanation.

Thermodynamic variables: Extensive and Intensive-equation of state-various process.

P-V Indicator diagram. The first law of thermodynamics-sign convention of heat and work. Work done by isothermal process of an Ideal gas, Internal energy as a state function. Application of firs law (i) Cyclic Process (ii) Isolated Process (iii) Adiabatic Process (iv) Isochoric Process (v) Isobaric Process (vi) Isothermal Process (vii) Relation between the heat capacities for ideal gases. Adiabatic process for on ideal gas Relation between temperature and volume, pressure and volume, pressure and temperature. Work done in an adiabatic process for ideal gases. Reversible and Irreversible processes, Enthalpy.
.....(7 hrs)

The second law of Thermodynamics, Heat engines-Car not cycle and its efficiency with derivation, Practical cycles used in internal combustion engines (qualitative). Car not's engine, Refrigerator, coefficient of performance. Car not's theorem, thermodynamic scale of temperature Classis Caparison equation. Elevation of boiling point the triple point. Clausius inequality. Second law of thermodynamics and entropy, principle of increase of entropy. Change in entropy in (i)adiabatic process (ii)free expansion (iii) cyclic process (iv)isobaric process (v) perfect gases (vi) mixture of two gases. Microscopic interpretation of entropy temperature-entropy (T-S) diagram of a car not's cycle and its use. Third law of thermodynamics (Nernst Heat Theorem) .....(8 hrs)

UNIT -IV

Thermodynamic potentials- (i) Internal energy (ii) Enthalpy (iii) Helmholtz free (iv) Givv's free energy and their significance, conditions of equilibrium of phases in Gibb's potential. Maxwell's thermodynamic relations and their significance, Applic Maxwell's thermodynamic relations, Clausius Clapeyron's equation, Variation of energy with volume, difference between the heat capacities for ideal gases and real gas equations (energy equations), Temperature variation under adiabatic processes.
….(hrs)

Low Temperature physics-

Phase transition liquefactions of gases-(i) Joule Kelvin porous plug experiment(effect): working and discussion of results-expression for Joule -Kelvin coefficient-Joule heating and cooling for perfect gases, temperature of inversion, its relation with temperature, difference between adiabatic-expansion and Joule-Kelvin __adiabatic demagnetization (thermo magnetic effect)-production of low temper adiabatic demagnetization: working and theory-thermodynamics expression for coo Methods adopted for liquefying gases: cascade process, regenerative process coupled __ Joule-Thomson cooling, adiabatic expansion with Joule Thomson cooling (qualitative). ….(hrs)

Reference:

1. I.II. Sears and II N. Zeemansky: university Physics, Addison Wesley-London-1963

2. G.Basavaraja and Dipan Gosh: Mechanics and Thermodynamics, Tata McGraw Hill-New Delhi.
3. Brij Lal and N. Subramanyam: Properties of Matter, S. Chand and Co. Delhi-1982
4. G. Mittal. W.D. Knight H.A. Rudermann: Mechanics-Berkley Physics course, Vol-I TMH, Delhi-1984.
5. A.P. French: Newtonian Mechanics: Nelson and sons, U.K. 1971
6. H.R. Spiegel: Theoretical Mechanics, Schaum's Outline Series-McGraw Hill- New Delhi-1981
7. M.M. Zeemansky: Heat and Thermodynamics (International Edition) McGraw Hill-New Delhi-___
8. Brij Lal and N. Subramanyam: Heat and Thermodynamics: S. Chand and co.., New Delhi-1985
9. D.S. Mathur-Elements of properties of matter, Shamlal charitable trust. Delhi-1996
10. Concepts of Physics-H.C. Verma, Vol-(1) and (2) Bharti Bhavan Publications- Delhi-1996

Course No: PHY 202: Physics Lab II

1) Young's modulus by single cantilever.
2) Young's modulus by stretching
3) Young's modulus by uniform bending.
4) Rigidity modulus by dynamic method.
5) Rigidity modulus by static method.
6) Elastic constants by Searle's double bar.
7) Surface tension and interfacial tension by drop-weight method.
8) Viscosity of water by damping torsion oscillations.
9) Experimental verification of velocity distribution
10) Viscosity by stokes method
11) Newton's law of Cooling
12) K by Lee's & Charlton's method.
13) Bulk modulus of rubber

(A minimum of ten experiments should be performed)

References:

(1) D.S. Mathur-Elements of properties of matter. Sham lal charitable trust Delhi-1996
(2) Brijlal and N. Subramanyam-Heat and thermodynamics S. Chand and Co. New Delhi 1985.

III-Semester

Course No: PHY 301

Electricity, Magnetism and Radiation

UNIT-I

Network theorems:- Thevenin's theorem, Superposition theorem (mesh current analysis)-Maxwell's power transfer theorem (Derivation) Some applications ….(5hrs)

Magnetism:- Introduction Definition of magnetic field B- Magnetic force an a moving charge. Lorentz force. Force on a current carrying conductor in a magnetic field. Torque on a current loop in a magnetic field. Ballistic galvanometer (theory)- charge sensitivity-effect of damping-applications of B.G. Determination of capacitance and high resistance by leakage. Magnetic dipole moment- Torque on a magnetic dipole. Equivalence of a current loop to a magnetic dipole. Biot-Savart's law. Applications, Theory of Helmholtz galvanometer-magnetic field due to a current in a straight conductor of a finite length-field along the axis of a solenoid. Ampere's law. Application- magnetic field at a point due to a straight current carrying conductor of infinite length-magnetic fields inside a solenoid (with derivation)
….(10 hrs)

UNIT-II

Electro Magnetic Induction:- Faraday's and Lenz's laws -RH rule, energy stored in a conductor-elementary ideas about eddy currents and applications -electromagnetic damping-induction furnace-induction motor-electric brakes and speedometers. ...(3hrs)

Electromagnetism:- Review of vectors analysis-Physical significance of divergence of a vector and Gauss theorem-physical significance of curl of a vector and Stoker's theorem. Concept of displacement and total current, equation of continuity-setting up of Maxwell's equations-setting up of wave equations for E & B- Velocity of e.m wave (proof)-Poynting theorem-Poynting vector-energy density of e.m waves. …..(12hrs)

UNIT III

Transient Currents:- Theory of CR circuit (charging and discharging)-LR circuit (growth and decay) -LCR circuit (charging and discharging) .....(6 hrs)

Alternating Currents:- Real value, expression for the mean value and rms value-response of LC.CR and LCR circuit to sinusoidal voltages-Impedance by using j operators -series and parallel resonance circuits -expression for the 'Q' factor, band width-expression for the power in an a.c. circuit-choke-its applications. .....(9 hrs)

Thermoelectricity:- See beck effect -Thermoelectric series-neutral temperature- laws of thermoelectricity -Peltier effect-demonstration of Peltier effect (any two experiments)-Peltier coefficient-applications of thermodynamics to a thermoelectric circuit-Thomson effect -Experiments to demonstrate Thomson effect (any two experiments) -Thomson coefficient-theory of thermoelectric circuit-total EMF-thermoelectric diagrams and uses-

applications of thermoelectricity -Boy's radio micrometer, thermopile and thermoelectric pyrometer. (..... 9 hrs)

Radiation:- Black body radiation and distribution of energy in its spectrum -Kirchoffs law-Stefan-Bolzmann law and Wien's distribution -Wien's displacement law- Rayleigh-Jeans law - Derivation of Plank's law-Radiation pressure (without derivation). Solar constant and its determination- Estimation of surface temperature of the sun.
(..... 6 hrs)

References:

1. Griffiths: Electrodynamics PIII-2
2. R.P. Feynman et al. Feynman Lectures, Vol II Narosa
3. Theraja: Electrical Networks,
4. Malvino: Electrical Networks
5. Bhrgava: Electronics, TTTI-2
6. Halliday & Resnick.

Course No. PHY 302: Physics Lab III

1) Verification of Thevenin's theorem.
2) Verification of superposition theorem
3) Study of charging and discharging of a capacitor in an RC circuit.
4) Verification of maximum power transfer theorem.
5) Variation of thermo emf of a thermocouple- determination of constants and verification of law of intermediate temperatures and metals.
6) Series resonance
7) Parallel resonance
8) Determination of constants of Ballistic Galvanometer.
9) Determination of self inductance of the given coil by using an A.C. bridge. (Anderson or Maxwell's bridge).
10) Verification of Stefan's law of radiation.
11) Reduction factor of Helmholtz galvanometer using potentiometer.
12) Determination of L & C by equal voltage method.
13) Desauty's bridge.
14) High Resistance by leakage

(A minimum of ten experiments should be performed)

References:

1. B. Saraf etc: Physics Through Experiments. Vlkas
2. Chauhan & Singh: Advanced Practical Physics pragati

B.Sc. Syllabus (Semester Scheme)

IV-Semester

Course No: PHY 401

Acoustics, Optics and Lasers

UNIT-I

Acoustics: Velocity of sound in solids, rods and strings, expression for the same. Kundt's tube experiment. Quirke's Method for the velocity. (4hrs)

Reflection, refraction 2^{nd} diffraction of sound. Percentage of reflection and refraction at a boundary- A caustic impedance of a medium- Impedance matching transducers (4hrs)

Principles of Microphones and loud speakers. Basic ideas of electromagnetic sound recording and reproduction.

Geometrical optics: Velocity of light-Foucault's rotating mirror and the Kerr cell method.

(2 hrs)

Fermat's principle of extremism path and its application to reflection, refraction and rectilinear propagation of light.

UNIT II

Physical Optics: Huygens wave-theory of light-concept of Huygens Principle and construction of wave front. Proof of laws of reflection and refraction of a spherical wave-front at a plane surface. (4hrs)

Interference:Review of interference of light waves up to conditions for observable interference.Coherent sources: Production of coherent sources. Biprism-construction, working and experiment it to find wavelength white light fringes. Introuducing a thin film in the path of interfering beam-calculation of Refractive index/thickness of thin film.

(5hrs)

Coherent sources by

Amplitude division. Colors of thin films-Theory- reflected and transmitted system-Stokes treatment of reflected and transmitted amplitudes- Theory and experiment of Air -wedge. Newton's Rings with applications (5hrs)

Michelson's Interferometer and applications. (2 hrs)

UNIT III

Diffraction of Light

Fresnel diffraction: Division of wave front into half period/fresnel (IIP) zones-Theory of rectilinear propagation, Zone Plate: Preparation and working as a lens, Expression for focal length, comparison with lens, diffraction at a straight edge-theory
(5hrs)

Fraunhofer diffraction -single slit -Theory-many slits-grating- Theory of Normal & oblique incidence-Dispersive power- Resolution- Rayleigh's criterion- expression for resolving power of grating and Telescope.
(5hrs)

Polarisaton: Review of plane polarized light. And method's of production (1hrs)

Polarization by double refraction-crystals-Huygens' explanation of double refraction-Retarding plated-Theory of Quart wave plate (QWP) and half wave plate (HWP)
(4hrs)

UNIT- IV

Production and detection of circularly, elliptically and linearly polarized light with necessary theory.
(2hrs)

Lasers:

General Principles- Spontaneous and induced emissions-optical pumping. Resonance cavity active medium population inversion-Condition for laser action. Mention of Einstein's constants A &B Purity of a spectral line- time and spatial coherence-Ruby and He-Ne lasers- pulsed and tunable lasers. (7 hrs)

Holography-Elementary ideas of holography-Principle. Theory production and analysis of a hologram. (2hrs)

Reference Books:

1. A.K. Ghatak-Lasers & Optics, Tata McGrawHill
2. L -Kinsler and Frey, John wiley- New york for acoustics.
3. Halliday and Resnick, Fundamentals of Physics VI edition.
4. B.K. Mathur -Princioples of Optics
5. A.K. Ghatak and K Thyagarajan- Contemporary Opitcs-(Macmillan)
6. B.B. Laud-Lasers-
7. Subramanyam & Optics.
8. Jenkins & white; Optics.
9. Sylfast Laser fundamentals Cambridge umv prex.

Course: PHY 402: Physics Lab IV

1. Kundt's Tube-
2. Verification of Brewster's law.
3. Modes of vibration of a fixed-free strip (Assuming of f of Ac and young's modulus)
4. Lens combination-f by magnification (graphically)
5. R.I. of liquid- parallax method.
6. Biprism
7. Air-wedge
8. Newton's Rings.
9. Diffraction grating=minimum deviaton
10. Diffraction grating-normal incidence
11. Resolving power of a Telescope
12. Diffraction at a straight edge.
13. Specific Rotation-Polarimeter
14. Diffraction at a wire or aperture using Laser.

(A minimum of ten experiments should be performed)

References:

1. R S Sirohi-Experiments with He-Ne laser Wiley Eastern

V-Semester

Course: PHY 501

UNIT-1

Gravitation, Space Physics, Atmospheric Physics

Newton's law of gravitation, gravitational potential and field intensity due to spherical distribution of matter (solid sphere only). Derivation of Kepler's law of planetary motion from Newton's laws (Vector method). Inertial and gravitational mass.
(4hrs)

Escape velocity, elements of satellite motion, orbital velocity and time period. Launching of artificial satellites, geostationary satellites, weightlessness and artificial gravity-Remote sensing-Solar and tenestrial radiation. Atmospheric effects, spectral response of some natural earth surface features, remote sensing applications. Evolution of remote sensing in India.

(4hrs)

Composition of atmosphere, vertical structure of the atmosphere-Thermodynamics of dry air, moist air, hydrostatic balance, static stability, Heat balance of the atmosphere, Green House effect. -(3hrs)

Atmospheric dynamics-Basic equation-equations of motion. Continuity equation, equation of state. First law of Thermodynamics. Atmospheric waves. Sound waves. Gravity waves Ross by waves Kelvin waves Principles of numerical weather prediction.

UNIT-II

Electronics (1)

Review of p-n junction diodes-zener diode and its use as a voltage regulator. Tunnel diode and its characteristics.

Review of transistors-CE mode-Transistor as an amplifier-h parameters and their uses in analyzing the amplifier circuit. FET-volt-ampere characteristics-Applications of FET. CRO and its uses.

Integrated circuits -monolithic IC-description of discrete IC-Techniques of manufacturing thin film and thick IC, Hybrid IC.

UNIT-III

Electronics (II)

Operational amplifiers-ideal OP amplifier characteristics and its applications.

Oscillators-Feed back concepts-oscillator circuits-Feed back amplifier-oscillator operation-phase and frequency considerations-oscillator operation-phase shift oscillator. Wein bridge oscillator-tuned oscillator circuits (Hartley and Culprit oscillators).

Brinary systems-Digital computer systems-Binary numbers-number base conversion-octal and hex a decimal numbers-conjugate elements-binary codes-binary storage registers-binary logic (AND, OR, NOT, NAND, NOR exclusive OR)-Truth table-Binary graphical representation of input and output.

Combination logic-Adders (full and half adder) Subtractor (full and half) -Code converters i.e., BCD to excess 3 code. (BCD- Binary Code Decimal). ....(15hrs)

References-

1. Concepts in space science-Ed. R.R. Daniel.

2. Mechanics-Berkeley physics course Ed G. Mittal
3. A.P. French-Newtonian mechanics.
4. Classical and Modern Physics-Kenneth W. Ford, Vol-1
5. G.T. Houghton-Physics of atmosphere.
6. Introduction to Dynamical meteorology-J.R. Holton.
7. Physics of monsoons-R.N. Keshava Murthy & M. Sankara Rao.
8. Physics of climate-J.P. Peioxoto and A.H. Oora
9. Electronic circuits and devices by Boy lstead.
10. Electronic circuits and devices by N.N. Bhargava and Kulashresta.
11. Digital electronics by Malvino and Leach
12. Digital electronics by Floyd and Tocci
13. Operational amplifier by Ramakanth Gayakwad.
14. Electronic principles, Malvino
15. Electronic principles, Millman and Halkias.
16. Basic electronics by Grob.

