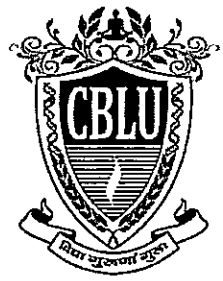
Chaudhary Bansi Lal University, Bhiwani

(A State University established under Haryana Act No. 25 of 2014)



Examination Scheme
&
Syllabus
For
B.Sc. PHYSICS
(SEMESTER- I to VI)
(w.e.f. 2020-21)

Chaudhary Bansi Lal University, Bhiwani
(A State University established under Haryana Act No. 25 of 2014)

Study & Evaluation Scheme
of
B.Sc.PHYSICS
Summary

Programme : B.Sc.
Duration : Three-year full time (Six Semesters)
Medium : English
Minimum Required Attendance : 75%
Total Credits : 36 (Physics)*
Assessment/Evaluation

Internal Marks	Major Test (End Semester Exam) Marks	Total Marks
10	40	50

Internal Evaluation (Theory)

Minor Test	Attendance	Assignment	Total Marks
5	2.5	2.5	10

Duration of Examination

Major Test (End Semester Exam)	Internal (Minor Test)
3 hrs.	1 hrs.

*Question Paper Structure**

There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.

****Excluding Credits of Skill enhancement course***
Skill enhancement course may have different question paper structure.
In Skill enhancement courses, demonstrations and hands on experiance must be encouraged

SCHEME OF EXAMINATION

B.Sc. (PASS COURSE) PHYSICS Semester I – IVw.e.f. 2020-21

Semester I

Paper No.	Paper Code	Name of the paper	Credit	Contact hour per week	Max mark	Internal Assessment	Total
Paper I	20UPHY-101	Mechanics I	2	2	40	10	50
Paper II	20UPHY-102	Electrostatics & Magnetism	2	2	40	10	50
Paper III	20UPHY-103	Physics Lab I	2	4	40	10	50
Total			6	8	120	30	150

Semester II

Paper No.	Paper Code	Name of the paper	Credit	Contact hour per week	Max mark	Internal Assessment	Total
Paper I	20UPHY-201	Mechanics II	2	2	40	10	50
Paper II	20UPHY-202	Waves and Electrodynamics	2	2	40	10	50
Paper III	20UPHY-203	Physics Lab II	2	4	40	10	50
Total			6	8	120	30	150

SemesterIII

Paper No.	Paper Code	Name of the paper	Credit	Contact hour per week	Max mark	Internal Assessment	Total
Paper I	20UPHY-301	Thermodynamics	2	2	40	10	50
Paper II	20UPHY-302	Optics	2	2	40	10	50
Paper III	20UPHY-303	Physics Lab III	2	4	40	10	50
Total			6	8	120	30	150

SemesterIV

Paper No.	Paper Code	Name of the paper	Credit	Contact hour per week	Max mark	Internal Assessment	Total
Paper I	20UPHY-401	Semiconductor Physics	2	2	40	10	50
Paper II	20UPHY-402	Quantum Mechanics	2	2	40	10	50
Paper III	20UPHY-403	Physics Lab IV	2	4	40	10	50
Total			6	8	120	30	150

B.Sc. (PASS COURSE) PHYSICS Semester V – VI w.e.f. 2020-21

SemesterV

Paper No.	Paper Code	Name of the paper	Credit	Contact hour per week	Max mark	Internal Assessment	Total
Paper I	20UPHY-501	Discipline Specific Elective Group I	2	2	40	10	50
Paper II	20UPHY-502	Discipline Specific Elective Group II	2	2	40	10	50
Paper III	20UPHY-503	Physics Lab V	2	4	40	10	50
Total			6	8	120	30	150

SemesterVI

Paper No.	Paper Code	Name of the paper	Credit	Contact hour per week	Max mark	Internal Assessment	Total
Paper I	20UPHY-601	Discipline Specific Elective Group III	2	2	40	10	50
Paper II	20UPHY-602	Discipline Specific Elective Group IV	2	2	40	10	50
Paper III	20UPHY-603	Physics Lab VI	2	4	40	10	50
Total			6	8	120	30	150

INTERNAL ASSESSMENT: - The Internal Assessment for practical papers comprises of
(i) Attendance- 05
(ii) Seminar/presentation/report 05

Total 10

Odd Semester: (Choose any one from each group)	**Even Semester: (Choose any one from each group)**
Discipline Specific Elective Group Group-I **20UPHY**501A Solid State Physics **20UPHY** 501B Medical Physics Discipline Specific Elective Group Group-II **20UPHY** 502A Statistical Physics **20UPHY** 502B Digital. Electronics and microcontrollers	Discipline Specific Elective Group Group-III **20UPHY** 601A Nuclear Physics **20UPHY** 601B Nano Materials and Applications Discipline Specific Elective Group Group-IV **20UPHY** 604A Atomic & Molecular Spectroscopy **20UPHY** 604B Computational Physics

Skill Enhancement Course (any four) (Credit: 03 each; Max Marks 40, IA 10, Total = 50)- SEC 1 to SEC 4
20USECP 701 Physics Workshop Skills
20USECP 702 Electrical circuits and Network Skills
20USECP 703 Basic Instrumentation Skills
20USECP 704 Renewable Energy and Energy harvesting
20USECP 705Radiation Safety

SCHEME OF EXAMINATION
Semester-I

Paper I- 20UPHY 101:Mechanics I

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Dynamics of a single particle, Dynamics of a system of particles. CentreofMass. Conservation of Linear momentum,Conservation of energy.

UNIT II

Angular displacement, Angular velocity, Angular acceleration and angular momentum. Torque. Conservation of Angularmomentum, Motion of Rocket.Frame of reference, Non-inertial frame of reference: Pseudo-forces

UNIT III

Rotation of Rigid body, moment of inertia, torque, angular momentum, kinetic energy of rotation. Theorems of perpendicular and parallel axes with proof. Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross-section. Acceleration of a body rolling down on an inclined plane.

UNIT IV

Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped and forced harmonic oscillations.

Reference Books:

- Classical Physics by V.K. Jain (Ane 2009)
- Physics – Resnick, Halliday & Walker 9/e, 2010,Wiley
- Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., 2015, Oxford University Press
- University Physics. FW Sears, MW Zemansky& HD Young 13/e, 1986.Addison- Wesley
- Mechanics Berkeley Physics course, V.1:Charles Kittel, et.al. 2007, Tata McGraw- Hill
- University Physics, Ronald Lane Reese, 2003, ThomsonBrooks/Cole

SCHEME OF EXAMINATION
Semester-I

Paper II- 20UPHY 102:Electrostatics and Magnetism

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).

UNIT II

Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, chargedconductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculationof electric field from potential.

UNIT III

Capacitance of an isolated spherical conductor. Parallelplate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field.Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics.Parallel plate capacitor completely filled with dielectric.

