



MAHARAJA KRISHNAKUMARSINHJI BHAVNAGAR UNIVERSITY

NAAC Accreditation Grade "B"
(With effect from Academic Year 2014-2015)

Academic Council: 23 / 11 / 2013, R.No. (2)

Second Year B.Sc. PHYSICS

Paper No-PHY-201:	Mechanics, Optics, Sound	Total Marks: 75
Paper No-PHY-202:	Mathematical Physics, Electricity & Magnetism	Total Marks: 75
Paper No-PHY-203:	Nuclear Physics, Molecular Spectra and Spectroscopy, Electronics, Instrumentation and Number System in digital Electronics, Solid State Physics	Total Marks: 75
Paper No-PHY-204:	Practical	Total Marks: 75



S.Y. B.Sc.
PHYSICS

Paper No: PHY-201: Mechanics, Optics, Sound

Total Marks: 75 Marks

Unit	Detailed syllabus	Teaching Hours	Marks
Unit-1	Equivalent one body problem, Motion in a central force field, Unit vector in polar co-ordinate system, Radial and tangential acceleration component in polar co-ordinate system, General features of the motion, Equation of the orbit, Types of the orbit, Problems	15 lectures	15
Unit-2	Group velocity and Phase velocity, Schrodinger wave equation for a particle subjected to a force in one dimension and three dimensions, Probability interpretation of the wave function, Normalization of wave function, Conservation of probability, Eigen value, Eigen function, Particle in a box, Problems	15 lectures	15
Unit-3	Macroscopic States, Microscopic States, Fluctuations and their dependence on N molecules, Phase space, Phase trajectory, Density distribution in the phase space, Volume in phase space, Division of phase space into cells, μ -Space, Γ -Space, Concept of ensemble, Types of ensemble, Canonical distribution, Thermodynamic probability, β - Parameters, Entropy & probability, Law of equipartition of energy, Boltzmann Canonical distribution, Evaluation of constant A and B, Fundamental assumptions of Kinetic theory of gases, Maxwell-Boltzman distribution law of velocities, Problems	15 lectures	15
Unit-4	Fraunhofer and Fresnel diffraction, Grating, Resolving power of grating, Resolving power of Prism, Resolving power of Telescope, Comparison of grating spectra & prism spectra, Introduction to Eye pieces: (1) Kellner eyepiece (2) Ramsden eyepiece (3) Huygens's eyepiece (4) Gauss eyepiece, Comparison of Ramsden eyepiece and Huygens's eyepiece, Circular polarized light, Elliptical polarized light, Malus's law, Dichroism, Birefringence, Problems	15 lectures	15
Unit-5	Doppler effect for different cases, Limitation of doppler's principle, Architectural Acoustics, Loudness, Reverberation (Sabine's formula), Determination of absorption coefficients, Properties of Ultrasound, Production of ultrasonic wave, Magnetostriction generator, Piezo-electric generator, Detection of Ultrasonic waves, Methods for Ultrasonic Velocity Measurement, Uses of ultrasonic (Physical, Medical & Navigation), Problems	15 lectures	15

Reference/Text book/ Additional Reading:

1. Introduction to classical mechanics by R. G. Takwale & Puranik
2. Introduction to classical mechanics by Shrivastava & Gupta
3. Introduction to Quantum mechanics by Mathews & Venkateshan
4. Quantum Mechanics by Ahuti Narayan Konark
5. Quantum Mechanics by Shrivastava



6. Fundamental of statistical Mechanics by B. B. Laud (New Age International)
7. Elementary statistical mechanics by Gupta & Kumar (Pragati Prakashan)
8. Thermodynamics and statistical physics by Aggarwal and Satyaprakash (Pragati prakashan)
9. Principles of Optics by B. K. Mathur
10. Optics by Eugene Hecht pearson Education
11. A Text book of sound by R. L. Saihgal (S. Chand)
12. A Text book of sound by M. Ghosh (S. Chand)