Course: PHY 502: Electronics Lab

1. CRO and its applications (Lissajous figures)
2. FET characteristics
3. RC coupled amplifier (transistor).
4. FET amplifier
5. Phase shift oscillator
6. AF and RF oscillators
7. Study of regulated power supply-CRO waveform
8. Digital gates-Half and full adder circuits.
9. Op amp (differentiator, integrator etc), Inverter, Summing amplifier (AC and DC output)
10. P Spice-circuits schematic editor (any circuit can be built up and output can be got) using computer.
11. Transistor characteristics-calculation of h paramenters.
12. Emitter follower.
13. Inverting and non-inverting amplifier.

(A minimum of ten experiments should be performed

1.Ramalingom & Raghupalan: A Lab Course in Electronics.

V-Semester

Course: PHY 503

Quantum Mechanics, Atomic and Molecular Physics

UNIT-I

Development of Quantum Mechanics: Introduction of quantum mechanics, Planck's quantum theory. Failure of classical physics to explain the phenomena such as atomic spectra. Black body radiation photoelectric effect. Compton Effect and specific heat of solids. Explanation of the above effects on the basis of quantum mechanics. …..(hrs)

Wave-Particle Duality and Uncertainty Principle: De Brigit's hyspthesis of matter waves. Thomson's Experiment Davison and germer's experiment-Normal incidence method. Concepts of wave packets for a quantum particle, group velocity and phase velocity. Relation between particle velocity and group velocity, Bohr's quantum conditions and matter waves. Heisenberg's uncertainty principle-different forms. Gamma ray microscope experiment.. Application- Why electrons cannot be inside the nucleus? .....(10hrs)

UNIT-II

Schrödinger's Equation: The concept of the wave function, physical significance of wave function, Development of time-dependent Schrödinger equation for a free particle, Operators for X, P and E. Time independent Schrödinger equation. Max Born's interpretation of the wave function, Eigen values and Eigen functions. Applications of Schrödinger equation-Particle in one dimensional box, derivation of eigen values and eigen functions, mention of solutions for a three dimensional case, Linear Harmonic Oscillator.
.....(10hrs)

Atomic Spectra: Review of Bohr's theory of hydrogen atom-mention of expressions for total energy, wave number and Rydberg constant. Variation of the Rydberg constant with nuclear mass, Summerfield's modification of the Bohr atomic model (qualitative), excitation and ionization potentials, Frank-Hertz experiment. …..(5hrs)

UNIT III

Vector Model of The Atom: Concept of Spatial quantization and spinning electron. Different quantum numbers associated with the vector atom model, Spectral terms and their notations. Selection rules, coupling schemes-l-s and j-j coupling (multi electron systems) Pauli's Exclusion Principle, expression for maximum number of electrons in an orbit. Spectra of alkali elements (sodium D-line), Larmor precession. Bohr magneton, Stern-Gerlach Experiment. Zee man effect, experimental study of Zeeman effect, theory of normal and anomalous zee man effect based on quantum theory. Pachen-Back Effect and Stark effect (qualitative only).

...(10hrs)

Molecular Spectra: Pure rotational motion: spectrum and selection rules, Vibrational motion: spectrum and selection rules, Rot-Vib spectrum, Scattering of light-Tyndall.Rayleigh and Raman's scattering, Experimental of Raman effect Quantum theory of Raman effect. 5hrs

Reference

1. Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles-Eisenberg and Resnik John Wiley and Sons.
2. Concepts of Modern Physics Beiser 3rd edition, Student edition New Delhi 1981
3. Introduction to Atomic Physics –H.E. White
4. Introduction to Modern Physics-H.S. Mani, G.K. Mehta-west Press 1989
5. Atomic Spectra-H.G. Kuhn-Ongmans 1952
6. Atomic Physics-J.B. Rajam –S.Chand and Company 1979

7. Modern Physics-R. Murugesan-S.Chand and Company 1996
8. The Feymann Lectures on physics Vol-3 Narosa Publishing House. New Delhi.
9. Elements of Modern Physics-S.H. Patil TMH New Delhi-1984
10. Atomic Physics-Yarwood and Olozo
11. Principles of Modern Physics, A.P. French John Wiley London 1958
12. Modern Physics-S.N. Ghosal, Part 1 and 2 S.Chand and company 1996

Course No: PHY 504: Modern Physics Lab I

1. Characteristics of photo cell.
2. Determination of the Planck's constant using a photo cell.
3. Determination of e/m by Thomson's method
4. Ionisation Potential of Xenon
5. Study of solar spectrum-Fraunhofer lines and the determination of Rydberg constant.
6. Analysis of Band spectra
7. Analysis of rotational spectra
8. Analysis of rotational and Vibrational spectra
9. Study of spectra of hydrogen
10. Absorption spectrum of KMnO4
11. Summerfield's fine structure constant a by measuring fine structure separation of Na doublets. (Photograph?)

(A minimum of ten experiments should be performed)

References

Practical Books by

1. IGOU
2. Saraf
3. S.P. Singh
4. Melissinos: Experiments in Modern Physics

VI-Semester

Course No: PHY 601

Statistical Physics & Solid State Physics

UNIT-I

Statistical Physics:- Introduction-Basic concepts-phase space, microstate and macro state-thermodynamic probability –classical or Maxwell Boltzmann statistics-Basic postulates-Distribution function-Maxwell distribution of molecular velocities-Quantum statistics-Introduction-Bosons and Perm ions-Bose-Einstein statistics-postulates-Distribution function-Fermi-Direct statistics-postulates-Distribution function ….(7hrs)

Free Electron Theory of Metals:- Introduction-Drudge and Lorenz classical theory-Expression for electrical conductivity-Ohm's law-Weidman-Franz law-Density of states for free electron- Fermi-Dirac distribution function and Fermi energy-expression for Fermi energy and kinetic energy at absolute zero and above absolute zero.
….(5hrs)

Nano Materials:- Nanoscale systems-Properties-examples and applications.. ..(2hrs)

Smart Materials:- Their properties, examples and applications. ….(2hrs)

UNIT-II

X-rays:- Production-Coolidge x-ray tube-continuous and characteristic X-rays, Mosley's law, scattering X-rays-Compton effect. Basic ideas of crystal structure-Bravais lattice-symmetry elements-lattice planes, Miller indices-speacing between lattice planes of cubic crystals-Bragg's law of X-ray diffraction-Powder method. Elementary ideas of crystal binding-Liquid crystals, classification, properties and applications. ….(14hrs)

UNIT-III

Band theory of Solids:- Introduction –Statement of Bloch theorem-The Bloch function-kroning penny model Energy Vs wave vector relationship-Distinction between metals, insulators and semiconductors. Intrinsic Semiconductors-concept of holes-concept of effective mass-Derivation of expression for carrier concentration and electrical conductivity-extrinsic semiconductors-impurity states energy band diagrams and the Fermi level. Hall effect in metals and semiconductors-optical properties of solids-Solar cells-photoconductivity- Light dependent resistors-Light emitting diodes-superconductivity-introduction- Experimental facts-Zero resistivity-The critical field-The critical current density-Meissner effect –Type I and type II superconductors-Cooper pairs-BCS Theory-Persistent currents-superconducting magnets-magnetic levitation-isotope effect-temperature dependence of specific heat and thermal conductivity.
……(13hrs)

Para magnetism: Quantum theory-Derivation of expression for paramagnetic susceptibility-Curie law

References:

1. Azaroff: Introduction to Solids
2. Kittel: Solid State Physics
3. S O Pillai: Solid State Physics
4. Gupta and Kumar: Solid State Physics
5. R K Puri and V.K. Babbar Solid State Physics
6. R L Singhal: Solid State Physics
7. M.Ali Omar: Elementary Solid State Physics
8. Singal, Agrawal and Prakash: Thermodynamics and Statistical Physics.
9. Reif: Statistical Physics
10. A.B. Gupta and H.P. Ray: Heat and Thermodynamics
11. Agarwal and Eisner: Statistical Mechanics
12. N. Rudraiah (Ed): Modeling of Nano and smart materials.

Course No: PHY 602: Modern Physics Lab II

1. Analysis of X-ray photograph
2. Energy gap of a semiconductor
3. Determination of dielectric constant.

4. Solar cell characteristics-Open circuit voltage-short circuit current-efficiency
5. LED Characteristics-graph of wavelength vs current-Spectral resoponse
6. LDR Characteristics-dark resistance-saturation resistance-material constant.
7. Semiconductor temperature sensor-(pure silicon) output voltage vs temperature (calibration)
8. Spectral response of a selenium photo cell (vs I)
9. Transistor as a switch and an active device.
10. Determination of Fermi energy of copper
11. Resistivity of a material by four probe technique.
12. Determination of thermal conductivity of material.

(A minimum of ten experiments should be performed)

Experiments with optical fibers, smart materials and liquid crystals are suggested.

References:

1. Raj kumar and Mada Lal: Advanced Practical Physics

VI-Semester

Course No: PHY 603

Relativity, Astrophysics & Nuclear Physics

UNIT-I

RELATIVITY

Review of frames of reference. Inertial and non-inertial frames. Principle of Galilean relativity

Michelson-Morley experiment with a brief historical background, significance of its negative results

Postulates of special theory of relativity, Derivations of Lorentz transformation equations proper time and proper length. Time dilation, illustration with 'twin paradox' and 'life time of a u meson'

Lorentz –Fitzgerald length contraction, simultaneity in relativity

Velocity transformation equations

Variation of mass with velocity

Mass-energy and momentum-energy relations

Qualitative introduction to Murkowski's space ….(15hrs)

UNIT-II

ASTROPHYSICS

Absolute or intrinsic luminosity apparent brightness, apparent magnitude scales of Hipparchus. Distinction between visual and bolo metric magnitudes distance-modulus relationship. Stellar parallax and units of stellar distances: Definition of arcsec and parsec (pc) Relation between distance of a star and its parallax. Definitions of astronomical unit (AU) and light year (ly) and equations relating AU ly and pc. Surface or effective temperature and color of a star: Definitions. Wine's displacement law. Intrinsic temperature of a star. Expression for average temperature, core temperature and core pressure of a star based on the linear density model of a star. Spectral classification of stars and their chemical composition: Edward Charles Pickering classification (ie OBAFGKM). Harvard sequence and Yreka's luminosity classification. Size (radius) of a star. Expression for radius using Stefan-Boltzmann law. Spectral signature of elements present in the stellar atmosphere. Mass-luminosity relationship and expression for life-time of a star. Hertzsprung –Russell (HR) diagram: Main sequence stars and their general character Evolution of a star to white dwarf stage through red giant stage. Supernova expose Formation of a pulsar or neutron star and blackhole (qualitative) with mention of typical required temperatures and the corresponding densities. Event horizon, singularity and Schwarz child's radius (qualitative).

….(hrs)

UNIT-III

NUCLEAR PHYSICS

Nuclear charge: Rutherford's theory of alpha particle scattering. Derivation of Rutherford's scattering formula (assuming the path of the alpha particle to be a hyperbola).

Nuclear mass: Aston's mass spectrograph with theory

Alpha decay: Range and disintegration energy of alpha particles, Geiger - Nuttal law Brief description of characteristics of alpha ray spectrum, Gammon's theory of alpha decay.

Beta decay: Types of beta decay (electron, Positron decay and electron capture). Characteristics of beta spectrum, Paula's neutrino hypothesis Detectors of nuclear radiation: Variation of ionization current with; applied voltage in lionization chamber and identification of the regions of operation of ionization detector proportional counter and GM counter. Working of Proportional and Geiger-Muller counter. Accelerators: Cyclotron and electron synchrotron.

Nuclear reactions: Conservation laws in nuclear reactions with examples Expression for Q value of a nuclear reaction. endoergic and exoreic reactions. Threshold energy.

References:

1. Introduction to the theory of relativity-Peter Gabriel Bergmann
2. Introduction to special relativity-Robert Resnick
3. Special relativity –A.P. French
4. Astronomy: Fundamentals and Frontiers-Jastrow & Thompson
5. Chandrashekhar and his limit-G.Venkataraman

6. An introduction to Astrophysics-Baidyanath Basu
7. Nuclear Physics-lrving Kaplan
8. Concepts of Nuclear Physics-Cohen
9. Atomic and nuclear physics-Ghoshal
10. Atomic physics-J.B. Rajam.

Course NO: PHY 604: Modern Physics Lab III

1. Calculation of physic properties stars plotting of H-R diagram.
2. Determination of the temperature of an artificial star.
3. Determination of the distance of a distant object by the parallax method.
4. Low pass filter
5. High pass filter
6. Band pass filter
7. Verification of inverse square law applicable to intensity of gamma rays emitted by radioactive substance using a GM counter.
8. Determination of mass-absorption of coefficient of aluminum for gamma rays.
9. Characteristics of Geiger-Muller (GM counter)
10. Half life of K40
11. Analysis of stellar spectra
12. Analysis of sunspot photographs

(A minimum of ten experiments should be performed)

References:

1. Nelkon and Ogborn: Practical Physics
2. R.M. Singru: Experimental Nuclear Physics.

I Semester

PHYSICS-I

Mechanics, Oscillations and Waves

Time: 3 Hrs Max. Marks:60

Instruction: Answer should be written completely either in Kannada or in English.

«¨sÁUÀ-J

PART-A

AiÀiÁªÀÅzÁgÀÆ LzÀÄ ¥Àæ±ÉßUÀ½UÉ GvÀÛj¹. ¥Àæw¥Àæ±ÉßUÉ DgÀÄ CAPÀUÀ¼ÀÄ.

Answer any five questions. Each question carries six marks.

1. F PÉ¼ÀV£À ¸À«ÄÃPÀgÀtUÀ¼À£ÀÄß ªÀÅåvÀåwÛ¹:

i) v=voe-kt

ii) x=vok (1-e-kt)

Derive the above equations with usual notations. 6

2. dqÀ ªÀÄvÀÄÛ C¥ÀdqÀ ZËPÀlÄÖUÀ¼ÉAzÀgÉÃ£ÀÄ? ¸Á¥ÉÃPÀëªÉÃUÀzÀ°è ZÀ°¸ÀÄwÛgÀÄªÀ JgÀqÀÄ ZËPÀlÄÖUÀ¼À°ègÀÄªÀ «ÃPÀëPÀjUÉ MAzÀÄ PÀtzÀ ªÉÃUÉÆÃvÀÌµÀðªÀÅ ¸ÀªÀÄ£ÁVgÀÄvÀÛzÉ JAzÀÄ vÉÆÃj¹.

What are inertial and non-inertial frames of reference?

Show that two observers moving with uniform relative velocity observe same acceleration for a particle. (2+4)

3. PÉÆjAiÀiÁ°¸ï §®ªÉAzÀgÉÃ£ÀÄ? PÉÆjAiÀiÁ°¸ï §®PÉÌ MAzÀÄ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß §gÉ¬Äj. ªÁtÂdå ªÀiÁgÀÄvÀ ªÀÄvÀÄÛ ZÀAqÀªÀiÁgÀÄvÀUÀ¼À ªÉÄÃ¯É PÉÆjAiÀiÁ°¸ï §® ©ÃgÀÄªÀ ¥Àæ¨sÁªÀªÀ£ÀÄß «ªÀj¹.

What is Cariolis force? Write expression for Carioles force. Explain its application to trade winds and cyclones. (1+1+4)

4. PÉ®¸À-±ÀQÛAiÀÄ ¥ÀæªÉÄÃAiÀÄªÀ£ÀÄß ¤gÀÆ¦¹ ªÀÄvÀÄÛ «ªÀj¹.
§zÀ¯ÁUÀÄwÛgÀÄªÀ §®¢AzÀ §gÀÄªÀ ±ÀQÛAiÀÄ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¥ÀqÉ¬Äj.