UNIT IV

Magnetostatics: Biot-Savart's law & its applications- straight conductor, circular coil,solenoid carrying current. Divergence and curl of magnetic field. Magnetic vectorpotential. Ampere's circuital law.Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability,magnetic susceptibility. Brief introduction of dia-, para- and ferro-magnetic materials.

Reference Books:

- D.J. Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.
- Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education..
- Electricity and Magnetism, J.H. Fewkes& J. Yarwood. Vol. I, 1991, Oxford Univ.
- Press.Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

SCHEME OF EXAMINATION
Semester-II

Paper I-20UPHY 201:Mechanics II

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Degree of freedom, constraints and its classifications Generalised coordinates, principle of virtual work, D'Alembert principle, Lagrange's equations of D'Alembert principle, Simple & compound Pendulum, Atwood Machine, Hamilton's principle and derivation of Lagrange's from Hamilton's equation.

UNIT II

Reference systems, inertial frames, Gallilean invariance and conservation laws, Newtonian relativity principle,Michelson-Morley experiment and its outcome,Special Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity,Lorentz transformation, length contraction and time dilation.

UNIT III

Relativistic velocity addition theorem, variation of mass with velocity and mass energy equivalence, massless particles, Relativistic Doppler effect, relativistic kinematics, transformation of energy and momentum

UNIT IV

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia - q, η and σ bySearles method.

Reference Books:

- Classical Physics by V.K. Jain (Ane 2009)
- Classical mechanic by H.Goldstein, 2nd edition, Peasrson
- Classical Mechanics by J.C, Upadhyaya, 2nd edition, HPH
- Physics – Resnick, Halliday & Walker 9/e, 2010,Wiley
- Engineering Mechanics, Basudeb Bhattacharya, 2ndedn., 2015, Oxford University Press
- University Physics. FW Sears, MW Zemansky& HD Young 13/e, 1986.Addison- Wesley
- Mechanics Berkeley Physics course, V.1:Charles Kittel, et.al. 2007, Tata McGraw- Hill
- University Physics, Ronald Lane Reese, 2003, ThomsonBrooks/Cole

SCHEME OF EXAMINATION
Semester-II

Paper II- 20UPHY 202:Waves andElectrodynamics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. Equation of continuity of current, Displacement current, Maxwell's equations in vacuum and medium, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium.

UNIT II

Superposition of Two Collinear Harmonic oscillations: Linearity and Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses.

UNIT III

Wave Equation, Solution of wave equation, Particle and Wave Velocities, Intensity of Wave, Superposition Principle, Group velocity, Phase velocity, Definition and Properties of wave front, Huygens Principle, Longitudinal Waves: Velocity of Longitudinal Waves in a Fluid in a Pipe, Newton's Formula for Velocity of Sound, Laplace's Correction, Reflections and transmission of sound waves at a boundary.

UNIT IV

The string as a force oscillator, Velocity of Transverse Vibrations of Stretched Strings, Reflections and transmission of waves on a string at a boundary, Transverse waves on a string, Travelling and standing waves on a string, Normal Modes of a string, Reflections and transmission of Energy.

- D.J. Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.
- Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.
- Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
- The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.

SCHEME OF EXAMINATION
Semester-III

Paper I- 20UPHY 301:Thermodynamics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Zeroth Law of thermodynamics andtemperature. First law and internal energy, conversion of heat into work, VariousThermodynamical Processes, Applications of First Law: General Relation between CP &CV, Work done during Isothermal and Adiabatic Processes, Compressibility &Expansion Coefficient, Reversible & irreversible processes, Second law & Entropy,Carnot's cycle & theorem, Entropy changes in reversible & irreversible processes,Entropy-temperature diagrams,

UNIT II

Third law of thermodynamics, Unattainability of absolute zero. Thermodynamic Potentials:Enthalpy, Gibbs, Helmholtz and Internal Energyfunctions, Maxwell's relations & applications - Joule-Thompson Effect, Clausius-Clapeyron Equation, Expression for (CP – CV), CP/CV, TdS equations.

UNIT III

Kinetic Theory of Gases: Derivation of Maxwell's law of distribution of velocities andits experimental verification, Mean free path (Zeroth Order), Brownian motion (qualitative), Real gases, Van der Waal's equation.

UNIT IV

Law of equipartition of energy (no derivation) and its applications to specific heat of gases; mono-atomic and diatomic gases, Theory of Radiation:Blackbody radiation, Spectral distribution, Concept of EnergyDensity, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh-Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

Reference Books:

- Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill.
- S. Lokanathan and R.S., Gambir, Statistical and Thermal Physics: AnIntroduction, Prentice Hall of India, Pvt., Ltd. (1991, New Delhi).
- J.K. Sharma and K.K. Sarkar, Thermodynamics and statistical Physics, Himalaya Publishing House (1991, Bombay.)
- A Treatise on Heat, MeghnadSaha, and B.N. Srivastava, 1969, Indian Press.
- Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
- Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill
- Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears&G.L.Salinger. 1988, Narosa
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. chand Publications.

SCHEME OF EXAMINATION
Semester-III

Paper II- 20UPHY 302:Optics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Wave optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. Michelson's Interferometer-fringes formation.

UNIT II

Fresnel Diffraction: Fresnel's Assumptions, Fresnel's Half-Period Zones for Plane Wave, Rectilinear Propagation of Light, Theory of a Zone Plate and its application, Multiple Foci of a Zone Plate, Qualitative description for Fresnel diffraction pattern of a straight edge, a slit and a wire.

UNIT III

Fraunhofer diffraction: Single slit, Double slit and multiple slits, Various kind of diffraction grating, resolving power of grating, Rayleigh Criteria of the limit of resolution and Resolving Power of an optical instruments (prism, telescope)

UNIT IV

Polarization: Double refraction, Plane polarized light – production and analysis, Circular and elliptical polarization, Half wave and full wave plates, Opticalactivity, Specific Rotation, Optical Fibres - Construction and working, Critical angle of propagation, Modes of propagation, Acceptance angle, Attenuation. Advantages and applications of Optical Fibre.

Reference Books:

- Mathematical Physics by B.S. Rajput and Yog Prakash PragatiPrakashan.
- Optics by Ajay Ghatak, 4th edition, Tata McGraw Hill 1977
- Fundamentals of Optics, F A Jenkins and H E White, McGraw-Hill,1976
- Principles of Optics, B.K. Mathur, 1995, Gopal Printing
- Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. ChandPublication
- University Physics. FW Sears, MW Zemansky and HD Young 13/e, 1986.Addison-Wesley

SCHEME OF EXAMINATION
Semester-IV

PaperI- 20UPHY 401:Semiconducting Device

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Semiconductor Diodes: p and n type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode. Drift and Diffusion Currents PN junction and its characteristics. Static and Dynamic Resistance. Applications of PN Junction Diode as Half-wave rectifier, Full-wave Rectifier, Calculation of ripple factor and rectification efficiency.

UNIT II

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff, and Saturation Regions. Current gains α and β. Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point, h-parameter Equivalent Circuit.

