

SHIVAJI UNIVERSITY, KOLHAPUR

B.Sc. Part – II Physics Revised Syllabus

(with effect from June-2014)

Semester - III

Paper -V (General Physics, Sound and Acoustics)

Lect.

UNIT-I

(11)

Vectors:

Del operator, gradient of a scalar, divergence of a vector and their physical significance, curl of a vector, line integral, surface integral, volume integral, (definitions only), Gauss's divergence theorem, Stoke's theorem and Green's theorem.

UNIT-II

(11)

Precessional Motion:

Precession, torque necessary for precession, nutation, gyroscope, Lanchester's rule, gyrostatic pendulum, motion of rolling disc and hoop, gyroscopic applications- riding on a bicycle, refilling of barrels of guns and rifles.

UNIT-III

(12)

Elasticity:

Torsional oscillation, torsion of a wire, couple per unit twist and expression for modulus of rigidity, flat spiral spring- expressions for Y and η .

Viscosity:

Viscosity of liquid by rotating cylinder method, Searle's viscometer, viscosity of gases by Rankine's method (qualitative treatment only).

UNIT-IV

(11)

Sound:

Transducers and their characteristics, pressure microphone, moving coil loud speaker, process of recording and reproduction of sound in compact disc.

Acoustics of Buildings:

Reverberation time, factors affecting acoustics of buildings, Sabine's experimental work and formula, optimum reverberation time, requirements of good acoustics.

Reference Books:

1. Mathematical Physics by Rajput-Gupta.
2. Physics volume I - Halliday & Resnick.
3. Elements of properties of matter by D.S.Mathur.
4. Properties of Matter-Newman & Searl
5. Textbook of sound - Brijalal-Subramanyam.
6. Sound by F. G. Mee.
7. Sound by Khanna and Bedi.
8. Sound by Wood A.B.

Semester - III**Paper - VI (Electronics and Semiconductor Devices)****UNIT-I**

(11)

Cathode Ray Oscilloscope:

Principle, construction and working of CRT, block diagram of CRO, uses of CRO (measurement of A.C., D.C. voltage, Lissajous figures, Periodic time and frequency measurement).

Oscillator:

Types of wave forms, oscillations from tank circuit, Barkhausen's criterion for sustained oscillations, phase shift oscillator, Colpitt's oscillator, crystal oscillator.

UNIT-II

(11)

Operational Amplifier:

Differential amplifier and its types, comparison between normal amplifier and differential amplifier, qualitative explanation of common mode and differential mode gains and CMRR, Op-Amp symbol, block diagram of Op- Amp., OP-

Amp. parameters- input offset current, input offset voltage, input bias current, slew rate, input impedance, output impedance, open loop gain, close loop gain, bandwidth, characteristics of ideal Op-Amp., necessity of negative feedback in Op-Amp., inverting amplifier (voltage gain), Op-Amp. as a differentiator and integrator.

UNIT-III

(11)

Digital Electronics:

Review of basic logic gates, study of NAND, NOR, Ex-OR and Ex-NOR gates, De-Morgan's theorems, NAND and NOR as the universal gates, R-S flip flop, J-K flip-flop, half adder, full adder and parallel binary adder.

UNIT-IV

(12)

Unijunction Transistor:

Construction, working and characteristics of UJT, concept of negative resistance of UJT, application of UJT as voltage sweep generator.

Field Effect Transistor:

Types of field effect transistors (FETs), construction, working and characteristics of JFET, application of FET as VVR.

Reference Books:

- 1) Schaums outline series- programming with C, second edition, Byron S.Doltfried (Tata McGraw-Hill).
- 2) Principles of Electronics, V.K.Mehata & Shahu Mehata (S.Chand.)
- 3) Electronics Principles: III Edition, Malvino (Tata McGraw Hill).
- 4) Digital principles and Applications: IV Edition, Malvino and Leach.
- 5) Industrial Electronics, G. K. Mithal
- 6) Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad.
- 7) A text book of Applied Electronics, R.S. Sedha

Semester - IV
Paper - VII Optics and Lasers

UNIT-I (11)

Cardinal Points:

Cardinal points of an optical system (definitions only), graphical construction of image using cardinal points, Newton's formula, relation between f and f' for any optical system, relation between lateral, axial and angular magnifications.

UNIT-II (12)

Interference of light:

Michelson's interferometer and its applications to measure i) wave length of light ii) refractive index of thin film, construction and working of Fabry – Perot interferometer, superiority of F-P interferometer over Michelson's interferometer.

Diffraction of light:

Theory of Fresnel's half period zones, principle, construction and working of zone plate, Fresnel's diffraction at a straight edge.

Optical Fibers:

Principle and structure, types of optical fibers, numerical aperture (definition only) and pulse dispersion in step index fiber, fiber optic communication system (qualitative treatment only), advantages of optical fibers.

UNIT-III (11)

Resolving Power:

Rayleigh's criterion for the limit of resolution, modified Rayleigh's criterion, resolving power of plane diffraction grating, resolving power of a prism.