State and explain work-energy theorem. Hence deduce an expression for work done by a variable force. (2+4)

5. gÀPÀë ªÀÄvÀÄÛ CgÀPÀë §®UÀ¼ÀÄ JAzÀgÉÃ£ÀÄ? JgÀqÀPÀÆÌ MAzÉÆAzÀÄ GzÁºÀgÀuÉ ¤Ãrj. UÀÄgÀÄvÀé «¨sÀªÀ±ÀQÛAiÀÄÄ JvÀÛgÀ ºÉaÑzÀAvÉ ºÉZÀÄÑvÀÛzÉ JAzÀÄ vÉÆÃj¹.

What are conservative and non-conservative forces? Give one example for each. Show that the gravitational potential energy increases linearly with altitude. (3+3)

6. PÀtUÀ¼À MAzÀÄ vÀAqÀzÀ gÉÃTÃAiÀÄ ¸ÀAªÉÃUÀ ¤vÀåvÀé ¤AiÀÄªÀÄªÀ£ÀÄß ¤gÀÆ¦¹. PÀtUÀ¼À MAzÀÄ vÀAqÀzÀ gÉÃTÃAiÀÄ ¸ÀAªÉÃUÀ ¤vÀåvÀéªÀÅ zÀæªÀågÁ² PÉÃAzÀæzÀ gÉÃTÃAiÀÄ ¸ÀAªÉÃUÀ ¤vÀåvÀéPÉÌ ¸ÀªÀÄ JAzÀÄ vÉÆÃj¹.

State the law of conservation of linear momentum for a system of particles.

Show that the linear momentum of a system of particles is equal to the linear momentum of the centre of mass. (2+4)

7. MAzÀÄ ¸ÀªÀÄvÀ® vmÉÖAiÀÄ ¨sÀæªÀÄt dqÀvÀézÀ ®A¨ÁPÀëö ¹zÁÞAvÀªÀ£ÀÄß ªÁåSÉåPÉÆlÄÖ ¸Á¢ü¹.

State and prove the theorem of perpendicular axis of moment of inertia of a plane lamina.

8. ¸ÀgÀ¼À ¸ÀAUÀvÀ ZÀ®£ÉAiÀÄ ªÁåSÉå ¤Ãr. ¸ÀgÀ¼À ¸ÀAUÀvÀ ZÀ®£ÉAiÀÄ°ègÀÄªÀ MAzÀÄ PÀtzÀ ±ÀQÛUÉ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¥ÀqÉ¬Äj.

Define simple harmonic motion. Derive an expression for the energy of a particle executing SHM. (2+4)

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PART-B

AiÀiÁªÀÅzÁgÀÆ £Á®ÄÌ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ LzÀÄ CAPÀUÀ¼ÀÄ.

Answer any four of the following questions. Each question carries five marks.

9. 120 N §®ªÀÅ MAzÀÄ ªÀ¸ÀÄÛ«£À ªÉÄÃ¯É 3 ¸ÉPÉAqÀÄUÀ¼ÀÄ ¥ÀæAiÉÆÃV¹zÁUÀ CzÀgÀ ªÉÃUÀªÀÅ 30 ms-1 DVgÀÄvÀÛzÉ. CzÀgÀ zÀæªÀågÁ²AiÀÄ£ÀÄß PÀAqÀÄ»r¬Äj ªÀÄvÀÄÛ 3 ¸ÉPÉAqÀÄUÀ¼ÀÄ £ÀAvÀgÀ CzÀgÀ ¸ÀAªÉÃUÀªÀ£ÀÄß PÀAqÀÄ »r¬Äj.
5

10. A force of 120N acting on a body for 3 sec. imparts it a velocity of 30m/s. What is the mass of the body? What is the momentum of the body at the end of 3 sec?

0.28 JA CAvÀgÀzÀ°ègÀÄªÀ 19PÉf ªÀÄvÀÄÛ 150PÉf zÀæªÀågÁ²ÀÅ¼Àî JgÀqÀÄ UÉÆÃ¼ÀUÀ¼À £ÀqÀÄ«£À DPÀµÀðt §®ªÀÅ 0.25 JA.f vÀÆPÀPÉÌ ¸ÀªÀÄ£ÁVgÀÄvÀÛzÉ. UÀÄgÀÄvÀé ¤AiÀÄvÁAPÀªÀ£ÀÄß PÀAqÀÄ»r¬Äj. UÉÆÃ¼ÀUÀ¼À ªÀÄzsÉå EgÀÄªÀ CAvÀgÀªÀÅ CzsÀðQÌ½zÀgÉ CªÀÅUÀ¼À ªÀÄzsÉå EgÀÄªÀ DPÀµÀðt §®ªÀ£ÀÄß PÀAqÀÄ »r¬Äj. g=9.8m/s2 5

11. A sphere of mass 19 kg is attracted by another sphere of mass 150kg when their centres of separated by distance of 0.28 m with a force equal to the weight of 0.25 mg. Calculate the gravitational constant. If the distance is halved, what would be the force? Given g=9.8m/s2.

5 N ¸ÀªÀÄvÀ® §®ªÀ£ÀÄß G¥ÀAiÉÆÃV¹ 0.1PÉf zÀæªÀågÁ²ÀÅ¼Àî MAzÀÄ CZÀÑ£ÀÄß UÉÆÃqÉUÉ MwÛ»rAiÀÄ¯ÁVzÉ. UÉÆÃqÉ ªÀÄvÀÄÛ CaÑ£À £ÀqÀÄ«£À WÀµÀðt ¤vÁAPÀªÀÅ 0.4 DVzÀÝgÉ, CªÀÅUÀ¼À ªÀÄzsÉå EgÀÄ WÀµÀðuÁ §®ªÀ£ÀÄß PÀAqÀÄ»r¬Äj g=9.8 ms-2.
5

A block of mass 0.1kg is held against a wall by applying a horizontal force of 5 N on the block. If the coefficient of frictions between the wall and the block is 0.4 what is the magnitude of frictional force on the block? g=9.8 ms-2. 5

12. 10 PÉf zÀæªÀågÁ²AiÀÄ¼Àî MAzÀÄ ªÀÄgÀ½£À aÃ®ªÀ£ÀÄß 3 m GzÀÝzÀ zÁgÀzÀ ¸À°ÁAiÀÄ¢AzÀ vÀÆUÀÆ °ÁPÀ¯ÁVzÉ. 0.2 PÉf zÀæªÀågÁ²ªÀÅ¼Àî MAzÀÄ UÀÄAqÀ£ÀÄß 20 m/s ªÉÃUÀzÀ°è ªÀÄgÀ½£À aÃ®PÉÌ °Áj¸À¯ÁVzÉ.

C)ªÀÄgÀ½£À aÃ® UÀ½¹zÀ ªÉÃUÀªÀ£ÀÄß PÀAqÀÄ»r¬Äj.

D) EªÀÅUÀ¼À WÀµÀðuÉAiÀÄ°è ¥ÀjªÀwðvÀªÁzÀ ±ÀQÛAiÀÄ GµÀÚvÉAiÀÄ£ÀÄß PÀAqÀÄ»r¬Äj.

A sand bag of mass 10kg is suspended with a 3 m long string. A bullet of mass 0.2 kg is fired with a speed 20 m/s into the bag and stays in the bag. Calculate.

i) the speed acquired by the bag.

ii) the energy converted into heat in the collision. 5

13. MAzÀÄ PÀtªÀÅ 0=3t3/20 – t2/3, ¸À«ÄÃPÀgÀtzÀAvÉ wgÀÄUÀÄwÛgÀÄvÀÛzÉ. 5 ¸ÉPÉAqÀÄUÀ¼À £ÀAvÀgÀ PÀtzÀ PÉÆÃ¤ÃAiÀÄ ªÉÃUÀ ªÀÄvÀÄÛ PÉÆÃ¤ÃAiÀÄ ªÉÃUÉÆÃvÀÌµÀðªÀ£ÀÄß PÀAqÀÄ»r¬Äj.

A particle starts rotating from rest according to the realation

0=3t3/20 – t2/3, calculate the angular velocity and angular acceleration at the end of 5seconds. 5

14. MAzÀÄ J¼ÉzÀ zÁgÀzÀ ªÉÄÃ¯É EgÀÄªÀ vÀgÀAUÀzÀ ¸ÀÜ¼ÁAvÀgÀªÀ£ÀÄß F ¸À«ÄÃPÀgÀtzÀ°è ¸ÀÆa¹zÉ.

y=5 sin 2 {t 0.03 – x 600 x ªÀÄvÀÄÛ y («ÄÃ)ªÀÄvÀÄÛ (¸ÉPÉAqÀÄ)£À°è EªÉ. vÀgÀAUÁvÀgÀ, vÀgÀAUÀ¥ÁgÀ ªÀÄvÀÄÛ PÀA¥À£À ¸ÀASÉå EªÀÅUÀ¼À£ÀÄß ¯ÉQÌ¹.

The equation of wave on a stretched string is given by y=5 sin 2 {t 0.03 – x 600. Where x and y are in meters and t is in second. Find wave length, amplitude and frequency. 5

«¨sÁUÀ-¹

PART-C

AiÀiÁªÀÅzÁzÀgÀÆ LzÀÄ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ JgÀqÀÄ CAPÀUÀ¼ÀÄ.

Answer any five of the following questions Each question carries two marks.

15. a) ¨ÁA§Ä ¹rzÁUÀ vÀÄtÄPÀÄUÀ¼ÀÄ J¯Áè ¢PÀÄÌUÀ¼À°è ¥Àæ¸Àj¸ÀÄvÀÛªÉ. F ¥ÀæQæAiÉÄAiÀÄ°è AiÀiÁªÀ CA±ÀªÀÅ ¹ÜgÀªÁVgÀÄvÀÛzÉ?
(2)

When a bomb explodes, the fragments go in all directions. What remains constant for entire system?

b) ¨sÀæªÀÄt ¤gÀvÀ ZËPÀnÖUÉ £ÀÆål£ïUÉ JgÀqÀ£ÉAiÀÄ ¤AiÀÄªÀÄªÀÅ C£ÀéAiÀÄªÁUÀÄvÀÛzÉAiÉÄÃ? «ªÀj¹. (2)

In Newton’s second law of motion valid in the rotating frame of reference? Explain.

c) PÉÆÃ¤ÃAiÀÄ ªÉÃUÀªÀÅ IÄuÁäPÀªÁVgÀ®Ä ¸ÁzsÀåªÉÃ? «ªÀj¹.
(2)

Can angular velocity be negative? Explain.

d) AiÀiÁªÀÅzÉÃ vÀÆUÁlzÀ ZÀ®£ÉAiÀÄÄ ¸ÀgÀ¼À ¸ÀAUÀvÀ ZÀ®£ÉAiÀiÁVgÀÄvÀÛzÉAiÉÄÃ? «ªÀj¹. (2)

Can we call any to and fro motion as simple harmonic? Explain.

e) WÀµÀðuÉ CªÀ±ÀåªÁzÀ MAzÀÄ ¦qÀÄUÀÄ, «ªÀj¹.

Friction is a necessary evil Explain. (2)

f) ªÀvÀÄð¯ÁPÁgÀzÀ°è ¹ÜgÀªÉÃUÀzÀ°è ZÀ°¸ÀÄwÛgÀÄªÀ PÀt ªÉÃUÉÆÃvÀÌµÀð ºÉÆA¢gÀÄvÀÛzÉAiÉÄÃ? «ªÀj¹.

Does a particle moving along a circular path with uniform speed possess acceleration? Explain. (2)

g) ºÁå«Ä¯ÉÆÖÃ¤AiÀÄ¯ï AiÀiÁªÀ ¸ÀAzÀ¨sÀðzÀ°è ªÀåªÀ¸ÉÜAiÉÆAzÀgÀ MlÄÖ ±ÀQÛUÉ ¸ÀªÀÄ£ÁVgÀÄvÀÛzÉ.?

When is the Hamiltonian equal to the total energy of a system/ (2)

h) CqÀØ vÀgÀAUÀUÀ¼ÀÄ zÀæªÀ CxÀªÁ C¤®UÀ¼À ªÀÄÆ®PÀ ZÀ°¸À®Ä ¸ÁzsÀå«®è. «ªÀj¹.

Transverse waves cannot propagate through fluids. Explain. (2)

II Semester

PHYSICS-II

Properties of Matter, Heat and Thermodynamics

Time: 3 Hours Max. Marks: 60

Instruction: Answers should be written completely either in Kannada or English.

«¨sÁUÀ-J

PART-A

PÉ¼ÀV£À ¥Àæ±ÉßUÀ¼À°è AiÀiÁªÀÅzÁzÀgÀÆ LzÀÄ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ DgÀÄ CAPÀUÀ¼ÀÄ.

Answer any five of the following questions. Each question carries six marks. (5x6=30)

1. a) ¥Á¬Ä¸Á£ï PÉÆÃµÀÖPÀªÀ£ÀÄß ¤gÀÆ¦¹ ªÀÄvÀÄÛ CzÀgÀ Ew«Äw w½¹.
b) MAzÀÄ vÀAwAiÀÄ KPÀªÀiÁ£À wgÀÄZÀuÉAiÀÄ §®AiÀÄÄUÀäPÉÌ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¥ÀqÉ¬Äj.

a) Define Poisson's ration and mention its limits.
b) Derive an expression for the couple per unit twist of a wire under torsion. (2+4)

2. ¥ÀæªÀ»¸ÀÄªÀ zÀæªÀzÀ gÉÃSÁUÀw JAzÀgÉÃ£ÀÄ? MAzÀÄ ¸ÀAPÀÄavÀ £Á¼ÀzÀ°è ¥ÀæªÀ»¸ÀÄwÛgÀÄªÀ zÀlÖªÁzÀ zÀæªÀPÉÌ ¥ÉÆÃAiÀiï¸À° ¸ÀÆvÀæªÀ£ÀÄß ªÀÅåvÀàwÛ¹.

What is meant by streamline flow of a fluid? Derive Poiseuille's formula for the flow of a viscous fluid through a narrow tube. 6

3. JgÀqÀÄ zÀæªÀUÀ¼À ªÀÄzsÉå EgÀÄªÀ DAvÀjPÀ ªÉÄÃ®ªÉÄÊ ¸É¼ÉvÀªÀ£ÀÄß ºÀ¤-vÀÆPÀ C¼ÀvÉAiÀÄ ¥ÀæAiÉÆÃUÀzÀ ¥ÀzÀÞw¬ÄAzÀ ¤tð¬Ä¸ÀÄªÀ §UÉÎ UÀtÂvÀ vÀPÀðzÀ ¸ÀªÉÄÃvÀ «ªÀj¹.

Describe with necessary theory, how the interfacial tension between any two liquids is determined by drop-weight method. 6

4. MAzÀÄ C¤®zÀ CtÄ«£À ¸ÀgÁ¸Àj ªÀÄÄPÀÛ¥ÀxÀªÀ£ÀÄß ¤gÀÆ¦¹ ªÀÄvÀÄÛ CzÀPÉÌ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¥ÀqÉ¬Äj. CtÄ«£À ¸ÀgÁ¸Àj ªÀÄÄPÀÛ¥ÀxÀzÀ ¥ÀæªÀiÁtªÀÅ AiÀiÁªÀ AiÀiÁªÀ CA±ÀUÀ¼À£ÀÄß CªÀ®A©¸ÀÄvÀÛzÉ, ZÀað¹.