S.Y. B.Sc.
PHYSICS

Paper No: PHY-202: Mathematical Physics, Electricity and Magnetism

Total Marks: 75 Marks

Unit	Detailed syllabus	Teaching Hours	Marks
Unit-1	Definition & representation of a complex function and complex variables in argand plane and polar plane, complex conjugate, conversion of complex function and variable in different planes, Analytic function, Cauchy Riemann Condition, Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Definition of Fourier series, Evaluation of coefficient of Fourier series, Cosine & Sine series, Complex representation of Fourier series, Problems	15 lectures	15
Unit-2	Types of Galvanometer: (1) Dead beat Galvanometer (2) Ballistic Galvanometer, (3) Moving iron Galvanometer, (4) Moving Coil Galvanometer, Damping, Wattmeter, Hall effect in conductor, Hall probe, Problems	15 lectures	15
Unit-3	Concept of gradient, divergence & Curl, Poisson's and Laplace's equation, Solution of Laplace's equation in Cartesian Co-ordinate system, Electrical Images, Type of Capacitor, Uses of Capacitor, Energy of charged Condenser, Capacity of cylindrical condenser, Capacity of spherical condenser, Problems	15 lectures	15
Unit-4	Measurement of Susceptibility : Rowland method, Hysteresis I & B verse H Curves, Langevin's theory for paramagnetic substances, Weiss theory for ferromagnetic substance, Hysteresis Loss, Magnetic Circuit, Problem	15 lectures	15
Unit-5	Equation of Continuity, Concept of displacement current, Derivation of Maxwell equation (in differential & integral form), Physical Interpretation of Maxwell's equation, Maxwell equation in free space, Linear Isotropic Media and Harmonically Varying Fields, Poynting theorem, Problems	15 lectures	15

Reference/Text book/ Additional Reading

1. Mathematical Physics by S. Chand
2. Mathematical Physics by Mary Bose
3. Mathematical Physics by Rajput
4. Fundamental of Magnetism & Electricity by D. N. Vasudeva (S. Chand & Comm.)
5. Electricity and Magnetism by R. Murugesan (S. Chand)
6. Introduction to Electrodynamics by D. J. Griffith
7. Electrodynamics by J .D. Jackson
8. Electrodynamics by S. L. Gupta & V. Kumar (S. P. Sinsh, Pragati prakshan)
9. Halliday and Resnik, "Physics", Vol. 2



S.Y. B.Sc.
PHYSICS

Paper No: PHY-203: Nuclear Physics, Spectroscopy, Electronics and SSP

Total Marks: 75 Marks

Unit	Detailed syllabus	Teaching Hours	Marks
Unit-1	α - Decay, Barrier Penetration, Gamow's theory of α - Decay, Range of α - particle, Geiger-Nuttall law, Determination of velocity and energy of α - particle using magnetic spectrograph, α - particle spectrum, Qualitative explanation of continuous β - particle spectrum, Anomalies of continuous β - particle spectrum, Pauli's Neutrino hypothesis, Problems	15 lectures	15
Unit-2	Atomic Spectra: Spectra of alkali and alkaline elements, Different series in alkali spectra and Ritz's combination principle, Zeeman effect and its classification, Classical interpretation of normal Zeeman effect Molecular spectra: Explanation of rotational spectra & vibration spectra with derivation, Experimental arrangement of Raman effect, Classical theory and quantum theory of Raman effect, Problems	15 lectures	15
Unit-3	Transistor: Introduction, Transistor load line analysis, Transistor biasing & stability factor, Methods of transistor biasing, Feedback: Introduction, Types of feedback, Oscillators: Introduction, Classification, Barkhausen Criterion, Tank circuit, LC Oscillator, Colpitt Oscillator, Hartley Oscillator, Problems on Feedback and Oscillators, Zener diode, FET	15 lectures	15
Unit-4	Instrumentation: G M Counter, Feby - Perot Interferometer, Oscilloscope, Function generator, Number system in digital electronics: Mutual conversion of decimal, binary and hexadecimal numbers, Addition, subtraction, multiplication of binary and hexadecimal number	15 lectures	15
Unit-5	Introduction to Interatomic forces in solids, Force between atoms, Cohesion of atoms and cohesive energy Madelung constant, Calculation of cohesive energy, Different types of Bonds in solids, Reciprocal Lattice and determination of crystal structure, Relation between a, b, c and a^* , b^* , c^* , Brillouin zone, Bragg's Law, Laue's interpretation of X-Ray Diffraction by Crystal, Crystal defects and its classification, Problems	15 lectures	15