UNIT III

Field Effect transistors- JFET, MOSFET, Advantages of using Field Effect transistors (in comparison to BJT), Amplifiers and Their Biasing: Voltage Divider Bias Circuit for CE Amplifier, bias stabilization, Class-A, B&C amplifiers, RC coupled amplifiers and its frequency response, Feedback in amplifiers, positive and negative feedback in amplifiers, Advantages of negative feedback in amplifiers.

UNIT IV

Operational Amplifiers (Black Box approach):Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop& Closed-loopGain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting andNon-Inverting Amplifiers, (2) Differentiator, (3) Integrator.

Reference Books:

- Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
- Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill.
- Microelectronic Circuits, M.H. Rashid, 2nd Edn.,2011, Cengage Learning.
- Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning
- Digital Principles & Applications, A.P. Malvino, D.P. Leach &Saha, 7th Ed.,2011, Tata McGraw Hill
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.
- Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
- OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd.

SCHEME OF EXAMINATION
Semester-IV

PaperII- 20UPHY402:Quantum Mechanics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Black body radiation. quantum theory of radiation (old quantum theory), Photon,photoelectric effect and Einsteins photoelectric equation, Compton effect (theory and result).In-adequacy of old quantum theory, de-Broglie hypothesis. Davisson and Germerexperiment.Phase velocity group velocity, Heisenberg's uncertainty principle.Time-energy and angular momentum, position-momentum uncertainty, Uncertainty principle from de-Brogliewave, (wave-particle duality).

Unit-II

Basics of Quantum Mechanics: Wave function and its physical significance, Properties of wave-function, Orthogonality and Normalization of wave function, Time dependent Schrodinger wave equation, Time Independent Schrodinger Equation, Momentum and Energy operators; Hermitian Operators- Eigenvalue and Eigen functions, Commutator relations of various operators.

Unit-III

Stationary states; Probabilities and normalization, Probability current densities and its relation to wave function, Expectation Values of Dynamical quantities, Particle in 1-dimention Infinite Square Well (Energy levels and general Wave function),Application of Schrodinger equation in the solution of the following one-dimensional problems: One-dimensional potential barrier (Reflection and Transmission coefficient, penetration depth, Tunnelling), Solution of Schrodinger equation for harmonic oscillator ground states and excited states.

UNIT IV

Schrodinger Equation in spherical co-ordinates, Separation of variables for r, θ and ϕ coordinates, Solution for θ and ϕ equations, Spherical Harmonics, Space Quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment, Stern-Gerlach Experiment. Gyromagnetic Ratio and Bohr Magneton.

References:

- Quantum Mechanics, D.J. Griffith, Pearson Ltd.
- Quantum Mechanics, V. K. Jain
- Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill
- Quantum Mechanics by L.I. Schiff, McGraw Hill Book Company, Inc.
- Quantum Mechanics by G. Aruldhas, 2nd Edition, PHI Learning of India
- Quantum Mechanics by A.P. Messiah.

SCHEME OF EXAMINATION
Semester-V

Paper I- 20UPHY 501A:Solid state Physics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

Unit I

Crystal Structure: Crystalline and amorphous solids, liquid crystals, crystal structure, periodicity, lattice and basis, crystal translational vectors and axes, unit cell and primitive Cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions, Crystal planes and Miller indices, Crystal structures of Sodium Chloride and Diamond,

Unit II

Crystal Structure: X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods, K-space and reciprocal lattice and its physical significance, reciprocal lattice vectors, reciprocal lattice to a simple cubic lattice, BCC and FCC.

Unit III

Free electron theory: Free electron gas models and its failures, Sommerfeld quantum theory, Hall Effect, Lattice vibrations: lattice vibration and concept of phonon, specific heat of solids, Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids.

Unit IV

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials, Classical Langevin Theory of dia – and Paramagnetic Domains, Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains.
Super conductivity: Historical introduction, survey of superconductivity, super conducting systems.

References:

- Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
- Elements of Solid State Physics, J.P. Srivastava, 4th Edition, 2015, Prentice-Hall of India.
- Solid State Physics by R.K. Puri and V.K. Babbar, S. Chand Publication.
- Solid State Physics : Structure and Properties of Material by M. A. Wahab
- Solid State Physics Neil W. Ashcroft and N. David Mermin, 1976, Cengage Learning

SCHEME OF EXAMINATION
Semester-V

Paper I- 20UPHY 501B:Medical Physics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Basic Anatomical Terminology: Standard Anatomical Position, Planes. Familiarity with terms like- Superior, Inferior, Anterior, Posterior, Medial, Lateral, Proximal and Distal.Mechanics of the body: Skeleton, forces, and body stability. Muscles and dynamics ofbody movement. Physics of Locomotors Systems: joints and movements, Stability andEquilibrium. Energy household of the body:Energy balance in the body, Energyconsumption of the body, Heat losses of the body, Thermal Regulation. Pressuresystem of body:Physics of breathing, Physics of cardiovascular system.

UNIT II

Acoustics of the body:Nature and characteristics of sound, Production of speech,Physics of the ear, Diagnostics with sound and ultrasound. Optical system of the body:Physics of the eye. Electrical system of the body: Physics of the nervous system,Electrical signals and information transfer.

UNIT III

X-RAYS: Electromagnetic spectrum, production of x-rays, x-ray spectra,Brehmsstrahlung, Characteristic x-ray. **X-ray tubes & types:** Coolidge tube, x-ray tubedesign, tube cooling stationary mode, Rotating anode x-ray tube, Tube rating, qualityand intensity of x-ray. X-ray generator circuits, half wave and full wave rectification,filament circuit, kilo voltage circuit, types of X-Ray Generator, high frequencygenerator, exposure timers and switches, HT cables, HT generation. Radiation units exposure, absorbed dose, units: rad, gray,relative biological effectiveness, effective dose, inverse square law.Radiation Detectors: GeigerMuller counter, Scintillation counters and Solid State detectors, ionization chamber

UNIT IV

MEDICAL IMAGING PHYSICS: Evolution of Medical Imaging, X-ray diagnosticsand imaging, Physics of nuclear magnetic resonance (NMR), NMR imaging, MRIRadiological imaging, Ultrasound imaging, Physics of Doppler with applications andmodes, Vascular Doppler. Radiography: Filters, grids, cassette, X-ray film, filmprocessing, fluoroscopy. Computed tomography scanner- principle & function,display, generations, mammography. Thyroid uptake system and Gamma camera (OnlyPrinciple, function and display).

References:

- Medical Physics, J.R. Cameron and J.G. Skofronick, Wiley (1978)
- Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers MedicalPublishingPvt. Ltd. New Delhi (2003)
- Christensen's Physics of Diagnostic Radiology: Curry, Dowdey and Murry -Lippincot Williams and Wilkins (1990)
- Physics of Radiation Therapy: F M Khan - Williams and Wilkins, Third edition(2003)
- Physics of the human body, Irving P. Herman, Springer (2007).
- The essential physics of Medical Imaging: Bushberg, Seibert, LeidholdtandBooneLippincot Williams and Wilkins, Second Edition (2002)
- Handbook of Physics in Diagnostic Imaging: R.S. Livingstone: B.I. PublicationPvt Ltd
- The Physics of Radiology-H E Johns and Cunningham.