Define mean free path of a molecule in a gas and obtain an expression for the same. Discuss the factors that affect the mean free path of a molecule. 6

5. a) ¹ÜgÀ vÁ¥À ªÀÄvÀÄÛ ¹ÜgÉÆÃµÀÚ ¥ÀzÀÞwUÀ¼À°è£À ªÀåvÁå¸ÀªÀ£ÀÄß w½¹.

b) ¹ÜgÉÆÃµÀÚ §zÀ¯ÁªÀuÉAiÀÄ°è GAmÁUÀÄªÀ PÉ®¸ÀzÀ ¥ÀæªÀiÁtPÉÌ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¥ÀqÉ¬Äj.

a) Distinguish between isothermal and adiabatic processes.
b) Derive an expression for the work done during an adiabatic change. (2+4)

6. a) GµÀÚ ¥ÀæZÀ®£ÀzÀ JgÀqÀ£ÉAiÀÄ ¤AiÀÄªÀÄªÀ£ÀÄß w½¹ ªÀÄvÀÄÛ MAzÀÄ gÉ¦üæfgÉÃlgÀß PÁAiÀÄð¤ªÀðºÀuÉAiÀÄÄ JgÀqÀ£ÉAiÀÄ ¤AiÀÄªÀÄªÀ£ÀÄß KPÉ G®èAX¸ÀÄªÀÅ¢®è. «ªÀj¹.

b) PÁ£Áðmï DªÀvÀðªÀ£ÀÄß GµÀÚvÉ-JAmÉÆæÃ¦ gÉÃSÁavÀæzÀ ªÀÄÆ®PÀ ªÀåPÀÛ¥Àr¹ ªÀÄvÀÄÛ CzÀgÀ «¹ÛÃtðªÀÅ ¥ÀæAiÉÆÃd£ÀPÀgÀ ±ÀQÛAiÀÄ£ÀÄß ªÀåPÀÛ ¥Àr¸ÀÄvÀÛzÉ JAzÀÄ ¸Á¢ü¹.

a) State the second law of thermodynamics and explain why the working of a refrigerator does not violate the second law.

b) Represent carnot cycle on a temperature-entropy diagram and prove that its area represents available energy. (3+3)

7. ªÀiÁPÀïªÉÃ¯ï GµÀÚ¥ÀæZÀ®£ÀzÀ ¸ÀA§AzsÀUÀ¼À£ÀÄß, £Á®ÄÌ GµÀÚ¥ÀæZÀ®£À «¨sÀªÀUÀ½AzÀ ªÀÅåvÀàwÛ¹.

From four thermodynamic potentials. Derive Maxwell's thermodynamic relations. 6

8. °Aqï£À UÁ½ zÀæ«ÃPÀj¸ÀÄªÀ ¸ÁzsÀ£ÀzÀ ªÀÄÆ®vÀvÀé ªÀÄvÀÄÛ PÁAiÀÄð ¤ªÀðºÀuÉAiÀÄ£ÀÄß CZÀÄÑPÀmÁÖzÀ avÀæzÀ ¸ÀªÉÃvÀ ªÀtÂð¹, CzÀgÀ ¯Á¨sÀUÀ¼À£ÀÄß w½¹.

With a neat diagram, describe the principle and working of Linde's air liquefier. Mention its advantages. 6

«¨sÁUÀ-©

PART-B

AiÀiÁªÀÅzÁzÀgÀÆ £Á®ÄÌ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ LzÀÄ CAPÀUÀ¼ÀÄ.

Answer any four questions. Each question carries five marks. (4x5=20)

9. 0.5 m. GzÀÝ ªÀÄvÀÄÛ 1 m m wæªÀåªÀÅ¼Àî GQÌ£À vÀAwAiÉÆAzÀ£ÀÄß 2 kg vÀÆPÀ¢AzÀ J¼ÉAiÀÄ®ànÖzÉ vÀAwAiÀÄ°è ±ÉÃRj¹zÀ ±ÀQÛAiÀÄ£ÀÄß ¯ÉPÀÌ ªÀiÁr q=20x10 10 Nm–2.

A steel wire of radius 1 mm and length 0.5 m is extended by a constant weight of 2 kg. Calculate the energy stored in the wire. q=20x10 10 Nm–2.

10. ªÁAiÀÄÄªÀÄAqÀ®zÀ MvÀÛqÀQÌAvÀ 980 Nm–2 ºÉZÀÄÑ MvÀÛr«gÀÄªÀ MAzÀÄ ¤Ãj£À mÁåAQ£À gÀAzsÀæ¢AzÀ ºÉÆgÀ¸ÀÆ¸ÀÄªÀ ¥ÀæªÁºÀzÀ ªÉÃUÀzÀ ¥ÀæªÀiÁtªÀ£ÀÄß ¯ÉPÀÌ ªÀiÁr. ¤Ãj£À ¸ÁAzÀævÉ=1000 kgm–3, g=9.8 ms–2.

Calculate the velocity of efflux of water from a tank in which the pressure at the orifice is 980 Nm-2 above the atmospheric pressure. Density of water=1000 kgm-3, g=9.8ms-2.

11. ¸Á§Æ¤£À UÀÄ¼ÉîAiÀÄ°ègÀÄªÀ ºÉaÑ£À MvÀÛqÀªÀÅ, 800 kgm–3 ¸ÁAzÀævÉAiÀÄÄ¼Àî 0.2 m JvÀÛgÀzÀ JuÉÚ¸ÀÛA¨sÀzÀ MvÀÛqÀPÉÌ ¸ÀªÀÄªÁVzÉ. ¸Á§Æ¤£À zÁæªÀPÀzÀ ªÉÄÃ¯ÉäöÊ ¸É¼ÉvÀªÀÅ 0.075 Nm–1 EzÀÝ°è, ¸Á§Æ¤£À UÀÄ¼ÉîAiÀÄ wædåªÀ£ÀÄß PÀAqÀÄ»r¬Äj g=9.8 ms–2

The excess pressure inside a soap bubble is equal to the pressure of 0.2 m height of an oil column of density 800 kgm–3. If the surface tension of soap solution is 0.075 Nm–1, find the radius of the soap bubble. g=9.8 ms–2 .

12. 27 C £À°ègÀÄªÀ ¤¢ðµÀÖ ¥ÀæªÀiÁtzÀ vÉÃªÀ«®èzÀ UÁ½AiÀÄ£ÀÄß ªÀÄÆ®UÁvÀæzÀQÌAvÀ 1/5 gÀµÀÄÖ UÁvÀæPÉÌ ¸ÀAPÀÄavÀUÉÆ½¸À¯ÁVzÉ.

EzÀgÀ ¥ÀjuÁªÀÄ¢AzÀ GAmÁUÀÄªÀ GµÀÚvÉ ªÀÄvÀÄÛ C¤®zÀ ªÉÄÃ¯É J¸ÀVzÀ PÁAiÀÄðªÀ£ÀÄß ¯ÉPÀÌªÀiÁr. r=1.4 R=8.31 JK-1 mole-1.

A certain quantity of dry air at 27C is compressed adiabatically to 1/5th of its original volume. Calculate the resulting temperature and work done on the gas. r=1.4 R=8.31 JK-1 mole-1.

13. MAzÀÄ GµÀÚAiÀÄAvÀæªÀÅ ¥Àæw DªÀvÀð£ÀzÀ°è 200 J GµÀÚ±ÀQÛAiÀÄ£ÀÄß ªÀÄÆ®¢AzÀ »Ãj, 120 J GµÀÚ±ÀQÛAiÀÄ£ÀÄß PÀÆ¥ÀPÉÌ vÀ½îºÁPÀÄvÀÛzÉ. CzÀgÀ ¸ÁªÀÄxÀåðªÀ£ÀÄß ¯ÉPÀÌªÀiÁr. ªÀÄÆ®zÀ GµÀÚvÉAiÀÄ 600 K DVzÀÝ°è, AiÀÄAvÀæzÀ ¸ÁªÀÄxÀåðªÀÅ 0.6 DUÀ®Ä, PÀÆ¥ÀzÀ GµÀÚvÉAiÀÄ£ÀÄß JµÀÄÖ vÀVÎ¸À¨ÉÃPÀÄ?

A heat engine absorbs 200 J of heat from the source and rejects 120 J of heat to the sink in a cycle. Calculate its efficiency. If the temperature of the source is 600 K, by how much should the temperature of the sink be reduced so as to increase its efficiency to 0.6.

14. d®d£ÀPÀzÀ C¤®ªÀÅ-100 GµÀÚvÉAiÀÄ°è O¯ï-xÁªÀÄ¸À£ï »UÀÄÎ«PÉAiÀÄ£ÀÄß ºÉÆA¢zÁUÀ GAmÁUÀÄªÀ GµÀÚvÉAiÀÄ §zÀ¯ÁªÀuÉAiÀÄ£ÀÄß ¯ÉPÀÌ ªÀiÁr. ©gÀqÉAiÀÄ JgÀqÀÄ ¥Á±ÀéðUÀ¼À ªÀÄzsÉå EgÀÄªÀ MvÀÛqÀzÀ ªÀåvÁå¸À 50 d®d£ÀPÀ C¤®zÀ ªÁåAqÀgïªÁ¯ï ¹ÜgÀUÀ¼ÀÄ =0.0247 Nm4 mole-2, b=2.6 x 10-5 m3 mole-1, R=8.31 JK-1 mole-1 C¤®ªÀÅ GµÀÚvÉAiÀÄ°è ºÉZÀÑ¼À CxÀªÁ vÀUÀÄÎ«PÉ vÉÆÃj¸ÀÄvÀÛzÉAiÉÄÃ? 1 atm=1.012 x 105 Nm-2.

Calculate the change in temperature when hydrogen gas suffers Joule-Thomson expansion at -100C; the pressure difference on both sides of the plug being 50 atm. The Vander Waal's constants for hydrogen are a=0.0247 Nm4 mole-2, b=2.6 x 10-5 m3 mole-1, R=8.31 JK-1 mole-1 atm=1.012 x 105 Nm-2. Does the gas exhibit heating or cooling effect?

«¨sÁUÀ-¹

PART-C

AiÀiÁªÀÅzÁzÀgÀÆ LzÀÄ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ JgÀqÀÄ CAPÀUÀ¼ÀÄ.

Answer any five questions. Each question carries two marks.
(5x2=10)

15. a) DAiÀÄvÁPÁgÀzÀ CqÀØ¨sÁUÀªÀÅ¼Àî MAzÀÄ GQÌ£À vÉÆ¯ÉAiÀÄ°è GzÀÝ«gÀÄªÀ ¥Á±ÀéðªÀÅ D¼ÀzÀAvÉ §¼À¸À¯ÁUÀÄvÀÛzÉ «ªÀj¹.

b) gÉÊ¥sÀ¯ï£À UÀÄAqÀÄ PÉÆ¼ÀªÉ DPÁgÀzÀ°ègÀÄvÀÛzÉ, UÉÆÃ¼ÀPÁgÀªÁVgÀÄªÀÅ¢®è. KPÉ?

c) ¨sÀÆ«ÄAiÀÄ£ÀÄß G¼ÀÄªÀÅzÀjAzÀ vÉÃªÁA±À »r¢nÖgÀÄvÀÛzÉ. KPÉ/

d) MAzÉÃ GµÀÚvÉ ªÀÄvÀÄÛ zÀæªÀågÁ² EgÀÄªÀ KPÁtÄ ªÀÄvÀÄÛ ¢éªÁtÄ C¤®UÀ½UÉ ¸ÀªÀÄªÁV GµÀÚªÀ£ÀÄß ºÀAazÁUÀ, AiÀiÁªÀ C¤®ªÀÅ ºÉaÑ£À GµÀÚvÉAiÀÄ£ÀÄß ¥ÀqÉAiÀÄÄvÀÛzÉ ªÀÄvÀÄÛ KPÉ?

e) mÉÊgÉÆAzÀÄ MqÉzÀÄºÉÆÃzÁUÀ CzÀjAzÀ ºÉÆgÀ§gÀÄªÀ UÁ½AiÀÄ GµÀÚvÉAiÀÄÄ ¸ÀÄvÀÛªÀÄÄvÀÛ°£À UÁ½AiÀÄ GµÀÚvÉVAvÀ PÀrªÉÄ DVgÀÄvÀÛzÉ. «ªÀj¹.

f))«±ÀézÀ JAmÉÆæÃ¦AiÀÄÄ AiÀiÁªÁUÀ®Æ ºÉZÀÄÑvÀÛ¯ÉÃ EgÀÄvÀÛzÉ. «ªÀj¹.

g) d®d£ÀPÀ ªÀÄvÀÄÛ »Ã°AiÀÄA C¤®UÀ¼ÀÄ PÉÆoÀrAiÀÄ GµÀÚvÉAiÀÄ£ÀÄß O¯ï-xÁªÀÄ¸À£ï »UÀÄÎ«PÉAiÀÄ£ÀÄß M¼ÀUÉÆAqÁUÀ GµÀÚzÀ ¥ÀjuÁªÀÄªÀ£ÀÄß ¥ÀæzÀ²ð¸ÀÄvÀÛzÉ «ªÀj¹.

h)AiÀiÁªÀ GµÀÚ¥ÀæZÀ®£ÀzÀ ¸ÀÆZÀPÁAPÀ C)¹ÜgÉÆÃµÀÚ »UÀÄÎ«PÉ D) O¯ï-xÁªÀÄ¸À£ï ¥ÀjuÁªÀÄUÀ¼À°èM §zÀ¯ÁUÀÄªÀÅ¢®è w½¹.

a) In a girder of rectangular cross-section, the longer side is used as depth. Explain.
b) Why is a rifle bullet made cylindrical and not spherical?
c) Ploughing of field retains moisture in them Why?
d) Equal masses of monatomic and diatomic gases at the same temperature are given equal quantities of heat. Which gas will undergo a larger temperature rise and why?
e) When a type bursts, the air coming out is cooler than the surrounding air. Explain.
f) Entropy of the universe always increases. Explain.
g) Hydrogen and Helium gases exhibit heating effect while undergoing Joule-Thomson expansion at room temperature. Explain.
h) Name the thermodynamic function that remains constant in (i) an adiabatic expansion (ii) Joule-Thomson effect.

III Semester

PHYSICS-III

Electricity, Magnetism and Radiation

Time: 3 Hours Max. Marks: 60

Instruction: Answers should be written completely either in Kannada or English.

PART-A

¨sÁUÀ-J

Answer any five of the following questions. Each question carries six marks. (5x6=30)

PÉ¼ÀV£À ¥Àæ±ÉßUÀ¼À°è AiÀiÁªÀÅzÁzÀgÀÆ LzÀÄ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ DgÀÄ CAPÀUÀ¼ÀÄ.

1. State and prove maximum power transfer theorem and show that emf of source

E= 4Rth P max. (4+2)

UÀjµÀ× ±ÀQÛ ªÀUÁðªÀuÉ ¥ÀæªÉÄÃAiÀÄªÀ£ÀÄß ªÁåTå¹ ºÁUÀÆ ¸Á¢ü¹. E=4Rth P max.JA§ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¤gÀÆ¦¹.

2. State Biot-Savart's law. Obtain an expression for the magnetic field on the axis of a current carrying solenoid. (1+5)

§AiÉÆÖÃ-¸ÀªÀmïð ¤AiÀÄªÀÄªÀ£ÀÄß ¤gÀÆ¦¹. «zÀÄåvï ºÀjAiÀÄÄwÛgÀÄªÀ ¸Á°£ÁAiÀÄqï£À CPÀëzÀ ªÉÄÃ¯É AiÀiÁªÀÅzÉÃ ©AzÀÄ«£À°è £À PÁAvÀPÉëÃvÀæPÉÌ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¥ÀqÉ¬Äj.

