

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. Part – II Physics Syllabus with effect from June-2012
Semester - III
Paper - V General Physics, Sound and Acoustics

Lect.

UNIT I

Vectors: (11)

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 divergence theorem, Stoke's theorem and Green's theorem.

UNIT II

Precessional Motion: (10)

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

UNIT III

1. Elasticity: (7)

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

2. Viscosity: (5)

Viscosity by rotating cylinder method for liquid, Searle's viscometer, viscosity of gases by Rankine's method [Qualitative treatment only].

UNIT IV

1. Sound: (6)

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

2. Acoustics of Buildings: (6)

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

Semester - III

Paper - VI Electronics and Computer Programming:

UNIT I

Lect.

1. Cathode ray oscilloscope:

(5)

Principle, construction & working of CRT, block diagram of CRO. Uses of CRO (measurement of A.C, D.C. voltage, Lissajous figures, Time period and frequency measurement)

2. Transistor amplifier:

(6)

Single stage common emitter transistor amplifier, DC & AC load line, frequency response curve of an amplifier, negative and positive feedback, effect of negative feedback on the gain response curve.

UNIT II

1. Oscillator:

(5)

Types of wave forms, oscillations from tank circuit, Barkhausen's criterion for sustained oscillations, Phase shift oscillator, Colpitt's oscillator, Crystal Oscillator (qualitative treatment only)

2. Operational Amplifier:

(7)

Differential amplifier and its types, comparison between normal amplifier & 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, power band width Characteristics of ideal Op-Amp, Necessity of negative feedback in Op-Amp.

UNIT III

Digital electronics:

(9)

Review of basic gates, Study of NAND, NOR, Ex-OR and Ex-NOR gates. De Morgan's theorems, NAND and NOR as the universal gates, Half adder and Full adder. R-S flip flop, J-K flip-flop.

UNIT IV

1. C-Language fundamentals:

(8)

Algorithm, flowchart, What is C, character set, identifiers, keywords, constants, variables, data types in C, assignment statement, defining symbolic constants, operators – Arithmetic, Relational, Logical, Assignment, Conditional, Comma, Increment and decrement and expressions.

2. Data input-output & Control statements:

(5)

Data input and output using scanf function, printf function, if statement, if-else statement, loop structures, while statement, do-while statement, for statement, give illustrative example for each.

B. Sc. II Physics
Semester - IV
Paper - VII Optics and Lasers

UNIT I

Lect.

Cardinal points:

(10)

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

1. Interference of light:

(5)

Michelson's interferometer & its applications to measure i) wave length of light ii) refractive index of thin film Construction & working of Fabry - Perot Interferometer, Superiority of F-P interferometer over Michelson's interferometer

2. Diffraction of light:

(5)

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

3. Optical fibers:

(3)

Structure and types of fibers, Numerical aperture (definition only) and pulse dispersion in step index fiber, fiber Optic communication system (Qualitative treatment only). Advantages of optical fiber.

UNIT III

1. Resolving Power:

(6)

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

2. Laser system:

(6)

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

UNIT IV

Polarization of light:

(10)

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

Semester - IV
Paper - VIII Relativity and Modern Physics

UNIT I

Lect.

Relativity:

(12)

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.

UNIT II

Wave particle duality:

(10)

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

UNIT III

Vector atom model:

(12)

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 quantum number.

UNIT IV

1. X rays:

(6)

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.

2. Nuclear Energy Sources:

(5)

Neutron induced reactions, nuclear fission energy released in fission, chain reaction, Nuclear reactor, Atomic Energy in India.

Reference Books:

Semester III Paper- V

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 - Brijlal-Subramanyam.
6. Sound by F. G. Mee.
7. Sound by Khanna and Bedi.
8. Sound by Wood A.B.

Semester III Paper- VI

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

Semester IV Paper- VII

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

Semester IV Paper- VIII

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 Singh, Bagade, Kamal Shing, 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)
(w. e. f. June 2011)

Group I: - (General Physics & 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 & Computer Programming)

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.
5. Verification of De Morgans Theorem
6. Sensitivity of C.R.O. and measurement of unknown frequency.
7. C – Programming: - A) Area of Circle B) Area of rectangle
8. C – Programming: -A) Use of if-else statement B) Use of for statement.

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 eighty percent practical should be performed by the student.
3. Practical examination would be conducted annually.

EQUIVALENCE FOR THEORY PAPERS
(w. e. f June-2012)

Annual pattern	Semester pattern
Paper III Gen. Physics sound and Acoustics Optics and laser	Semester III Paper V General. Physics, Sound and Acoustics Semester IV Paper VII Optics and laser
Paper IV Electronics & Computer Programming Relativity & Modern Physics	Semester III Paper VI Electronics & Computer Programming Semester IV Paper VIII Relativity & Modern Physics