SCHEME OF EXAMINATION
Semester-V

Paper II- 20UPHY 502A:Statistical Physics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

Unit-I

Probability, some probability considerations, basic idea of Permutations and Combinations, combinations possessing maximum probability, combinations possessing minimum probability, distribution of molecules in two boxes. Case with weightage (general). Phase space, microstates and macrostates, statistical fluctuations constraints and accessible States, Entropy andThermodynamic probability. Concept of Ensembles and type of Ensembles.

Unit-II

Postulates of Statistical Physics, Phase space and Application to One Dimension Harmonic Oscillator and Free particle, Division of phase space into cells, Basic approach in three statistics, Maxwell-Boltzmann Distribution Law, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox. Condition ofequilibrium between two systems in thermal contact. Entropy andProbability.

Unit-III

Bose-Einstein statistics, Thermodynamic relations of a Completely Degenerate Bose Gas. Bose-Einstein condensation, liquid He (qualitative description), photon gas, Application of B.E. Statistics to Plancks's radiation law

UNIT IV

Fermi-Dirac statistics, Thermodynamic relations of a Completely Degenerate Fermi gas, Fermi Energy,Electron gas in a Metal, Zero point energy, Specific Heat of Metals, Thermionic emission, White Dwarf Stars, Chandrasekhar Mass Limit, Comparison of three statistics M-B, B-E and F-D

References:

- Introduction to Statistical Mechanics, B.B. Laud, Macmillan 1981
- Statistical Physics, Berkeley Physics Course Volume 5 by F Reif (Tata McGraw-Hill Company Ltd, 2008)
- Statistical and Thermal Physics: an introduction by S.Lokanathan and R.S.Gambhir. (P.H.I., 1991).
- Statistical Mechanics by R. K. Patharia.(Oxford: Butterworth, 1996).
- Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears&G.L.Salinger. 1988, Narosa
- J.K. Sharma and K.K. Sarkar, Thermodynamics and statistical Physics, Himalaya Publishing House (1991, Bombay.)

SCHEME OF EXAMINATION
Semester-V

Paper II- 20UPHY 502B:Digital Electronics and microcontrollers

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. Binary Addition. Binary Subtraction using 2's Complement Method).Half Adders and Full Adders and Subtractors, 4-bit binary Adder-Subtractor.

UNIT II

Embedded system introduction: Introduction to embedded systems and general purpose computer systems, architecture of embedded system, classifications, applications and purpose of embedded systems, challenges and design issues in embedded systems, operational and non-operational quality attributes of embedded systems, elemental description of embedded processors and microcontrollers. Review of microprocessors: Organization of Microprocessor based system, 8085μp pin diagram and architecture, concept of data bus and address bus, 8085 programming model, instruction classification, subroutines, stacks and its implementation, delay subroutines, hardware and software interrupts.

UNIT III

8051 microcontroller: Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions. 8051 I/O port programming: Introduction of I/O port programming, pin out diagram of8051 microcontroller, I/O port pins description and their functions, I/O port programming in 8051, (Using Assembly Language), I/O programming: Bit manipulation.

UNIT IV

Programming of 8051: 8051addressing modes and accessing memory using various addressing modes, assembly language instructions using each addressing mode, arithmetic & logic instructions, 8051 programming in C: - for time delay and I/O operations and manipulation, for arithmetic & logic operations, for ASCII and BCD conversions.

References:

- Digital Principles & Applications, A.P. Malvino, D.P. Leach &Saha, 7th Ed.,2011,Tata McGraw Hill
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.
- Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
- Embedded Systems: Architecture, Programming & Design, R. Kamal, 2008, Tata McGraw Hill .
- The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
- Embedded Microcomputor System: Real Time Interfacing, J.W. Valvano, 2000, Brooks/Cole
- Embedded Systems and Robots, SubrataGhoshal, 2009, Cengage Learning
- Introduction to embedded system, K.V. Shibu, 1st Edition, 2009, McGraw Hill
- Microcontrollers in practice, I.Susnea and M.Mitescu, 2005, Springer.

SCHEME OF EXAMINATION
Semester-VI

Paper I- 20UPHY 601A:Nuclear Physics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about size, mass, charge density (matter energy), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. Nuclear Models: Liquid drop model approach, semi empirical mass formula andsignificance of various terms, condition of nuclear stability. evidence for nuclear shell structure, nuclear magic numbers, basic assumption ofshell model, residual interaction, concept of nuclear force.

UNIT II

Radioactivity decay:(a) Alpha decay: basics of α-decay processes, theory of α-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) β-decay: energykinematics for β-decay, positron emission, electron capture, neutrino hypothesis. (c)Gamma decay: Gamma rays emission & kinematics, internal conversion).

UNIT III

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct reaction, resonance reaction, Coulomb scattering (Rutherford scattering). Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation, Gamma ray interactionthrough matter, photoelectric effect, Compton scattering, pair production, neutroninteraction with matter.

UNIT IV

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobilityof particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si& Ge) for charge particle and photon detection (concept of charge carrier and mobility).

References:

- Introductory nuclear Physics by Kenneth S. Krane (Wiley India Pvt. Ltd., 2008).
- Nuclear Physics by D.C. Tayal, Himalaya Publishing House, Mumbai
- Concepts of nuclear physics by Bernard L. Cohen. (Tata Mcgraw Hill, 1998).
- Introduction to the physics of nuclei & particles, R.A. Dunlap. (Thomson Asia, 2004)
- Introduction to Elementary Particles, D. Griffith, John Wiley & Sons
- Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi
- Basic ideas and concepts in Nuclear Physics - An Introductory Approach by K. Heyde(IOP- Institute of Physics Publishing, 2004).
- Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
- Theoretical Nuclear Physics, J.M. Blatt &V.F.Weisskopf (Dover Pub.Inc., 1991)

SCHEME OF EXAMINATION
Semester-VI

Paper I- 20UPHY 601B:Nanomaterials and applications

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Basic idea of band structure, Metals, insulators and semiconductors, variation of Density of States and Band Gap with size of a Crystal, Quantum Confinement, Electron confinement in One, Two and Three Dimensional Infinitely Deep Square Well Potentials. Quantum well, wire and dot (basic idea).