Laser System:

Absorption, spontaneous and stimulated emission, Einstein coefficients (only definitions), population inversion, optical and electrical pumping, properties of lasers, Ruby laser, Helium-Neon laser, uses of laser, idea of holography (qualitative treatment only).

UNIT-IV

(11)

Polarization of light:

Idea of polarization, polarization by double refraction, Huygens explanation of double refraction through uniaxial crystals, optical rotation - laws of rotation of plane of polarization, polarimeter.

Reference Books:

1. Geometrical and Physical optics by D. S. Mathur.
2. A Text book of optics (New edition) by Subrahmanyam and Brijlal.
3. Fundamentals of optics by Jenkins and White.
4. Optics (second edition) by Ajay Ghatak.
5. Laser and Non liner optics by B.B. Laud.
6. Optics & Atomic Physics - Satya Prakash.

Semester - IV

Paper - VIII Relativity and Modern Physics

UNIT-I

(11)

Relativity:

Inertial and non-inertial frame of reference, Galilean transformation, ether hypothesis. Michelson- Morley experiment, postulates of the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition theorem, variation of mass with velocity, mass-energy equivalence relation.

UNIT-II

(11)

Wave Particle Duality:

De-Broglie hypothesis and derivation of wavelength of matter wave, explanation of wave packet, group velocity, phase velocity, relations between them, Davission and Germer experiment, Bohr's quantum condition on the basis of matter waves, Heisenberg's uncertainty principle (statement and explanation)

UNIT-III

(11)

Vector Atom Model:

Space quantization, electron spin hypothesis, quantum numbers, Pauli's exclusion principle, effect of magnetic field on atom – magnetic moment due to orbital motion of an electron, normal Zeeman effect, explanation of normal Zeeman effect using magnetic orbital quantum number.

UNIT-IV

(12)

X rays:

Explanation of Continuous and characteristics x-ray spectra, Bragg's law, intensity of X-rays, Mosley's experimental work, Mosley's diagram, Mosley's law, scattering of radiations, Compton Effect, expression for change in wavelength, experimental verification of Compton Effect.

Nuclear Energy Sources:

Neutron induced reactions, nuclear fission, energy released in fission, chain reaction, Nuclear reactor, nuclear fusion, sources of stellar energy (C-N cycle, P-P cycle).

Reference Books:

1. Introduction of special Relativity by Robert Resnik.
2. Perspectives of modern Physics-Arthur Beiser.
3. Atomic and nuclear Physics by Gupta and Gosh, 2nd Edition.
4. Quantum Mechanics by sing, Bagade, Kamal Sing, Chand & Comp.
5. Introduction to Atomic and Nuclear Physics by H. Semat and Albright.
6. Atomic Physics by J.B. Rajam.
7. Concepts of modern Physics by S.L. Gupta and S. Gupta, Dhanpatrai and Sons.

Note for examination

1. Equal weightage should be given to all units.
2. Two multiple choice questions may be asked from each unit.

B.Sc. Part II (List of Physics experiments)

Group I(General Physics and Sound)

1. Y by Searle's method
2. Y by vibration of a bar
3. Modulus of rigidity by torsional oscillations
4. S.T. by Quincke's method
5. S.T. by ripples method
6. Viscosity of liquid by Searle's viscometer.
7. Velocity of sound in air by Kundt's tube and audio oscillator
8. Velocity of sound in air by resonating bottle.

Group II(Optics)

1. Biprism - determination of wavelength
2. Goniometer - Equivalent focal length
3. Goniometer - Cardinal points
4. Determination of Cauchy's constants
5. Resolving power of grating
6. R.P. of prism.
7. Polarimeter
8. Double refracting prism

Group III (Electronics and Computer)

1. Study of transistor series voltage regulator.
2. Colpitt's oscillator.
3. Phase shift oscillator.
4. Study of NAND, NOR, Ex-OR and Ex-NOR gates / computer skill testing (MS Office –Excel).
5. Verification of De Morgan's Theorem / computer skill testing (MS Office – Power point Presentation)

6. AC/DC Sensitivity of C.R.O. and measurement of unknown frequency.
7. Characteristics of FET.
8. FET as VVR.

Group IV(Electricity)

1. Constants of B. G.
2. Comparison of capacities by De Sauty's method.
3. Mutual inductance by B.G. method.
4. Carey Foster Bridge- measurement of low resistance
5. Calibration of bridge wire by Griffith's method.
6. Frequency of an oscillator by Wien's bridge.
7. High resistance by equal deflection method.
8. Series resonance of LCR circuit.

Note

1. Study tour may be arranged for B. Sc. II class Physics students.
2. At least 80% practicals should be performed by the student.
3. Practical examination would be conducted annually.

TITLES FOR THEORY PAPERS

Semester	Paper No.	Paper title(Old)	Paper title(New)
Sem-III	Paper-V	General Physics, Sound and Acoustics	General Physics, Sound and Acoustics
	Paper-VI	Electronics and Computer Programming	Electronics and Semiconductor Devices
Sem-IV	Paper-VII	Optics and Lasers	Optics and Lasers
	Paper-VIII	Relativity and Modern Physics	Relativity and Modern Physics