3. State Faraday's Laws of electromagnetic Induction. Obtain expression for Induced emf.

(2+4)

¥sÁågÀqÉAiÀÄ «zÀÄåzÀAiÀÄ¸ÁÌAwÃAiÀÄ ¥ÉæÃgÀuÁ ¤AiÀÄªÀÄUÀ¼À£ÀÄß w½¹. ¥ÉæÃgÀuÁ«zÀÄåZÁÑ®PÀ §®PÉÌ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ªÀÅåvÀàwÛ¹.

4. Derive the Maxwell's Field equations: (3+3)

.D=p and .B=0

.D=p ªÀÄvÀÄÛ .B=0 JA§ ªÀiÁåPïªÉ¯ï£À PÉëÃvÀæ ¸À«ÄÃPÀgÀtUÀ¼À ¤µÀàwÛAiÀÄ£ÀÄß §gÉ¬Äj.

5. Obtain an expression for decay of current in a LR circuit applied with d.c. emf, represent graphically. Define time constant of LR circuit.. (4+1+1)

LR «zÀÄå£ÀäAqÀ®PÉÌ £ÉÃgÀ «zÀÄåZÁÑ®PÀ §®ªÀ£ÀÄß C£Àé¬Ä¹zÁUÀ QëÃtÂ¸ÀÄªÀ «zÀÄåwÛUÉ UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß ¥ÀqÉ¬Äj, UÀtÂvÉÆÃQÛAiÀÄ£ÀÄß D¯ÉÃRzÀ ªÀÄÆ®PÀ ¥Àæw¤¢ü¹. LR «zÀÄå£ÀäAqÀ®zÀ 'PÁ® ¤AiÀÄvÁAPÀ; JAzÀgÉÃ£ÀÄ?

6. Obtain an expression for impedance and current for a.c. circuit containing LCR in series. Bring out the concept of Resonsance. (4+2)

¸ÀgÀtÂ LCR «zÀÄå£ÀäAqÀ®zÀ°è ¥ÀAiÀiÁðAiÀÄ «zÀÄåvïUÉ ªÀÄvÀÄÛ ¥ÀæwgÉÆÃzsÀPÉÌ UÀtÂvÉÆÃQÛUÀ¼À£ÀÄß ¥ÀqÉ¬Äj.

C£ÀÄgÀt¤ÃAiÀÄ PÀ®à£ÉAiÀÄ£ÀÄß «ªÀj¹.

7. Define Peltier and Thomson coefficients. Describe an experiment to determine Peltier coefficient. (2+4)

¥É°ÖAiÀiï ªÀÄvÀÄÛ xÁA¸À£ï ¤AiÀÄvÁAPÀUÀ¼À ¸ÀàµÀÖ ¤gÀÆ¥ÀuÉ ¤Ãr. ¥É°ÖAiÀÄgï ¤AiÀÄvÁAPÀªÀ£ÀÄß ¥ÁæAiÉÆÃVPÀªÁV PÀAqÀÄ »rAiÀÄÄªÀ «zsÁ£ÀªÀ£ÀÄß «ªÀj¹.

8. Define Solar constant, Describe an experiment to determine it using a pyrheliometer.

(2+4)

¸ËgÀ ¤AiÀÄvÁAPÀ JAzÀgÉÃ£ÀÄ? ¸ÀÆAiÉÆÃðµÀÚ ªÀiÁ¥ÀPÀzÀ ¸À°ÁAiÀÄ¢AzÀ ¸ËgÀ¤AiÀÄvÁAPÀªÀ£ÀÄß PÀAqÀÄ »rAiÀÄÄªÀ §UÉAiÀÄ£ÀÄß «ªÀj¹.

PART-B

¨sÁUÀ-©

Answer any four questions. Each carries five marks.

AiÀiÁªÀÅzÁzÀgÀÆ £Á®ÄÌ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ LzÀÄ CAPÀUÀ¼ÀÄ.

9. Find the current through 8 resistance using superposition theorem in the circuit given below.

ªÉÄÃ®ÌAqÀ «zÀÄåeÁé®zÀ°è 8 gÉÆÃzsÀzÀ ªÀÄÆ®PÀ ºÀjAiÀÄÄwÛgÀÄªÀ «zÀÄåwÛ£À ¥ÀæªÀiÁtªÀ£ÀÄß, CzsÁågÉÆÃ¥Àt ¥ÀæªÉÄÃAiÀÄªÀ£ÀÄß G¥ÀAiÉÆÃV¹ PÀAqÀÄ »r¬Äj.

10. A Helmholtz Galvonometer has coils of circumference 0.49 m each and number of truns. 50. Calculate the current through the coils which produces a deflection of 45.

Given: BH=0.32x10-4 T and 0= 4x10-7 Hm-1.

MAzÀÄ ºÉ¯ïäºÉÆÃ¯ïÖ÷ì UÁå®é£ÉÆÃ«ÄÃlgï£À°è G¥ÀAiÉÆÃV¹gÀÄªÀ ¸ÀÄgÀÄ½AiÀÄ ¸ÀÄvÀÛ¼ÀvÉ 0.49 EzÉ ºÁUÀÆ CzÀgÀ°è 50 ¸ÀÄvÀÄÛUÀ½ªÉ. ºÁVzÀÝgÉ, 45 «±ÉèÃµÀuÉ §gÀ®Ä ¨ÉÃPÁzÀ «zÀÄåwÛ£À ¥ÀæªÀiÁt JµÀÄÖ?

(BH=0.32x10-4 T and 0= 4x10-7 Hm-1)

11. A capacitor of capacitance 2 f is discharged through a high resistance. The time taken for one third the charge of the capacitor to leak is 12 S.Find the value of High resistance.

2 f zsÁgÀPÀvÉAiÀÄÄ¼Àî ¸ÀAzsÁjvÀæªÀ£ÀÄß, MAzÀÄ C¢üPÀgÉÆÃzsÀzÀ ªÀÄÄ®PÀ «¸Àfð¸À¯ÁVzÉ. ¸ÀAzsÁjvÀæzÀ ªÉÄÃ°gÀÄªÀ «zÀÄåzÀA±ÀzÀ ªÀÄÄgÀ£ÉÃ MAzÀÄ ¨sÁUÀzÀµÀÄÖ ¸ÉÆÃgÀ®Ä 12 ¸ÉPÉAqï ¨ÉÃPÁzÀgÉ gÉÆÃzsÀzÀ ¨É¯É JµÀÄÖ?

12. A condenser of capacity 1 f is allowed to discharge through Inductance of 1 m H and resistance of 20 in series. Calculate the frequency of oscillatory discharge.

1mH¥ÉæÃgÀPÀvÉAiÀÄÄ¼Àî ¥ÉæÃgÀPÀ ªÀÄvÀÄÛ 20 gÉÆÃzsÀPÀvÉAiÀÄÄ¼Àî gÉÆÃzsÀzÀ ªÀÄÄ®PÀ 1 fzsÁgÀPÀvÉAiÀÄÄ¼Àî zsÁgÀPÀªÀ£ÀÄß «¸Àfð¸À¯ÁVzÉ. «¸Àdð£Á DAzÉÆÃ®£ÀzÀ DªÀvÁðAPÀªÀ£ÀÄß PÀAqÀ»r¬Äj.

13. The thermoelectric power of a Thermocouple at 100 C is 9.5 v/C. If the neutral temperature is 350C, find the power at 0.C.

GµÀÚAiÀÄÄUÀäzÀ GµÀÚ«zÀÄåvï ¸ÁªÀÄxÀåð 100 C is 9.5 v/C. vÁ¥ÀªÀiÁ£ÀzÀ°è 9.5 v/C.EzÉ. vÀl¸ÀÜ vÁ¥ÀªÀiÁ£À 350C EzÀÝgÉ 0.C vÁ¥ÀªÀiÁ£ÀzÀ°è£À ¸ÁªÀÄxÀåðªÉµÀÄÖ?

14. If the average energy radiated per unit area of the surface of the sun is 7.452x104 kWm-2, estimate the surface temperature of the sun, assuming it to be a black body. Stefans constant is 5.67x10-8 Wm-2 k-4.

¸ÀÆAiÀÄð£À ªÉÄÃ¯ÉäöÊ¬ÄAzÀ ¥Àæ¸ÁgÀªÁUÀÄwÛgÀÄªÀ ¸ÀgÁ¸Àj ±ÀQÛ 7.452x104 kWm-2 ¸ÀÆAiÀÄð, MAzÀÄ ¥Àj¥ÀÆtð PÀÈµÀÚPÁAiÀÄ JAzÀÄ UÀæ»¹, CzÀgÀ ªÉÄÃ¯ÉäöÊ GµÁÚA±ÀªÀ£ÀÄß PÀAqÀÄ »r¬Äj. (¹ÖÃ¥sÀ£ï ¤AiÀÄvÁAPÀ 5.67x10-8 Wm-2 k-4).

PART-C

¨sÁUÀ-¹

Answer any five of the following. Each carries two marks. (5x2=10)

AiÀiÁªÀÅzÁzÀgÀÆ LzÀÄ ¥Àæ±ÉßUÀ¼À£ÀÄß GvÀÛj¹. ¥Àæw ¥Àæ±ÉßUÉ JgÀqÀÄ CAPÀUÀ¼ÀÄ.

15. a) Why the plane of Helmholtz coil must be made parallel to the magnetic meridian?

ºÉ¯ïä ºÉÆÃ¯ïÖ÷ì ¸ÀÄgÀÄ½AiÀÄ ¸ÀªÀÄ®ªÀ£ÀÄß ¨sÀÆ«ÄAiÀÄ PÁAvÀPÉëÃvÀæPÉÌ ¸ÀªÀiÁ£ÁAvÀgÀªÁVqÀ®Ä PÁgÀtªÉÃ£ÀÄ?

b) It is desirable to have a high value of power factor. Explian.

¸ÁªÀÄxÀåð ¤AiÀÄvÁAPÀ ºÉZÁÑVzÀÝµÀÄÖ M¼ÉîAiÀÄzÀÄ. «ªÀj¹.

c) In a power line current is flowing from North to South, what is the direction of magnetic field at a point above the power line?

«zÀÄåvï vÀAwAiÀÄ°è GvÀÛgÀ¢AzÀ zÀQëtPÉÌ «zÀÄåvï ºÀjAiÀÄÄwÛzÉ. vÀAwAiÀÄ ªÉÄ®ÎqÉAiÀÄ MAzÀÄ ©AzÀÄ«£À°è

PÁAvÀPÉëÃvÀæzÀ ¢PÀÄÌ AiÀiÁªÀÅzÀÄ.?

d) When an alternating current is passed through a thermocouple what will be the Peltier effect?

GµÀÚ AiÀÄÄUÀäzÀ ªÀÄÆ®PÀ ¥ÀAiÀiÁðAiÀÄ «zÀÄåvÀÛ£ÀÄß ºÁ¬Ä¹zÁUÀ ¥É°ÖAiÀÄgï ¥ÀjuÁªÀÄ K£ÁUÀÄvÀÛzÉ?

e) If the speed of a charged particle moving normally to a uniform magnetic field is doubled, how does it effect the radius of orbit? Explain.

¸ÀªÀiÁ£À PÁAvÀ PÉëÃvÀæzÀ ¢QÌUÉ ®A§ªÁVgÀÄªÀ ¸ÀªÀÄvÀ®zÀ°è «zÀÄåzÀA±ÀªÉÇAzÀÄ ZÀ°¸ÀÄwÛzÉ. PÁAvÀ PÉëÃvÀæzÀ

wÃPÀëuÉAiÀÄ£ÀÄß zÀÄ¥ÀàlÄÖ ªÀiÁrzÁUÀ PÀPÉëAiÀÄ wædåzÀ ªÉÄÃ¯É DUÀÄªÀ ¥ÀjuÁªÀÄªÉÃ£ÀÄ?

f) A Cloudy night is hotter than a clear night. Why?

¤gÀ¨sÀæ DPÁ±À EzÁÝV£À vÁ¥ÀªÀiÁ£ÀQÌAvÀ ªÉÆÃqÀ PÀ«zÀ ªÁvÁªÀgÀt«zÁÝV£À vÁ¥ÀªÀiÁ£À ºÉZÁÑVgÀ®Ä

PÁgÀtªÉÃ£ÀÄ?

g) Animals curl their body when they feel cold. Why?

¥ÁætÂUÀ¼ÀÄ ZÀ½UÁ®zÀ°è zÉÃºÀªÀ£ÀÄß ªÀÄÄzÀÄjPÉÆ¼ÀÄîvÀÛªÉ KPÉ? «ªÀj¹.

h) If a magnetic monopole exists, how does it effect Maxwell’s equation?

PÁAwÃAiÀÄ KPÀzsÀÈªÀ EgÀÄªÀÅzÉÃ, DzÀgÉ ªÀiÁåPïïªÉ¯ï ¸À«ÄÃPÀgÀtªÀÅ ºÉÃUÉ ªÀiÁ¥ÁðlÄ DUÀÄvÀÛzÉ?

IV Semester

Acoustics, Optics, and Lasers

Max. Marks: 60 Time:3hours

PART-A

Answer any five of the following
5x6=30

1. Derive an expression for the velocity of sound in a rod. Hence give an expression for the velocity of sound in an extended solid.
2. Describe with necessary theory the Foucault's method of determining the velocity of light. Explain how it is in favors of wave theory of light.
3. Obtain the law of refraction of a spherical wave front on a plane surface on the basis of wave theory of light.
4. What are Newton's rings? Give the theory of Newton's rings.
5. Give the construction and theory of a zone plate. Derive the formula for its focal length.
6. Explain the construction and working of a quarter wave plate. How is it used to produce circularly polarized light.
7. Explain Laurent's half shade polar meter to determine the angle of rotation of an optically active solution.
8. Describe the working of Helium-Neon laser with necessary diagrams.

PART-B

Answer any four of the following 4x5=20

9. In a Kundt's Tube experiment, the length of the steel rod is 1.5m and its young's modulus is 20 X 1010 Nm-2. If the length of the rod is reduced to 3/4m and again fixed at the centre, what is the change in the length of a loop of the stationary wave pattern? Assume the room temperature to be 25 C and the velocity of sound at 0 C is 330ms-1. Density of steel is 7800kgm-3
10. A thin plate of glass of refractive index. 1.52 and thickness 6.3mm is introduced in the path of one of the interfering beams. If wave length of light used is 546nm, calculate the shift in the central fringe.
11. An air wedge is formed between two plane glass plates. The distance between the apex and the spacer is 0.02m. The thickness of the space is 0.1mm. If the wedge is illuminated with light of wavelength 589.3nm calculate the fringe width.
12. The width of a grating is 3cm and it contains a total number of 18,000 lines. Calculate the angular separation between the two yellow lines of mercury of wavelength 5770A and 5790A in the first order spectrum.
13. A narrow slit illuminated by light of wave length of 589nm is placed at a distance of 2.5m form a straight edge. If the distance between the straight edge and screen is 5m, calculate the distance between first and forth dark band.
14. What is the ratio of stimulated to spontaneous emission rates for the sodium D line at 200C, Given h=6.62x10-34 J-s, c=3 x 10 8m/s, wavelength of sodium D line=5893A K=1.38 x 10-23 J/k.

PART-C

Answer any five of the following. 5x2=10

15. a) Sound loses so little in intensity when it travels through a pipe or speaking tubes explain.
    b) Sound waves cannot be polarized explain.

    c) When light travels from a rarer medium to a denser medium it losses speed. Does this imply a loss in energy of the wave? Explain.
    d) Mention two methods by which coherent sources can be obtained by division of wave front.
    e) The centre of the shadow of a small disc is bright, explain.
    f) What changes in diffraction pattern of a single slit will you observe when monochromatic light is replaced by white light?
    g) Can we produce polarized light using only a half wave plate? Explain.
    h) Mention four application of Polaroid's.