Unit II

Bottom up and Top down Approaches for Synthesis of Nano Materials, Sol-Gel Process, Core-Shell Nanoparticles, Ball Milling, Chemical vapor deposition techniques, Lithography: Two-Dimensional Nanostructures

Unit III

Carbon Molecules, New Carbon Structures, Carbon Clusters: C60 and other OtherBuckyballs, Structure of C60 and larger Fullerenes, Graphene, Carbon Nanotubes, Fabrication technique, Structure, properties: Electrical Properties, Vibrational Properties and Mechanical, Applications of Carbon Nanotubes

UNIT IV

Basic Principle and idea of Instrumentation for characterization of nanostructures: X-ray diffraction technique, Transmission Electron Microscopy, Raman Spectroscopy, Atomic Force Microscopy, ScanningTunneling Microscopy

References:

- Introduction to Nanotechnology C.P.Poole Jr. & F.J. Owens - John Wiley & Sons
- The Physics of Low Dimensional Semiconductors John H. Davies Cambridge Uni.Press.
- Nanotechnology- An Introduction J.J. Ramsden William Andrew Elsevier
- Nanotechnology M. Wilson, K. Kannangara, G. Smith, M. Simmons & B. Raguse

SCHEME OF EXAMINATION
Semester-VI

Paper II- 20UPHY 602A:Atomic& Molecular Spectroscopy

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

Unit-I

Atomic spectra, Bhor atomic model, energy levels and spectra, correspondence principle, atomic excitation, Franck Hertz experiment, Vector atom model, quantum numbers associated with vector atom model, penetrating and non- penetrating orbits (qualitative description).

Unit-II

Spectral lines in different series of alkali spectra, spin orbit interaction and doublet term separation LS or Russel-Saunder Coupling jj coupling (expressions for interaction energies for LS and jj coupling required), Zeeman effect (normal and Anomalous), Zeeman pattern,

Unit-III

Paschen, Back effect of a single valence electron system, Stark effect, discrete set of electronic energies of molecules, quantization of Vibrational and rotational energies, Raman effect (Quantitative description) Stoke's and anti Stoke's lines.

Unit-IV

Main features of a laser: Directionality, high intensity, high degree of coherence, spatial and temporal coherence, Einstein's coefficients and possibility of amplification, Threshold condition for laser emission, Laser pumping, He-Ne laser and RUBY laser (Principle, Construction and Working), Applications

References:

1. Introduction to Atomic and Molecular Spectroscopy by V. K. Jain, Narosa (2007)
2. Introduction to Atomic Spectra by H.B. White.
3. Atomic spectra by G. Herzberg.
4. Molecular Spectra and Molecular Structure by G. Herzberg.
5. Fundamentals of molecular spectroscopy by Colin N. Banwell and Elaine M.Mc-Cash.
6. Lassers, Theory and Application (2nd Ed.) by Thagrajan and Ajay Ghatak.
7. Laser and Nonlinear Optics by B.B. Laud (2nd Ed.)
8. Introduction to Optics by Frank L. Pedrotti and Lens S. Pedrotti, Prentice Hall, 1987.

SCHEME OF EXAMINATION
Semester-VI

PaperII- 20UPHY 602B:Computational Physics

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 4 units. Nine questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Importance of computers in Physics, paradigm for solving physics problems for solution. Usage of linux as an Editor. Algorithms and Flowcharts: Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of sin (x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal. Scientific Programming: Some fundamental Linux Commands (Internal and External commands). Development of FORTRAN, Basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of Fortran Program, Format of writing Program and concept of coding, Initialization and Replacement Logic. Examplesfrom physics problems.

UNIT II

Control Statements: Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO-CONTINUE, DO-ENDDO, DOWHILE, Implied and Nested DO Loops), Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine), RETURN, CALL, COMMON and EQUIVALENCE Statements), Structure, Disk I/O Statements, open a file, writing in a file, reading from a file. Examples from physics problems.

UNIT III:

Programming:

1. Exercises on syntax on usage of FORTRAN
2. Usage of GUI Windows, Linux Commands, familiarity with DOS commands and working in an editor to write sources codes in FORTRAN.
3. To print out all natural even/ odd numbers between given limits.
4. To find maximum, minimum and range of a given set of numbers.
5. Calculating Euler number using exp(x) series evaluated at x=1

Scientific word processing: Introduction to LaTeX:TeX/LaTeX word processor, preparing a basic LaTeX file, Document classes, Preparing an input file for LaTeX, Compiling LaTeX File, LaTeX tags for creating different environments, Defining LaTeX commands and environments, Changing the type style, Symbols from other languages.

UNIT III

Equation representation: Formulae and equations, Figures and otherfloating bodies, Lining in columns- Tabbing and tabular environment, Generating tableof contents, bibliography and citation, Making an index and glossary, List makingenvironments, Fonts, Picture environment and colors, errors. Visualization: Introduction to graphical analysis and its limitations. Introduction toGnuplot. importance of visualization of computational and computational data, basicGnuplot commands: simple plots, plotting data from a file, saving and exporting,multiple data sets per file, physics with Gnuplot (equations, building functions, userdefined variables and functions), Understanding data with Gnuplot.

Hands on exercises:

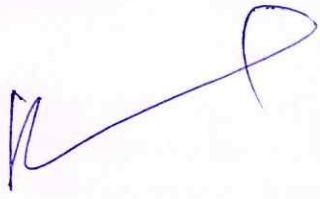
1. To compile a frequency distribution and evaluate mean, standard deviation etc.

2. To evaluate sum of finite series and the area under a curve.
3. To find the product of two matrices
4. Plotting trajectory of a projectile projected horizontally.
5. Plotting trajectory of a projectile projected making an angle with the horizontally.

.

Reference:

- Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd. computer Programming in Fortran 77". V. Rajaraman (Publisher:PHI).
- LaTeX–A Document Preparation System", Leslie Lamport (Second Edition,Addison-Wesley, 1994).
- Gnuplot in action: understanding data with graphs, Philip K Janert, (Manning 2010)
- Schaum's Outline of Theory and Problems of Programming with Fortran, SLipsdutz and A Poe, 1986Mc-Graw Hill Book Co.
- Computational Physics: An Introduction, R. C. Verma, et al. New Age InternationalPublishers, New Delhi (1999).
- A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning
- Elementary Numerical Analysis, K.E. Atkinson, 3 r d Edn. , 2007, Wiley India Edition.



SCHEME OF EXAMINATION
Skill Enhancement Course

20USECP 701: PHYSICS WORKSHOP SKILL

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 3 units. Eight questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Introduction: Measuring units. conversion to SI and CGS. Familiarization with meterscale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solidblock, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metalsheet, etc. Use of Sextant to measure height of buildings, mountains, etc. Mechanical Skill: Concept of workshop practice. Overview of manufacturing methods:casting, foundry, machining, forming and welding. Types of welding joints and weldingdefects. Common materials used for manufacturing like steel, copper, iron, metal sheets,composites and alloy, wood. Concept of machine processing, introduction to commonmachine tools like lathe, shaper, drilling, milling and surface machines.

UNIT II

Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Smoothening of cutting edge of sheet using file. Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. Make funnel using metal sheet. Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuitshaving discrete components (R, L, C, diode) and ICs on PCB.

UNIT III

Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay. Introduction to prime movers: Mechanism, gear system, wheel, Fixing of gears withmotor axel. Lever mechanism, lifting of heavy weight using lever. braking systems,pulleys, working principle of power generation systems. Demonstration of pulleyexperiment.