Reference/Text book/ Additional Reading:

1. Nuclear Physics by S. B. Patel
2. Nuclear Physics by Pandya and Yadav
3. Elements of spectroscopy by Gupta, Kumar and Sharma
4. Molecular Spectroscopy by G. King
5. Electronics by V. K. Mehta
6. Principle of Electronics by V. K. Mehta and Rohit Mehta
7. Digital Electronics by A. Anand
8. Elements of solid state physics by J. P. Shrivastava
9. Solid State Physics by S. O. Pillai
10. Solid State Physics by C. Kittel



S.Y. B.Sc.
PHYSICS

Paper No: PHY-204: Physics Practical

**Total Marks: 75 Marks
(25 Marks for each Section)**

Section A: GENERAL PHYSICS, HEAT, SOUND, & LIGHT

1. Determination of Young's Modulus 'Y' of a bar by bending.
2. Determination of modulus of rigidity 'η' of wire by Maxwell's needle.
3. Determination of surface tension of mercury by Quinck's method.
4. Verification of Stefan's law of radiation.
5. Determination of resolving power of prism.
6. Determination of wave length of sodium source by Biprism.
7. To determine Cauchy's constant.
8. To verify the Newton's formula $x_1 x_2 = f^2$ for lenses separated by given distance.
9. Determination of Young's Modulus 'Y' of a bar by elevation.
10. Determination of Modulus of rigidity 'η' of rod by Searle's statical method
11. Determination of Viscosity of liquid by co-axial cylinder.
12. Determination of Thermal conductivity of rubber tube.
13. Determination of focal length of an optical system by means of a Goniometer. (Searle's Method)
14. Determination of resolving power of grating.
15. Determination of wavelength of Sodium source by cylindrical edge or straight edge diffraction.

Section B: ELECTRICITY AND MAGNETISM

1. Determination of current sensitivity of Ballistic Galvanometer.
2. Determination of capacity ratio by Desauty's bridge using Ballistic Galvanometer.
3. Determination of High resistance & leakage resistance by Ballistic Galvanometer.
4. Determination of low resistance by Potentiometer.
5. Determination of thermo EMF of thermo couple.
6. To convert a galvanometer in to an ammeter of a given range.
7. To determine the self inductance of a given coil by Maxwell's induction bridge.
8. Determine Ballistic constant and resistance of Ballistic Galvanometer.
9. Determination of capacity ratio by method of Mixture.
10. Determination of resistance of unit length of potentiometer wire and to find specific resistance of coil by Carey-Foster method.
11. Determination of unknown frequency of audio-frequency oscillator by Wein's bridge.
12. To convert a galvanometer in to a voltmeter of a given range.
13. To study a transformer: Determination of Parameters of transformer.
14. To determine absolute value of capacitor using Ballistic Galvanometer.

Section C: ELECTRONICS AND MODERN PHYSICS

1. Determination of value of e/m by Thompson's method.
2. Determination of inductance of coil by Hartley Oscillator and calibration of variable air capacitor.
3. To study voltage – regulation characteristics of Zener diode.
4. To study characteristics of FET .
5. To study frequency response of RC Amplifier .
6. To study Dynamic characteristics of transistor and find quiescent point.
7. To determine e/m of an electron by magnetic focusing method.
8. Determination of Plank's constant 'h' by Photo cell.
9. Determination of inductance of coil by Colpitt's oscillator.



10. Determination of Q-factor of parallel resonance (LCR).
11. To study voltage multiplier (Double-half wave & full wave, Triplex and Quadruplet)
12. To study solar cell characteristics.
13. Absorption coefficient of liquid using Photo voltaic cell.
14. To determine the band gap in a semiconductor using a P N junction diode.

Reference Book:

1. Advanced Practical Physics (Vol -1 & 2) - Singh (Pragati Prakashan)
2. Practical Physics - Kumar Gupta (Pragati Prakashan)
3. B.Sc. Practical Physics - C. L. Arora (S. Chand)