IV Semester

Acoustics, Optics, and Lasers

Max. Marks: 60 Time:3 hours

PART-A

Answer any five of the following
5x6=30

1. Describe with necessary theory Kundt's tube experiment to determine the velocity of sound in a solid
2. State Fermat's principle of extremism time and prove Snell's law of refraction from Fermat's principle.
3. What is a biprism? Give the theory of biprism.
4. What is an interferometer? Describe the construction and working of a Michelson interferometer
5. Give the theory of plane transmission grating. Explain how would you use it to find the wavelength.
6. Explain diffraction at straight edge. Give a clear account of the distribution of intensity with a diagram.
7. Explain how one can produce and detect (a) plane polarized light (b) circularly polarized light (c) Elliptically polarized light.
8. Obtain the relationship between Einstein's coefficients of spontaneous and stimulated emission.

PART-B

Answer any five of the following
4x5=20

9. A brass rod of length 3 m is clamped at the centre. It emits a note of frequency 600Hz when it vibrates longitudinally. If the density of brass is 8300kgm-3, calculate the young's modulus of brass.
10. A train is approaching a tunnel surmounted by a cliff and the driver sends a short whistle when 1.6km away. The echo reaches him 9seconds later. Find the speed of the train. Velocity of sound =340m/s.
11. Newton's rings are formed with light of wavelength 600nm and using a lens whose surface has a radius of 2m in contact with a plane glass surface. Find the radius of the 10th dark ring.
12. The centre circle of a zone plate has a radius of 0.07cm, light of wavelength 5000A coming from (i)an object at infinite (ii) an object at 1.47m away from the zone plate falls on the plate. Find the position of the principal image in each case.
13. Calculate the minimum number of lines on a grating required to resolve the spectral lines of wavelength 5770A and 5791A in the second order spectrum.
14. Calculated the thickness of quartz plate for sodium light of wave length 5893A given _=1.5533.

PART-C

Answer any five of the following
5x2=10

(a) When does sound wave undergo a phase change of _ on reflection while traveling from one medium of certain acoustic impedance to another?
(b) When do we have only transmission of sound waves without reflection?
(c) A wave undergoes reflection at a denser medium. Does its phase change? Explain.
(d) Bubbles of colorless soap solution appear colored in sunlight. Why?
(e) If the number of rulings in a grating is increased what is its effect on the resolving power of the grating.
(f) Can a naked eye detect polarized light? If not how is polarized light deterred.
(g) Why can't we use gas lasers for recording images of moving objects in holography? Explain,

V Sem Physics Paper-VI

MODEL PAPER-II

Time: 3 hours Max Marks:60

Part-A

Answer any five of the following
6x5=30

1) Explain how classical physics fails and quantum theory helps in explaining (i) Black body radiation (ii) Specific heat of solids. 3+3
2) With relevant theory, explain G.P. Thomson's experiment of electron diffraction 6
3) Obtain Schrödinger's time-independent equation for a free particle. 6
4) (a) Explain Max Born's interpretation of wave function (b) Write an expression for eigen functions and eigen values for one dimensional harmonic oscillator and represent graphically the first two states. 2+4
5) Describe Frank-Hertz experiment for determination of critical potentials What are its limitation? 5+1
6) (a) Mention the different quantum numbers associated with atom model.
(b) State and explain Pauli's exclusion principle.

(c)Obtain an expression for the maximum number of electrons in a shell 2+2+2

7) (a) Write a note on Paschen-Back effect and Stark effect.
(b) Distinguish between Rayleigh and Raman scattering. 3+3

8) Give the Quantum theory of Raman effect. 6

Part-B

Answer any five of the following
4x5=20

9) Calculate the wavelength of thermal neutron at temperature 300K and 400K.
10) A pi meson has an average life of 26ns. If we have to measure the rest energy of the meason in this interval, what is the uncertainty in the energy measured?
11) An electron is confined to move between two rigid walls separated by 10 A. Find the Debroglie wavelength representing the first two allowed energy state of the electron and the corresponding energies.
12) The Rydberg constant for hydrogen is 1.09678 x 10 7m-1. The ration of proton mass to electron mass for ionized helium is 1869. Calculate the Rydberg constant for ionized helium.
13) Calculate the Zeeman shift produced in the normal Zeenman effect when spectral line of wavelength 590nm is subjected to a magnetic field of 0.8T. Given e/m=1.76 x 10 11 Ckg-1
14) If the wave number difference between successive rotation lines of HF molecule is 4050m-1, Calculate the inter atomic distance.

a) Part-C

Answer any five of the following 2x5=10

15) a) Do the Debroglie wavelength produce dispersion in vacuum?
   b) Can one eigen value have many eigne function? Explain.
   c) Why Normal Zeeman Effect occurs only in atoms with an even number of electrons.
   d) The colour of the setting sun is red. Give reason.
   e) What is the significance of negative sign the expression for energy of an electron?
   f) In rotational spectra energy levels are not equally spaced but frequencies are equally spaced. Explain.

Semester-I

ELECTRONIC FUNDAMENTALS

UNIT-1

Passive Components: 10hrs.

Resistors: Specification, tolerance, rating, colour code, power dissipation, type of resistors-Fixed and variable. Capacitors: Specifications, color code, energy stored in a capacitor, types of capacitors-fixed and variable, electrolytic.

Inductors: Specifications, energy stored in an inductor, types-air core and iron core, chokes.

Transformer: Working, classification, power losses in transformers and Fuses, switches and relays.

Measuring instruments:- D'Arsoval movement-BMC instruments-multi range ammeter-multiage voltmeter-loading effect, analog and digital multimeters (black diagrams only). CRO-block diagram of CRT-time base-synchronization-block diagram of CRO-measurement of voltage, frequency, phase measurement and Lissajous patterns.

UNIT-2 10hrs

Transient analysis of RC and RL circuits, time constant-representation, energy stored in inductors and capacitors Current and Voltage Sources: Ideal and real voltage and current sources D.C resistive circuits: Voltage divider and Current divider theorems, open and short circuits, Kirchhoff's laws-mesh analysis and node voltage method.

UNIT-3 12hrs

AC Circuits:

Representation of a.c, sine wave-cycle, time period, frequency, average value, peak value (amplitude), peak to peak, r.m.s valued, phase and phase difference, power factor, form,

factor, phasor diagram, complex number, j operator, reactance and impedance. RL series and RC series circuits, RLC circuits: series and parallel-impedance curve, selectivity, band width, Q factor-comparison between series RLC and parallel RLC circuits. Series and parallel Resonance circuits-condition for resonance, resonant frequency, half power frequencies, BW, quality factor (laded and unloaded Q), comparison and applications.

UNIT-4 10hrs

Network theorems (DC analysis)

T and networks, inter-conversions, superposition theorem, thevenin's theorem, nortion's theorem, maximum a.c analysis only for maximum transfer theorem and thevenin's theorem.

UNIT-5 8hrs

Basic Semiconductor theory: Intrinsic Semiconductor, extrinsic semiconductor-N type and P type, un biased pn junction, forward and reverse bias, energy level diagram of pn junction. Diode symbol, the diode curve, forward bias and reverse bias characteristics, the ideal diode, practical diode, Ebber's Moll model, diode equation, bulk resistance, static and dynamic resistance, PIV, junction capacitance. Breakdown in diode-zener and avalanche mechanisms, zener diode characteristics.

Text books:

1. Introductory circuit analysis, Robert Boylstead-PHI 5th edition.
2. Basic Electronics and Linear circuits, N.N. Bharagava, D.C. Kulshresta and D.C Gupts-TMII.

Reference:

1. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky-PHI
2. Fundamentals of electrical and electronic engineering, B.L. Theraja-S.Chand and Co.
3. Basic Electronics, B. Grob- 8th Edition
4. Electrical circuits and applications, B. Grob
5. Electronic devices and circuits, Allen Mottershed.
6. Measuring Instruments, W.D. Cooper and A.D. Helfrick

7. Electronics text lab manual, Paul B. Zbar.
8. Fundamentals of Electronics, B. Basavaraj-revised Edition 2002.
9. Electric circuits-Joseph Administer, Shamus series.
10. Electric circuits Book 1-Schums series-Syed. A. Nasar, McGraw-Hill edition

PRACTICALS Semester-I

01. Verification of KCL and KVL for D.C network.
02. Verification of Thevenin's theorem.
03. Verification of Super position theorem.
04. Verification of Maximum power transfer theorem.
05. Verification of Reciprocity theorem
06. T to T and T to T conversions.
07. Series resonance circuit-determination of Resonant frequency, Bandwidth and Q-factor.
08. Parallel resonance circuit-determination of Resonant frequency, Bandwidth and Q-factor.
09. Conversion of micro ammeter into Ammeter and voltmeter.
10. Measurements with C.R.O (voltage, frequency and phase measurements-Lissajous pattern)
11. Study of V-I Characteristics of Semiconductor diode.
12. Study of V-I Characteristics of Zener diode.

ALL THE 12 EXPERIMENTS ARE COMPULSORY

SUGGESTED EXPERIMENTS NOT FOR VALUATION

13. Charging and discharging characterization of RC circuits (voltage and current).
14. A.C response of RL circuit-impedance and phase measurements.

Semester-II

Electronic Circuits

UNIT-I 8hrs.

Rectifiers, Filters and Regulators:

Half wave, full wave and bridge rectifiers-rectification efficiency 'n' and ripple factor r in each case.

Filters: series inductor filter and shunt capacitor filter, LC filter, __ section filter performance, comparison.

UNIT-2 10hrs.

Special purpose diodes:

Tunnel diodes –characteristics-equivalent diagram-Parameter –schottky diode, varacter diode-characteristics, opt electronic device, LED, energy level diagram, principle, working seven Segment display, LED, photo diode, Solar cell.

Applications of diode: Voltage Multiplier, biased positive and negative shunt type-clipping circuits, clamping circuits, peak detector.

UNIT-3 10hrs.

Bipolar Junction Transistor:- Transistor symbol, NPN-PNP-working-CB, CE AND CC mode, current Gain, μ, B, & r relation –input and output characteristics of CB and CE, Configuration-leakage current-spreading resistance,

Data sheet-1c (max), PD (max), switching, power, small signal and large signal transistors.Transistor biasing: Need for biasing-load line-operating point, thermal runaway-fixed bias with and without emitter resister-voltage divider bias-design-bias stability-stability factor determination in each case-importance of voltage divider bias.

UNIT 4 10hrs.

Small signal voltage amplifier:

Classification of amplifiers-concept of amplification-CE Amplifier-RC model-frequency response-parameter-hybrid equivalent model of a transistor in CE mode-ac equivalent circuit of small signal amplifier using hybrid model –expression for current gain-voltage gain-input and output impedance using exact model-Problems based on only exact model, Swamped amplifier.

UNIT-5 12hrs.

Multistage amplifier:

Cascaded stages-analysis of a two stage RC coupled amplifier-distortions in amplifiers-direct coupled amplifier.

Other configurations:

Emitter follower-impedance matching-Darlington Pair.

Power amplifier:

Classification of large signal amplifier, ac load line, class A single ended power amplifier-power dissipation, output power calculation-efficiency-Class B Push pull (transformer coupled) amplifier-harmonic distortion-output power calculation-efficiency, complementary-symmetry class B push pull amplifier-crossover distortion, heat sinks.

Tuned amplifier:

Class C power amplifier-single tuned, double tuned amplifier-resonant load-frequency response-power relations, efficiency-application in communication.

Text books:- **10hrs**

1. Electronic Devices and circuit theory: Robert Boylstead and Louis Nashelsky-PHY
2. Electronic devices: David A Bell-Reston Publishing company/DB Tarapurwala Publ. Co.

Reference Books:

1. Applied Electronics: R.S. Sedha-S.Chand Publishers.
2. Electronic devices and circuits by Allen Mottershed.
3. Fundamentals of Electronics: B. Basavaraj-revised Edition 2002.
4. Basic Electronics and Linear circuits: N.N. Bharagava, D.C. Kulshresta and D.C. Gupta-TMH.

5. Electronics-Analog and Digital: I.J. Nagarath
6. Electronic Principles: A.P. Malviono-TMH 6th Edition.
7. Electronic devices, applications and Integrated circuits: Mathur, Kulshreshta and Chadha-Umesh Publications.
8. Electronics text lab manual: Paul B. Zbar.

Semester II-Practical

1. Half wave rectifier with and without shunt capacitance filter
2. Full wave/Bridge rectifier with and without shunt capacitance filter
3. Voltage Multiplier.
4. Study of Clipper and Clamper circuits using diodes.
5. Zener regulator-Line and Load regulation.
6. Fixed bias with emitter resistor-design and load line.
7. Voltage divider bias-design and load line.
8. Transistor characteristics in CE mode-determination of hybrid parameters.
9. CE amplifier-Frequency response.
10. CC amplifier-gain at mid frequency, determination of input and output impedance.
11. Complementary symmetry Class B push-pull power amplifier.
12. Single tuned amplifier.

ALL THE 12 EXPERIMENTS ARE COMPULSORY

SUGGESTED EXPERIMENTS NOT FOR VALUATION

13. Two stages RC coupled amplifier-Frequency response
14. Darlington pair-Determination of Bdc, Input and output impedances at mid frequency.

Semester-III

Linear IC'S and Application

UNIT-I 10hrs.

Field Effect Transistors:

Construction and working of JFET, drain characteristics, Tran conductance characteristics, FET parameters, FET approximations-Shockely's equation, CS amplifier, comparison of FET with BJT, MOSFET circuits-working of Depletion and Enhancement types, MOSFET as a variable voltage resistor.

Switching circuits:

UJT construction, working-application as oscillator-classification of ICs-monolithic ICs-linear and digital ICs. IC terminology,

SCR-characteristics-half wave and full wave rectifier-diac-triac.

Introduction to Ics: Advantages-limitations-scale of intergration-classification of ICs-monolithic ICs- linear and digital ICs. IC terminology, fabrication of monolithic IC-resistor, diode, capacitor and transistor.

UNIT-2 8hrs.

Differential amplifier:

Dual input balanced and unbalanced output-de and ac analysis-input impedance-output impedance-common mode gain-differential gain-CMRR-Current mirror.

Operational Amplifier: Block diagram-Equivalent circuit-characteristics of ideal and practical Op Amp-pin configuration of IC 741-paramentrs-Input bias current, input offset voltage, output offset voltage, CMRR, Transient response, Slew rate, SVRR thermal drift, frequency compensation. Open loop gain in inverting and non-inverting mode and differential gain-limitations.

UNIT-3 10hrs.

Op Amp with negative feedback:

Feedback-types of feedback-closed loop voltage gain using block diagram-advantages of negative feedback-types of negative feedback-voltage series feedback-non inverting amplifier-gain, input and output impedances, band width-total output offset voltage with feedback-voltage follower. Voltage shunt feedback-inverting amplifier-virtual ground-input and output impedances-bandwidth-total output offset voltage with feedback-current to voltage converter.

UNIT-4 12hrs.

Operational amplifier applications:

Adder, sign changer, Scale changer and difference amplifier-Instrumentation amplifier-V to I and I to V converter-Integrator-Differentiator-Logarithmic and antilogarithmic amplifiers, Small signal half wave rectifiers, positive and negative clampers.

Comparators:

Basic comparator, comparator characteristics-comparator ICs-Schmitt triggers.

Active filters: Importance of active filters-first order butter worth low pass, high pass, band pass and band culmination filters-problems based on designing, all pass filter.

UNIT-5 10hrs.

Oscillators:

Basic principle of Oscillator-tank circuit-barkhausen criteria-LC oscillators- Hartley and Colpitt's –RC oscillators- phase shift oscillator-Wein bridge oscillator-derivation of expression for frequency of oscillations in each case (using only feedback network), crystal oscillator, Sweep generator, voltage Controlled Oscillator.

Multivibrators-

Types of multivibrators-Block diagrams of as table, monostable and bitable multivibrators-Monostable and Astable Multivibrators using IC 555.