Reference Books:

- A text book in Electrical Technology - B L Theraja – S. Chand and Company.
- Performance and design of AC machines – M.G. Say, ELBS Edn.
- Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt. Ltd.
- Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn.,EditorNewnes [ISBN: 0750660732]
- New Engineering Technology, Lawrence Smyth/Liam Hennessy, TheEducational Company of Ireland [ISBN: 0861674480]

SCHEME OF EXAMINATION
Skill Enhancement Course

20USECP 702:ELECTRICAL CIRCUITS AND NETWORK SKILLS

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 3 units. Eight questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity.Familiarization with multimeter, voltmeter and ammeter. Understanding Electrical Circuits: Main electric circuit elements and theircombination. Rules to analyze DC sourced electrical circuits. Current and voltage dropacross the DC circuit elements. Single-phase and three-phase alternating current sources.Rules to analyze AC sourced electrical circuits. Real, imaginary and complex powercomponents of AC source. Power factor. Saving energy and money. Electrical Drawing and Symbols: Drawing symbols. Blueprints. Reading Schematics.Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading ofcircuit schematics. Tracking the connections of elements and identify current flow and voltage drop.

UNIT II

Generators and Transformers: DC Power sources. AC/DC generators. Inductance,capacitance, and impedance. Operation of transformers. Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DCor AC sources to control heaters & motors. Speed & power of ac motor. Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers.Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources.

UNIT III

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers.Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal.Surge protection. Interfacing DC or AC sources to control elements (relay protection device). Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star anddelta connection. Voltage drop and losses across cables and conductors. Instruments tomeasure current, voltage, power in DC and AC circuits. Insulation. Solid and strandedcable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, andsolder. Preparation of extension board.

Reference:

- A text book in Electrical Technology - B L Theraja - S Chand & Co.
- A text book of Electrical Technology - A K Theraja
- Performance and design of AC machines - M G Say ELBS Edn.

SCHEME OF EXAMINATION
Skill Enhancement Course

20USECP 703:BASICINSTRUMENTATIONSKILLS

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 3 units. Eight questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution rangeetc. Errors in measurements and loading effects. Multimeter: Principles of measurementof dc voltage and dc current, ac voltage, ac current and resistance. Specifications of amultimeter and their significance. Electronic Voltmeter: Advantage over conventional multimeter for voltagemeasurement with respect to input impedance and sensitivity. Principles of voltage,measurement (block diagram only). Specifications of an electronic Voltmeter/Multimeter and their significance. AC millivoltmeter: Type of AC millivoltmeters:Amplifier-rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter,specifications and their significance.

UNIT II

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT,Electron gun, electrostatic focusing and acceleration (Explanation only– nomathematical treatment), brief discussion on screen phosphor, visual persistence &chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance. Use of CRO for the measurement of voltage (dc and ac frequency, time period. Specialfeatures of dual trace, introduction to digital oscilloscope, probes. Digital storageOscilloscope: Block diagram and principle of working. Signal Generators and Analysis Instruments: Block diagram, explanation andspecifications of low frequency signal generators. pulse generator, and functiongenerator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

UNIT III

Impedance Bridges & Q-Meters: Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges. Digital Instruments: Principle and working of digital meters. Comparison of analog&digital instruments. Characteristics of a digital meter. Working principles of digitalvoltmeter. Digital Multimeter: Block diagram and working of a digital multimeter. Workingprinciple of time interval, frequency and period measurement using universal counter/frequency counter, time- base stability, accuracy and resolution.

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. CRO as a versatile measuring device.
3. Use of Digital multimeter/VTVM for measuring voltages
4. Winding a coil / transformer.

5. Study the layout of receiver circuit.

6. Trouble shooting a circuit

7. Balancing of bridges

Laboratory Exercises:

1. To observe the loading effect of a multimeter while measuring voltage across alow resistance and high resistance.

2. To observe the limitations of a multimeter for measuring high frequency voltageand currents.

3. To measure Q of a coil and its dependence on frequency, using a Q- meter.

4. Measurement of voltage, frequency, time period and phase angle using CRO.

5. Measurement of time period, frequency, average period using universal counter/frequency counter.

6. Measurement of rise, fall and delay times using a CRO.

7. Measurement of distortion of a RF signal generator using distortion factor meter.

8. Measurement of R, L and C using a LCR bridge/ universal bridge.

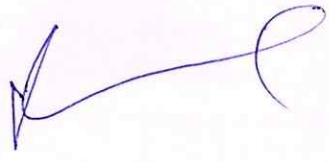
Open Ended Experiments:

1. Using a Dual Trace Oscilloscope

2. Converting the range of a given measuring instrument (voltmeter, ammeter)

Reference:

- A text book in Electrical Technology - B L Theraja - S Chand and Co.
- Performance and design of AC machines - M G Say ELBS Edn.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Logic circuit design, Shimon P. Vingron, 2012, Springer.
- Digital Electronics, SubrataGhoshal, 2012, Cengage Learning.
- Electronic Devices and circuits, S. Salivahanan& N. S.Kumar, 3rd Ed., 2012,
- Tata Mc-Graw Hill
- Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk,
- 2008, Springer
- Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India



SCHEME OF EXAMINATION
Skill Enhancement Course

20USECP 704:RENEWABLE ENERGY AND ENERGY HARVESTING

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 3 units. Eight questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Fossil fuels and Alternate Sources of energy: Fossil fuels and Nuclear Energy, theirlimitation, need of renewable energy, non-conventional energy sources. An overview ofdevelopments in Offshore Wind Energy, Tidal Energy, Wave energy systems, OceanThermal Energy Conversion, solar energy, biomass, biochemical conversion, biogasgeneration, geothermal energy tidal energy, Hydroelectricity. Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of solar pond and solar energy, solar water heater,flat plate collector, solar distillation, solar cooker, solar green houses, solar cell,absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PVmodels and equivalent circuits, and sun tracking systems.

UNIT II

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and differentelectrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies. Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristicsand Statistics, Wave Energy Devices. Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy,Osmotic Power, Ocean Bio-mass. Geothermal Energy: Geothermal Resources, Geothermal Technologies.

UNIT III

Hydro Energy: Hydropower resources, hydropower technologies, environmental impactof hydro power sources. Piezoelectric Energy harvesting: Introduction, Physics and characteristics ofpiezoelectric effect, materials and mathematical description of piezoelectricity,Piezoelectric parameters and modelling piezoelectric generators, Piezoelectric energyharvesting applications, Human power. Electromagnetic Energy Harvesting: Linear generators, physics mathematical models, recent applications. Carbon captured technologies, cell, batteries, power consumption. Environmental issues and Renewable sources of energy, sustainability.

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into voltage using thermoelectric modules.

References:

- Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
- Solar energy - M P Agarwal - S Chand and Co. Ltd.
- Solar energy - Suhas P Sukhative, Tata McGraw - Hill Publishing Company Ltd.
- Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004,Oxford University Press, in

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- Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
- J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
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SCHEME OF EXAMINATION
Skill Enhancement Course

20USECP 705:RADIATION SAFETY

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. The syllabus is divided into 3 units. Eight questions will be set up. Question no. 1 is compulsory. Question no. 1 will consists of 8 short question covering the entire syllabus. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question inall.
2. 20% numerical problems are to beset.
3. Use of Scientific (non-programmable) calculator isallowed.