IC regulators:

Classification as linear and switching regulator, fixed and variable voltage regulators, 78XX series, 79XX series and IC LM 317, series and shunt regulator.

Operational amplifiers and Linear Integrated circuits:

Ramakanth Gayekwad-PHY 5th edition.

Electronic Devices and circuit theory: Robert Boylstead and Louls Nashlsky-PHY 6th edition.

Reference Books:

1. Operational amplifiers and Linear Integrated circuits: Robert F. Coughlin and Frederick F. Driscoll-PIII
2. Electronic Principles: A.P. MALVINO-TMH 5th edition.
3. Integrated circuits: K.R. Botkar-Khanna Publishers.
4. Electronic devices, applications and Integrated circuits: Mathur, Kulshreshta and Chandha-umesh Pulbicatoins
5. Linear Integrated circuits-D.Roy choudhury, Shail Jain. TMH.

6. Operational Amplifier and linear Integrated circuits, Theory and application-Denton. J. Dailey-McGrawhill.
7. Operational Amplifierdesign and application-Jerald. G.Gracme and Gene, E. Jobey, McGrawhill
8. 2000 solved problems in Electronics-Jimmie J. Cathey-(Schaum series) McGrawHill.

Practical- sem-III

1. FET characteristics.
2. Common source FET amplifier-frequency response.
3. Non-inverting and inverting operational amplifier-ac response.
4. Inverting summer, Non-inverting summer and Subtractor.
5. Integrator and Differentiator circuits using OP-AMP.
6. Small signal half wave rectifiers using OP-AMP.
7. Hartley oscillator/Colpitt's oscillator.
8. Phase shift osciallator/Wein bridge oscillator.
9. UJT characteristics and UJT relaxation oscillator.
10. Variable voltage and current regulators using IC LM317.
11. First order Active Low-Pass and High Pass filters using OP-AMP- Frequency response.
12. First order Active Band-Pass (narrow band) and Band Elimination (notch) filters using OP-AMP-Frequency response.

ALL THE 12 EXPERIMENTS ARE COMPULSORY

SUGGESTED EXPERIMENTS NOT FOR VALUATION

13. Comparator, Schmitt Trigger using OP-AMP.
14. Astable multivibrator using Transistor.

IV Semester

DIGITAL ELECTRONICS

UNIT-1 6hrs.

NUMBER SYSTEMS:

Decimal, Binary, Octal and Hexadecimal-their inter conversion. BCD numbers (8421), Gray, Excess 3, ASCII and EBCDIC codes and Error detecting codes, error correcting codes. Arithmetic operations in Binary, Hexadecimal, BCD addition and Excess 3 addition.

Sign magnitude convention, 1's and 2's Complements-2's Complement Subtraction, signed number arithmetic-addition.

UNIT-2 10hrs.

LOGIC GATES and BOOLEAN ALGEBRA:

Positive and Negative Logic, Basic logic gates-AND, OR and NOT gates(Logic symbols and Truth tables), Boolean algebra-Laws & Theorems, NAND and NOR gates(Logic symbols and Truth tables), De Morgan's theorems, X-OR and X-NOR gates(Ligic symbols and Truth tables and applications), NAND and NOR us Universal gates.

Simplification of Logic Expressions using Boolean algebra, SOP and POS expressions. Karnaugh maps-K-Map techniques to solve 3 variable and 4 variable expressions.

UNIT-3 8hrs.

PULSE CHARACTERISTICS AND LOGIC FAMILIES:

Pulse Characteristics-Time delay, Rise time, Turn ON time, Storage time, Fall time, Turn OFF time, Pulse width, Duty cycle and Mark to Space ratio.

Classification of digital ICs, Characteristics of digital ICs-Speed of operation, power dissipation, Noise immunity, Operating temperature range, Power supply requirements and Flexibilities available. DTL and TTL families- Characteristics, Standard TTL NAND circuit (with totem pole output), and Schottky TTL NAND circuit.

MOS Logic-PMOS, NMOS. Characteristics-Fan out, Propagation delay time, Power dissipation and unconnected inputs. CMOS logic-CMOS inverter circuit.

UNIT-4 12hrs.

COMBINATIONAL LOGIC CIRCUITS:

Arithmetic logic circuits-Half adder, Full adder, 4-bit parallel binary adder, Half and Full Subtatactors.

Two bit comparator, Four bit comparator, IC 7485, Decimal to BCD priority encoder-IC 74147, BCD to decimal decoder-IC 7445. BCD to seven segment decoder-IC 7446 and IC 7447-Logic diagrams of each IC.

Multiplexers-4:1, 8:1 and 16:1 Multiplexers-IC 74150, application.

Demultiplexer-1:4, 1:8 and 1:16 Demultiplexers- IC 74154, decoder.

D to A conversion-Characteristics-resolution, linearity, accuracy, settling time and temperature sensitivity, 4 bit Binary weighted DAC and R-2R ladder circuit, IC DAC 08.

A to D conversion-Characteristics, Successive approximation method, IC ADC 0804

UNIT-5 14hrs.

SEQUENTIAL LOGIC CIRCUITS:

Flip-flops-Basic RS latch (NAND and NOR latches), Clocked RS Flip Flop (NAND), Edge triggering and level triggering, D Flip Flop and Edge triggered JK Flip Flop, T Flip Edge Triggered M/S JK Flip Flop, Clear & Preset inputs, IC 7473 and IC 7476 (logic diagrams). Registers and Counters-4 bit serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out, Applications.

Asynchronous counters-Logic diagram, Truth table and timing diagrams of 3 bit ripple counter, 4 bit Up-Down counter and modified counters-mod n asynchronous counters, 4 bit synchronous counter, Decade counter-Up counter, IC 7490. Synchronous up-down counter design using K-maps, Ring counter, Applications.

MEMORY DEVICES:

Introduction-Primary and Secondary memories, RAM-Static and Dynamic, ROM, EPROM and EEROM and EEROM-memory capacity, advantages, disadvantages and applications. Secondary memories-Floppy disk, Hard disk and CD ROM.

Text books:

1. Digital Fundamentals: Floyd-CBS Publishers
2. Digital systems-Principle and applications-Ronald J. Toeci-PHI 6th edition
3. Modern digital electronics: R.P. Jain-TMH publications 2nd edition.

Reference Books:

1. Digital Principles and applications: Malvino and Leach-TMH 3rd editon
2. Digital Logic and Computer design: M. Morris Mano-PIII New edition
3. Digital Design: M. Morris Mano-PHI 2nd edition December 2000.
4. Digital computer Electronics: Malvino-TMH
5. Digital computer Fundamentals: Thomas C. Bartee-TMII
6. Experiments in digital principles: Malvino and Leach-TMII

Semester IV-Practical

1. Diode transistor gates-AND, OR, NOT, NAND and NOR gates.

2. IC 7400-Realisation of AND, OR, NOT, NOR AND X-OR gates.

3. IC 7402-Realisation of AND, OR, NOT, NAND and X-NOR gates.

4. Construction of Half Adder and Half Subtract or

5. Construction of Full Adder using IC 7486, 7402 and IC 7432.

6. Binary to Gray code and vice versa using IC 7486.

7. BCD to seven segment conversion using IC 7447.

8. Study of Multiplexer using IC 74150.

9. Study of De-Multiplexer using IC 74154.

10. Clocked RS D and T Flip-flops.

11. Study of 4 bit binary ripple counter using IC 7476 (or equivalent) and conversion to decade counter

12. Digital to Analog converter.

ALL THE 12 EXPERIMENTS ARE COMPULSORY.

SUGGESTED ESPERIMENTS NOT FOR VALUATION

13. Analog to digital converter using IC 0804.
14. Frequency division (divide by5, divide by 10 and divide by 100) using IC 74 LS 390.

Semester V

Paper V

COMMUNICATION-I

UNIT-1 7 hrs.

Electromagnetic spectrum, propagation of EM waves & Noise

EM spectrum, Terrestrial propagation of EM waves, Surface wave, space wave and sky wave propagation. Propagation terms and definitions.

Noise-Types of noise (Internal and External Noise)-Definitions of Signal to Noise ratio and Noise figure.

UNIT-2 7 hrs.

Analog Modulation Techniques

Introduction-Block diagram of general communication system, Modulation-Need for Modulation, types of modulation-AM, FM &PM.

Amplitude Modulation-representation. Modulation index, Expression for instantaneous voltage, Frequency spectrum, Power relations, Generation of AM-Collector Modulator, Block diagram of AM Transmitter, Advantages of SSB-SC.

Frequency Modulation-representation. Expression for instantaneous voltage, Modulation index, Frequency spectrum (qualitative), Bandwidth requirements. FM generation-FET reactance Modulator and Varactor diode Modulator. Block diagram of FM Transmitter-Pre emphasis and de emphasis, Comparison of AM and FM.

UNIT-3 7 hrs.

Radio Receivers

Characteristics of Radio Receiver, AM Super Heterodyne receiver, Diode and Transistor Detectors, Principle of AGC, Choice of IF, Image frequency and rejection.

FM Super heterodyne Receiver, Pre-emphasis and De-emphasis with circuits.

FM Detectors-Balanced Slope Detector.

UNIT-4 7 hrs.

Transmission lines, Antennas and RADAR

Transmission lines-types, Equivalent circuit of T line, Primary and Secondary constants, Reflection coefficient, expression for K for a loaded line, SWR, Antenna-Radiation

Mechanism, Resonant and Non Resonant Antenna, Antenna parameters-Gain, Bandwidth, Beam width, Radiation Resistance, Expression for Radiation resistance and power radiated by Antenna, Yagi Antenna-design and applications.

RADAR-Principles, Block diagram of Pulsed RADAR system, RADAR range equation, applications.

UNIT-5 7 hrs.

Television

Introduction, Scanning, Interlaced scanning, T.V. camera tube (vidicon), Composite video signal-Blanking and Synchronizing pulses, Vestigial Sideband transmission, Block diagrams of monochrome T.V. transmitter and receiver.

T.V. systems and standards-comparison between American and European systems.

Basic principles of colour T.V. Primary and secondary colors, Colour combinations. Chromo and luminescence processing as per PAL system. Simplified Block diagram of PAL co lour TV receiver.

Text books:

1. Electronic Communications, Dennis Roddy & John Coolen-IVth edition-PIII
2. Electronic Communication systems, Kennedy & Davis IVth edition-TATA McGRAW hill.
3. Television Engineering-A.M. Dhake-TATA Mc GRAw hill.
4. Electronic Communication systems, Fundamentals through Advanced Wayne Tomasi-Vth edition-Pearson Education.

Reference Books:

1. Electronics text lab manual-Paul B. Zbar.
2. Advanced Electronic Communication systems, Wayne Tomasi-VIth edition Low priced Edition-Pearson Education
3. Colour TV principles & Practice-R.R. Gulati-Wiley Eastern Publishers.
4. Monochrome and Colour TV-R.R. Gulati-Wiley Eastern Publishers
5. Hand book of Experiments in Electronic and Communication –Poornachandra rao and Sasikala-VIKAS Publishing house.

Semester –V Practical V (any EIGHT experiments)

1. Amplitude Modulator
2. Amplitude Demodulator
3. Frequency Modulator
4. Pre-Emphasis
5. De-Emphasis
6. Automatic Gain Control (Audio AGC or RF AGC0
7. Astable and Monostabel Multivibrators using IC 555
8. Saw-tooth wave generator using IC 555.

9. Voltage controlled Oscillator using IC 555.
10. Schmitt Trigger using IC 555.

Semester V. Paper-VI

MICROPROSSESOR AND INTERFACING

UNIT-1 7 hrs.

Computer fundamentals and Introduction to Microprocessor

Introduction, Classification, Block diagram-Central processing unit, ALU, Control unit, Input devices, Memory, Output devices.

Terminology-Hardware, Software, Firmware, Complier, Interpreter, Assembler.

Languages-Machine language. Assembly language, High level Language, Program. Microprocessor-Introduction, Applications, Basic block diagram, speed, word size, memory capacity, Classification.

UNIT-2 7 hrs.

Microprocessor 8085

Features of 8085, Architecture of 8085-Block diagram, Internal registers. Register pairs, Flags. Stack pointer, Program counter. Types of Buses.

Supporting circuits-Clock circuit, Reset circuit, Generation of control signals. Bus drivers. Pin diagram of 8085.

Instruction-Operation code, Operand, Mnemonics, Instruction set.

Instruction classification, Addressing modes. Instruction formats.

UNIT-3 7 hrs.

8085 Instruction set

Data transfer and Memory operations, Arithmetic operations, increment & Decrement operations, Logical operations, Brach operations, Stack operations, I/O and Machine control operations, Interrupts.

Delay loops, use of counters, Timing diagrams-Instruction cycle, Machine cycle, T-states. Time delay.

UNIT-4 7 hrs.

Programming of 8085

Programs for Data transfer and Memory operations (direct & indirect addressing), Addition and Subtraction of two 8-bit & 16-bit numbers, Multiplication, Display of smallest/largest number in a given array of numbers, Sorting of numbers in descending/ascending order. Number of 1's and 0's in a given byte, Testing for zero condition. 1's and 2's complement, verification of truth tables of logic gates

UNIT-5 7 hrs.

Interfacing with 8085

Basic interfacing concepts. Compatible IC of uP 8085, Data transfer, Synchronous 1/0 data 989 transfer using interrupts.

Memory interfacing-Address decoding, Interfacing RAM and ROM. Interfacings I/O devices-Input port, Output port, IN & OUT instructions, Interfacing input devices (interfacing matrix key board-block diagram) Interfacing output devices (LED display interfacing-block diagram).

Programmable Peripheral Interface IC 8255-Features, Pin diagram, Functional block diagram. Ports & their modes.

Text Books:

1. Microprocessor Architecture, Programming and Applications with 8085 Ramesh S. Gaonkar-Wiley Eastern Limited-IV Edition.

Reference Books:

2. Microprocessor Architecture, Programming and Applications with 8085 Ramesh S. Gaonkar-Wiley Eastern Limited-IV Edition.
3. Fundamentals of Microprocessor & Microcomputer: B. Ram-Danpat Rai Publications
4. Introduction to Microprocessor Aditya P. Mathur-THM-3rd Edition
5. Modern Digital Electronics, R.P. Jain-Tata Mc-GRAW hill-2nd Edition.
6. Microprocessor and its Applications-R. Theagarajan, S. Dhanasekaran and S. _____ - New Age International Publishers.

Semester V- Practical VI

Microprocessor programs (any ELGHT programs)

1. Program to add & subtract two 8-bit numbers. (with carry).
2. Program to add two 16-bit numbers (with carry).
3. Program to subtract two 16-bit numbers.
4. Program to multiply two 8-bit numbers.

5. Program to find the ration (division) of two 8-bit numbers.
6. Program to find the number of 1's & 0's in a given byte.
7. Program to find the square of an 8-bit number.
8. Program to display the smallest number in a given array of numbers.
9. Program to display decimal up counting (00-99)
10. Program to find the solution of the Equation y=mx+c.
11. Program to verify the truth table of logic gates.
12. Program to sort the given array of numbers (descending order.)

Semester-VI

PAPER-VII. Communication-II

UNIT-1 07 hrs.

Pulse and Digital communications Systems

Introduction-Sampling Theorem Types-PAM, PWM, PPM, PCM-Quantization.

Digital communication systems-Introduction, digital modulations (FSK, PSK and ASK). Advantages and disadvantages of digital transmission, Applications.

Characteristics o data transmission circuits-Shannon limit for information capacity, Bandwidth requirements, Data transmission speeds, Noise, Cross talk, Echo Suppressors, Distortion and Equalizer, Modems-classifications, modes of modem operation.

UNIT-2 7 hrs.

Microwave Sources

Introduction to microwaves, Characteristic features of microwaves, Applications of microwaves. Construction and working of Klystron amplifier, Reflex Klystron, Magentron, Travelling Wave Tube (TWT) and Gunn diode.

UNIT-3 07 hrs.

Satellite Communications

Introduction, Satellite orbits, Satellite System-Block diagram of satellite sub systems (space segment), ground station (simplified block diagram of earth station), up link, down link, Cross link, Transponder (C-band), Antenna systems.

UNIT-4 07 hrs.

Optical Fiber Communication

Introduction-need for Optical Fiber Communication, Block diagram of OFC system, Core and clad concept, Light propagation through optical fiber, Expressions for acceptance angle and Numerical aperture.

Light sources-Requirements and examples. Construction and working of unguided LASER diode.

Photo detector-Requirements and examples. Construction and working of Avalanche photo diode. Advantages and disadvantages of Fiber Optic Communication, Losses in optical fiber cables.

UNIT-5 07 hrs.

Advanced Communication systems

Facsimile-Block diagrams of transmitter and receiver, Electronic CCD scanning, Concept of Cellular mobile communication –cell and cell splitting, frequency reuse, Roaming and Hand off., Block diagram of cellular mobile communication system, Simplified block diagram of cellular phone Hand set, Advantages and disadvantages.

Text books:

1. Electronic Communications, Dennis Roddy & John Coolen-IVth edition-PHI
2. Electronic Communication systems Kennedy & Davis IVth edition-TATA Mc GRAW hill.
3. Advanced Electronic Communication systems, Wayne Tomasi-VIth edition Low priced Edition-Pearson Education.

Reference Books:

1. Electronic Communication systems, Fundamentals through Advanced Wayne Tomasi-Vth ediotion-Pearson Education
2. Basic Electronics, A text lab manula, Paul B. Zbar, Albert P. Malvino & Michael A. Miller- TATA Mc GRAW hill
3. Hand book of Experiments in Electronics and Communication –Poornachandra Rao and Sasikala-VIKAS Publishing house.
4. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky-PIII
5. Principles of Communication Engineering-Umesh Sinha-satya prakashan, New Delhi
6. Advanced Communication systems (communication systems-II)-Dr. Ajay Sharma. – Satya prakashan, New Delhi
7. Satellite Communication-Agarwal-Khanna publishers, New Delhi

(Semester VI-Practical VII (any EIGHT experiments)

1. PWM and PPM using IC-555.
2. PAM using transistor.
3. FSK modulation using IC-555 or 565
4. ASK modulation and demodulation using OP-AMP or transistor.
5. Construction of regulated power supply using 78xx and 79xx series ICs.
6. Study of simple SMPS.
7. Frequency multiplier using transistor.
8. Audio cross over network.

9. Mixer using discrete components or IC 565.
10. Characteristics of photo detector using LDR, photodiode or Photo transistor
11. Characteristics of Optical fiber
12. Transmission and reception through optical fiber.

Semester-VI

PAPER VIII. SIGNALS AND SYSTEMS

UNIT-1

Introduction 10hrs

Signal and System, Overview some specific systems-communication system. ECG recording, speech signal analysis. Classification of signals, basic operations on signals, elementary signals and systems viewed as interconnections of operations, properties of systems.

UNIT-2

Time domain representation for linear time invariant systems 10hrs

Introduction, convolution, Impulse response representation for LTI systems. Properties of the impulse response representation for LTI systems. Differential and difference equation representation for LTI systems. Block diagram representations.

UNIT-3

Fourier representations of signals: 10hrs

Continuous time periodic signals, The Fourier series The Fourier transform. Introduction to discrete time signals, The discrete time Fourier series, The discrete time non periodic signal, the discrete time Fourier transform. Properties of Fourier transform.

UNIT-4

Applications of Fourier representations:
10hrs

Introduction, Frequency response of LTI systems, Fourier transform representations of periodic signals, convolution and modulation with mixed signal classes, Fourier transform representation for discrete time signals, Sampling, reconstruction of continuous time signals, Discrete time processing of continuous time signal.

UNIT-5

Z transform 10hrs

Introduction, the Z-transform, ROC, properties of Z transform, inversion of Z transform, the unilateral Z transform.

Model Question Papers

ELECTRONICS-II

Electronic Circuits

Time: 3 Hours Max.Marks:60

Instruction: Answer any five questions in Part A, any four questions in part B and any five sub-divisions in part C.

PART-A

Answer any five questions: (5x6=30)

1. Draw the circuit diagram of a half-wave rectifier and explain its operation, Derive an expression for its rectification efficiency. 6
2. What are clipping and clamping circuits? Explain the action of a positive clamper circuit for a sinusoidal input. 6
3. a) In which biasing conditions:
   i) Photo-diode and
   ii) LED are normally operated?

   b) Why is Tunnel diode called so? Draw its equivalent circuit and explain its V-I characteristics. (2+4)

4. a) Explain the different sizes, levels of doping and the nature of majority carriers in the three regions of an NPN transistor.
   b) Define current gains of a transistor in CB and CE configurations. Mention the Relation connecting them. (3+3)

5. What is transistor biasing ? Draw the circuit diagram of a Potential divider bias and obtain the expression for its operating point. 6
6. a) Give classification of amplifiers based on:
   i) Transistor configuration.

   ii) Selection of Q-point.

   iii) Frequency response.

   iv) Coupling methods.

   b) Draw the frequency response curve and indicate different regions for a CE amplifier. (4+2)

7. a) Draw the ac equivalent circuit of a two stage RC coupled amplifier. Obtain expression for its overall voltage gain.
   b) What is harmonic distortion? Write the expression for total harmonic distortion in a class B power amplifier.

8. With a circuit diagram and frequency response curve. Explain the operation of a double tuned voltage amplifier. What is its advantage over single tuned amplifier. 6

Answer any four questions: (4x5=20)

9. Find the input voltage variation range for the given circuit to act as a voltage regulator. 5

10. Draw the output waveforms for the circuit, when input is:
    a) a sine wave of Vpp=10V, V1=2V, V2=3V.

    b) a triangular wave of Vpp=8V, V1=3V, V2=0V. (3+2)

11. For the given circuit draw the d.c. load line and mark Q-point on it. 5
12. Calculate the voltage gain of the amplifier with and without emitter by pass capacitor for the circuit shown. 5
13. A transistor has hie=11000 hre=2.5x104, hfe=50 and hoe=25us. Find voltage gain, current and input impedance when the transistor is used as a small signal amplifier with Rs=800 and RL=2 k. 5
14. In a class A power amplifier, Vcc=20 V, zero signal collector current is 400 mA. If the load impedance is 16 and signal variation is from 50 mA to 850 mA. Find efficiency of the amplifier. 5

PART-C

Answer any five sub-division: (5x2=10)

15. a) For the given circuit, draw the output waveforms when

    i) the capacitor is open. Ii) the diode D2 is open. 2

    b) An open circuited power supply has 20 V output voltage, when connected to a load of

    150 , output drops to 16 V. Calculate the value of voltage regulation. 2

    c) Mention the characteristic features of a CC amplifier which make it a useful circuit. 2

    d) Arrange the following in the ascending order of their input impedance: 2

    1) Darlington amplifier 3) CC amplifier

    2) CE amplifier 4) CB amplifier

    e) Why is the transistor called Bipolar? 2

    f) What is thermal run away? 2

    g) Why does the gain of an amplifier decrease at high frequencies? 2

    h) Can a small signal amplifier be used as a power amplifier? Justify. 2

ELECTRONICS/INSTRUMENTATION (Paper-III)

Linear ICs and Applications

Time: 3Hours Max.Marks:60

PART-A

Answer all questions: (5x6=30)

1. a) Explain the basic construction and working of depletion type MOSFET in depletion mode.

OR

b) What is a UJT? Explain its working using the equivalent circuit. Draw the V-I Characteristics.

2. a) Derive the expression for Ic and VCE for Dual input unbalanced output differential amplifier.

OR

b) Explain the effect of temperature on input offset voltage, input offset current and input bias current of operational amplifier.

3. a) Derive the exact and ideal voltage gain expression of Non-inverting operational amplifier.

OR

b) With necessary circuit diagram, derive the expression for output impedance of iverting operational amplifier.

4. a) Explain the working of Integrator. Derive the expression for its output and sketch the output wave form for a square wave input.

OR

b) With necessary circuit and waveforms explain Schmitt trigger using operational amplifier.

5. a) State Barkhausen's criterion for sustained oscillation. Explain the working or Hartley Oscillator.

OR

b) What is a switching regulator? Differentiate between load and line regulation.

PART-B

Answer any five: (5x4=20)

6. For an n-channel JFET I DSS=20*mA*, Vp=_6V and gm=5000 u s. Determine the values of drain current and Tran conductance at VGS=_3V.

7. A half-wave rectifier circuit employing an SCR is adjusted to have current of 1mA. The forward break over voltage of SCR is 100V. If a sinusoidal voltage of 200V peak is applied. Find i) Firing angle ii) Conduction angle iii) Average current.
8. The following specifications are given for the dual input balanced output differential amplifier RC=2.2K RE=4.7 K Rin=50 VCC=VEE=10V, B=100 and VBE=0.75V. Determine the differential voltage gain and input resistance.
9. For a Non-inverting amplifier A=500, ACL=50, lower and upper cut off frequencies are 1 KHZ and 100KHZ respectively. Determine the bank width after feedback.
10. Design a differentiator to differentiate an input signal that varies in frequency from 10Hz to about 1KHz. Assume C=0.1 u F.
11. Construct a first order low pass filter for a gain of 4 and cut off frequency 4 KHz, Assume C=0.01 u F and RF =100 K.
12. Calculate the value of R2 so that oscillator generates 2.2 KHz. Given R1=680 , C1=0.1 u F and C2=0.11 u F.
13. Calculate the frequency of oscillation and duty cycle of the circuit.

PART-C

14. Answer any five subdivision: (5x4=20)
    a) From the structure given below identify the device and write the symbol.
    b) Sketch the integrated circuit fabrication layout for the following circuit.
    c) In the above circuit output measured is 10mV. Why? How it can be made to zero?
    d) Identify the above circuit. What is its voltage gain?
    e) Calculate the output voltage V0 in the above circuit.
    f) For the above circuit sketch the output wave form for a triangular wave input.
    g) From the response curve identify the circuit. Is it possible to obtain such a response practically Justify your answer.
    h) What is the value of V0 in the above circuit. What happens to V0 when 2.2 K resistor is open?

VI Semester B.Sc. Examination, June 2008

(Semester Scheme) ELECTRONICS(Paper-VII)

Communication-II

Time: 3 Hours Max.Marks:60

Instruction: Answer **any five** questions from **Part A, any four** questions from **part B** and **any five** sub-divisions from **part C**.

PART-A

Answer any five questions: (5x6=30)

1. a) What is pulse modulation ? Draw the waveform showing four prominent methods of pulse modulation.

   b) Define Amplitude Shift Keying (ASK) Sketch the input and output waveforms. (4+2)

2. Explain the following terms with respect to digital transmission 6

   i) Band width requirement.

   ii) Cross talk and

   iii) Distortion.

3. Explain the principle and working of a Reflex Klystron with Applegate diagram. 6

4. Draw the cross sectional view of an 8-cavity Magnetron and explain its working, considering mode oscillations. 6

5. a) Explain the function of a C-band satellite transponder with a block diagram.

   b) What are the advantages of TDMA over FDMA? (4+2)

6. Derive expressions for the angle of acceptance and the numerical aperture of an optic fiber in terms of refractive indices. 6

7. Explain the following losses in optical fiber cables 6

   i) Absorption losses.

   ii) Bending loss and

   iii) Radiation loss.

8. Explain the following terms with respect to Cellular communtication

   i) Frequency reuse.

ii) Cell splitting and

iii) Hand off process.

PART-B

Answer any four questions: (4x5=20)

9. A 4 KHz channel has a signal to noise ratio of 24 dB. Calculate the maximum information carrying capacity of this channel. Assuming constant transmitting power, calculate the capacity of the channel, if its band width is halved. 5
10. Draw a labeled diagram of Traveling Wave Tube (TWT), Mention its applications. 5
11. Draw the block diagram of a satellite up link system and mention the function of each block.
12. In a satellite communication system, calculate the path losses for:
    a) Signal of frequency 10 GHz at a distance of 40x103 km.
    b) Signal of frequency 6 GHz at a distance of 36x103 km. 5
13. The core of a fiber is clad with a material of refractive index 1.52. The acceptance angle is found to be 20. Calculate the refractive index of the core and numerical aperture of fiber, when launching takes place from air. 5
14. Draw the labeled block diagrams of FAX transmitter and receiver. 5

PART-C

Answer any five questions: (5x2=10)

15. a) Determine the band width and baud for an FSK signal with a mark frequency of 32KHz, a space frequency of 24 Hz and a bit rate of 4 KbPs. 2

b) Is Gunn effect found in p-type semiconductor? Explain. 2

c) How does a geostationary satellite appear stationary? 2

d) Is photo-emissive device forward biased? Explain. 2

e) Draw the Ray diagram showing the path of signal flow, when a mobile subscriber of a cell is communication with another mobile subscriber of another city. 2

f) What is macro cell and micro cell with respect to cellular communication? 2

g) What is a SIM Card? 2

ELECTRONICS (Paper-VIII)

Signals and Systems

Time: 3 Hours Max.Marks:60

Instruction: Answer any five questions in Part A, any four questions in part B and any five sub-divisions in part C.

PART-A

Answer any five questions: (5x6=30)

1. Explain the following:

a) Odd and even signals.

b) Periodic and non-periodic signals.

c) Continuous and discrete signals. 6

2. Explain Time-invariance, causality and stability of continuous time system 6

3. State and prove commutative and distributive properties of the convolution integral. 6

4. a) Mention elementary operations used in block diagram representation of LII system. 2

b) Draw direct form-I, implementation for the following differential equation.

Dy/dt =a0y=b1 dx/dt +b0x. 4

5. State and prove time-domain convolution in Fourier-series. 6

6. State and prove linearity and time-shifting properties of Fourier transform. 6

7. Find the Fourier transform of pulsed cosine. 6

8. Obtain frequency response function of the system:

PART-B

Answer any four questions: (5x4=20)

9. For the signal x(t), sketch the following:

a) y1 (t)=x (-t)

b) y2(t) =x [0.5 9t-20]

c) y3 (t)=x [-0.5 (t-1)].

10. a) Determine whether signal is periodic. 5

If periodic determine its fundamental period. X(t)=cos [/3t]+sin [/4t].

b) Find the step response of an LTI system whose impulse response is given by

h (t)=e- | t |. 5

11. For the differential equation, find the total response y (t)+5y (t)=u (t), y (0)=2. 5

12. Obtain Fourier co-efficient for the wave form x(t). 5

13. Compute the Fourier transform of the signal x(t)=e-t-1 u(t). 5

14. Find the Fourier transform of the following functions.

i) The unit impulse.

ii) The decaying exponential.

iii) The rect function (over the interval-0.5 to + 0.5). 5

Answer any five sub-questions: (5x2=10)

15. a) Figure (1) shows a stair-case like signal x(t) that may be viewed as super position of four rectangular pulses g(t), shown in figure (2). Starting with rectangular pulse g(t) construct x(t) and express it in terms of g(t).
2

b) Determine the following system is invertible or not. Y (t)=x (t-4). Justify. 2

c) Obtain even and odd components of the signal. X (t)=1+2t+3t2.

d) Identify the function and write the mathematical expression.

e) If x (t) --- x (k) then x (at) --- x (k); a>0 Identify the operation and state the property. 2

f) Write the conditions for a function x (t) to possess a unique Fourier Transform. 2

g) Identify and state the property for the waveforms shown. 2