UNIT I

Basics of Atomic and Nuclear Physics: Basic concept of atomic structure; X rayscharacteristic and production; concept of bremsstrahlung and auger electron, Thecomposition of nucleus and its properties, mass number, isotopes of element, spin,binding energy, stable and unstable isotopes, law of radioactive decay, Mean life andhalf life, basic concept of alpha, beta and gamma decay, concept of cross section andkinematics of nuclear reactions, types of nuclear reaction, Fusion, fission. Interaction of Radiation with matter: Types of Radiation: Alpha, Beta, Gamma andNeutron and their sources, sealed and unsealed sources, Interaction of Photons – Photoelectriceffect, Compton Scattering, Pair Production, Linear and Mass AttenuationCoefficients, Interaction of Charged Particles: Heavy charged particles - Beth-BlochFormula, Scaling laws, Mass Stopping Power, Range, Straggling, Channeling andCherenkov radiation. Beta Particles- Collision and Radiation loss (Bremsstrahlung),Interaction of Neutrons- Collision, slowing down and Moderation.

UNIT II

Radiation detection and monitoring devices: Radiation Quantities and Units: Basicidea of different units of activity, KERMA, exposure, absorbed dose, equivalent dose,effective dose, collective equivalent dose, Annual Limit of Intake (ALI) and derived AirConcentration (DAC). Radiation detection: Basic concept and working principle of*gas detectors* (Ionization Chambers, Proportional Counter, Multi-Wire ProportionalCounters (MWPC) and Gieger Muller Counter), *Scintillation Detectors* (Inorganic andOrganic Scintillators), *Solid States Detectors* and *Neutron Detectors, Thermoluminescent Dosimetry*

UNIT III

Radiation safety management: *Biological effects of ionizing radiation*, Operationallimits and basics of radiation hazards evaluation and control: radiation protectionstandards, International Commission on Radiological Protection (ICRP) principles,justification, optimization, limitation, introduction of safety and risk management ofradiation. Nuclear waste and disposal management. Brief idea about Accelerator drivenSub-critical system (ADS) for waste management. Application of nuclear techniques: Application in medical science (e.g., MRI, PET,Projection Imaging Gamma Camera, radiation therapy), Archaeology, Art, Crimedetection, Mining and oil. *Industrial Uses:* Tracing, Gauging, Material Modification,Sterization, Food preservation.

Experiments:

1) Study the background radiation levels using Radiation meter

2) Study of characteristics of GM tube and determination of operating voltage and plateaulength using background radiation as source (without commercial source).

3) Study of counting statistics using background radiation using GM counter.

4) Study of radiation in various materials (e.g. KSO4 etc.). Investigation of possibleradiation in different routine materials by operating GM at operating voltage.

5) Study of absorption of beta particles in Aluminum using GM counter.

6) Detection of α particles using reference source & determining its half life using spark counter

7) Gamma spectrum of Gas Light mantle (Source of Thorium)

8) Characteristics of Geiger Muller (GM) Counter:

References:

- W.E. Burcham and M. Jobes – Nuclear and Particle Physics – Longman (1995)
- G.F.Knoll, Radiation detection and measurements
- Thermoluninescense Dosimetry, Mcknlay, A.F., Bristol, Adam Hilger (MedicalPhysics Handbook 5)
- W.J. Meredith and J.B. Massey, "Fundamental Physics of Radiology". JohnWright and Sons, UK, 1989.
- J.R. Greening, "Fundamentals of Radiation Dosimetry", Medical Physics HandBook Series, No.6, Adam Hilger Ltd., Bristol 1981.
- Practical Applications of Radioactivity and Nuclear Radiations, G.C. Lowentaland P.L. Airey, Cambridge University Press, U.K., 2001
- A. Martin and S.A. Harbisor, An Introduction to Radiation Protection, JohnWilley & Sons, Inc. New York, 1981.
- NCRP, ICRP, ICRU, IAEA, AERB Publications.
- W.R. Hendee, "MedRadiation Physics", Year Book – Medical Publishers Inc. London, 1981

SCHEME OF EXAMINATION
Semester I

Paper III 20UPHY -103:Physics Lab I

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. Do any eight experiments.
2. The students are required to calculate the error involved in a particularexperiment (percentage error).
3. **Distribution of Marks:**

Experiment:	20 mark
Viva Voce:	10 marks
Lab Record:	10 marks
Total	40 marks

4. **Distribution of internal assessment Marks:**

Internal Viva Voce:	5 marks
Attendance:	.5 marks (>75% 3marks; >85% 5 marks)
Total	10 marks

For giving marks under Lab. practicals each college will maintain practical assessment record by using the following procedure: -

1. Each student has to perform a minimum number of experiments prescribed in the syllabus.

2. After the completion of a practical the teacher concerned will check the notebookand conduct the viva-voce of each student to find out how much conceptsrelated to the theoretical and experimental part of the experiment he/she hasunderstood. According to his/her performance marks will be recorded in theirpractical note book. These marks will constitute the internal viva-voce marks. While taking the final average the total marks obtained will be divided by the total no. of required practicals.

3. The lab. record register (which contain the number of practicals performed by the students) will be presented to the external practical examiners for assessment. The external examiners will verify the record randomly.

1. 'g' by Bar pendulum.
2. E.C.E. of hydrogen using voltmeter.
3. Calibration of thermocouple by potentiometer.
4. Frequency of A.C. mains and capacity by electrical vibrator.
5. Inductance (L) by Anderson Bridge (A.C. method)
6. Viscosity of water by its flow through a uniform capillary tube.
7. Mechanical equivalent of Heat by Callender and Barne's method.
8. Low resistance by Carey Foster's Bridge with calibration.
9. Determination of impedance of an A.C. circuit and its verification.
10. High resistance by substitution method.

SCHEME OF EXAMINATION
Semester II

Paper III20UPHY -203: Physics Lab II

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. Do any eight experiments.
2. The students are required to calculate the error involved in a particular experiment (percentage error).
3. **Distribution of Marks:**

Experiment:	20 mark
Viva Voce:	10 marks
Lab Record:	10 marks
Total	40 marks

4. **Distribution of internal assessment Marks:**

Internal Viva Voce:	5 marks
Attendance:	5 marks (>75% 3marks; >85% 5 marks)
Total	10 marks

For giving marks under Lab. practicals each college will maintain practical assessment record by using the following procedure: -

1. Each student has to perform a minimum number of experiments prescribed in the syllabus.

2. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded in their practical note book. These marks will constitute the internal viva-voce marks. While taking the final average the total marks obtained will be divided by the total no. of required practicals.

3. The lab. record register (which contain the number of practicals performed by the students) will be presented to the external practical examiners for assessment. The external examiners will verify the record randomly.

1. Moment of Inertia of a fly-wheel
2. M.I. of an irregular body using a torsion pendulum.
3. Young's modulus by bending of beam.
4. Surface Tension by Jeager's method.
5. Modulus of rigidity by Maxwell's needle.
6. Elastic constants by Searle's method.
7. Thermal conductivity of a good conductor by Searle's method
8. Verification of Inverse square law by photo-cell.
9. To get familiar with working knowledge of Cathode Ray Oscilloscope and Multimeter
10. To measure the phase using Lissajous Patterns (X-Y Mode):

SCHEME OF EXAMINATION
Semester III
Paper III -20UPHY -303: Physics Lab III

Max. Marks: 50
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. Do any eight experiments.
2. The students are required to calculate the error involved in a particular experiment (percentage error).
3. **Distribution of Marks:**

Experiment:	20 mark
Viva Voce:	10 marks
Lab Record:	10 marks
Total	40 marks

4. **Distribution of internal assessment Marks:**

Internal Viva Voce:	5 marks
Attendance:	5 marks (>75% 3marks; >85% 5 marks)
Total	10 marks

For giving marks under Lab. practicals each college will maintain practical assessment record by using the following procedure: -

1. Each student has to perform a minimum number of experiments prescribed in the syllabus.

2. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded in their practical note book. These marks will constitute the internal viva-voce marks. While taking the final average the total marks obtained will be divided by the total no. of required practicals.

3. The lab. record register (which contain the number of practicals performed by the students) will be presented to the external practical examiners for assessment. The external examiners will verify the record randomly.

1. Refractive index and dispersive power of a prism material byspectrometer.
2. Resolving power of a telescope.
3. Comparision of Illuminating Powers by a Photometer.
4. Ordinary and extra ordinary refractive indices for calcite or quartz.
5. To draw a graph between wave length and minimum deviation for variouslines from a Mercury discharge source.
6. Determination of wave length of Na light and the number of lines per centimeter using a diffraction grating.
7. Wave length by Newton's Rings.
8. Measurement of (a) Specific rotation (b) concentration of sugar solutionusingpolarimeter.
9. To find the equivalent focal length of a lens system by nodal slide assembly.
10. Wave length of Sodium light by fresnel'sbiprism.

SCHEME OF EXAMINATION
Semester IV

Paper III 20UPHY -403: Physics Lab IV

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. Do any eight experiments.
2. The students are required to calculate the error involved in a particular experiment (percentage error).
3. **Distribution of Marks:**

Experiment:	20 mark
Viva Voce:	10 marks
Lab Record:	10 marks
Total	40 marks

4. **Distribution of internal assessment Marks:**

Internal Viva Voce:	5 marks
Attendance:	5 marks (>75% 3marks; >85% 5 marks)
Total	10 marks

For giving marks under Lab. practicals each college will maintain practical assessment record by using the following procedure: -

1. Each student has to perform a minimum number of experiments prescribed in the syllabus.

2. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded in their practical note book. These marks will constitute the internal viva-voce marks. While taking the final average the total marks obtained will be divided by the total no. of required practicals.

3. The lab. record register (which contain the number of practicals performed by the students) will be presented to the external practical examiners for assessment. The external examiners will verify the record randomly.

1. To draw forward and reverse bias characteristics of a semiconductor diode.
2. ZenerDoide voltage regulation characteristics.
3. To draw common base and common emitter characteristics of a transistor and calculate transistor and calculate transistor characteristics parameters.
4. To study the ripple factor in a.d.c. power supply.
5. Electronic Voltmeter measurement of peak, average & R.M.S. values of signal.
6. Study of voltage doubler and trippler circuits.
7. To determine the value of plank constant using light source.
8. To draw frequency response curve of transistorised R.C. coupled amplifier.
9. Study of series and parallel resonance circuits.
10. Rydberg constant by Hydrogen gas spectrum.

SCHEME OF EXAMINATION
Semester V

Paper III 20UPHY -503: Physics Lab V

Max. Marks: 40
Internal Assessment:10
Time: 3Hrs.

NOTE:

1. Do any eight experiments.
2. The students are required to calculate the error involved in a particular experiment (percentage error).
3. **Distribution of Marks:**

Experiment:	20 mark
Viva Voce:	10 marks
Lab Record:	10 marks
Total	40 marks

4. **Distribution of internal assessment Marks:**

Internal Viva Voce:	5 marks
Attendance:	5 marks (>75% 3marks; >85% 5 marks)
Total	10 marks

For giving marks under Lab. practicals each college will maintain practical assessmentrecord by using the following procedure: -

1. Each student has to perform a minimum number of experiments prescribed in thesyllabus.
2. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded in their practical note book. These marks will constitute the internal viva-voce marks. While taking the final average the total marks obtained will be divided by the total no. of required practicals.
3. The lab. record register (which contain the number of practicals performed by the students) will be presented to the external practical examiners for assessment. The external examiners will verify the record randomly.

1. Verification of Truth tables of logic gates (NAND, NOR, AND, OR, NOT).
2. e/m by Thomson method.
3. Study of B-H Curve by C.R.O.
4. To study Hall effect.
5. Measurement of Energy Gap by Four Probe Method.
6. To study the Light Emitting Diode
7. To study double sit interference by He-Ne laser.
8. To print out all natural (even/odd) number between given limits using computer.
9. Young's Modulus by Newton's Ring.
10. Diameter of a wire using Diffraction method by LASER.

SCHEME OF EXAMINATION
Semester VI

Paper III 20UPHY-603: Physics Lab VI

Max. Marks: 40
Internal Assessment: 10
Time: 3Hrs.

NOTE:

1. Do any eight experiments.
2. The students are required to calculate the error involved in a particular experiment (percentage error).
3. **Distribution of Marks:**

Experiment:	20 mark
Viva Voce:	10 marks
Lab Record:	10 marks
Total	40 marks

4. **Distribution of internal assessment Marks:**

Internal Viva Voce:	5 marks
Attendance:	5 marks (>75% 3marks; >85% 5 marks)
Total	10 marks

For giving marks under Lab. practicals each college will maintain practical assessmentrecord by using the following procedure: -

1. Each student has to perform a minimum number of experiments prescribed in thesyllabus.
2. After the completion of a practical the teacher concerned will check the notebook and conduct the viva-voce of each student to find out how much concepts related to the theoretical and experimental part of the experiment he/she has understood. According to his/her performance marks will be recorded in their practical note book. These marks will constitute the internal viva-voce marks. While taking the final average the total marks obtained will be divided by the total no. of required practicals.
3. The lab. record register (which contain the number of practicals performed by the students) will be presented to the external practical examiners for assessment. The external examiners will verify the record randomly.

1. Transistor characteristic: CB, CE, CC.
2. Study of Hartley Oscillator
3. Study of Collpits Oscillator
4. Resolving power of a prism
5. Resolving power of a grating
6. To Draw the Plateau of G.M. Counter.
7. To Determine the Mass Attention Coefficient by G.M.Counter.
8. To measure the background radiation using Survey meter.
9. Operational characteristics
10. Op-Amp as: Differentiator and Integrator.