

**SOLAPUR UNIVERSITY,
SOLAPUR
Revised Semester Pattern Syllabus
B.Sc. Part I Physics
(w. e. f. June 2013)**

N. B.:-

i) There will be two theory papers, each of 50 marks. (Paper I and paper II for first semester and Paper III and paper IV for second semester) Annual practical examination will be of 50 marks.

The total marks for physics subject will be 250.

ii) There shall be 2.5 periods per paper i.e. 5 periods per week for theory and 4 periods per week for each batch of 20 students for practical.

iii) The duration of theory examination for each paper will be 2 hours each and that for practical will be 6 Hours. There will be two sessions for annual practical examination each of 3 hours

iv) Theory examination of Physics Paper-I & II will be held at end the of first Semester.

v) Theory examination of Physics Paper-III & IV will be held at end the of second Semester.

vi) Practical examination of both terms will be held at the end of semester II. Every student will have to perform two experiments (one each from Group I and Group II).

Semester-I

Titles of theory paper

Paper I – Mechanics and properties of matter. 50

Marks

Paper II – Optics and Laser 50

Marks

Semester-II

Titles of theory paper

Paper III – Heat and Thermodynamics	50
Marks	
Paper IV – Electricity, Magnetism and Basic Electronics	50
Marks	
Practical at the end of Second Semester	50
Marks	

Any 8 experiments from each group are required to certify the Journal. 10 Marks for certified journal should not be given in case of loss certificate. Student may appear practical examination for 20+20=40 marks with prior permission of his/her Principal. Examiner and Lab Sup will allow him/her only after submission of permission letter.

Paper I: - Mechanics and Properties of Matter.

Topic 1 – Moment of Inertia 09

Review of M.I., Moment of Inertia of 1) Circular disc 2) Rectangular lamina 3) Spherical Shell 4) Fly wheel.

Topic 2 – Pendulums 10

Introduction, Theory of compound pendulum, Bar pendulum, Kater's Pendulum, Bessel's Theory, Bifilar pendulum (parallel suspensions of equal lengths), Torsional Pendulum.

Topic 3 – Elasticity 07

Introduction, Equivalence of shear strain to compression and extension strains, Relation between elastic constants, Poisson's ratio of rubber tube (Theory and experimental method)

Topic 4 – Surface Tension 08

Review of S.T., relation between excess pressure and surface tension, excess pressure inside a liquid drop and soap bubble, Jaeger's method to determine Surface Tension, Factors affecting Surface Tension, Applications of Surface Tension.

Topic 5 – Viscosity and Fluid dynamics **08**

Introduction, Newton's law of viscosity, streamline and turbulent flow, Critical velocity and Reynolds number, Equation of continuity, Energy possessed by liquid, Poiseuille's equation, Bernoulli's theorem and its applications to 1) Venturimeter 2) Automiser. Factors affecting on viscosity.

Reference books:-

- 1) Properties of matter- D.S. Mathur
- 2) A Text book of properties of matter- N.S. Khare & S.Kumar
- 3) Physics Vol.I –David & Robert Resnick
- 4) University Physics-Mechanics of a particle- Anvar Kamal

Paper – II - Optics and Laser

Topic 1 – Geometrical Optics and aberrations **10**

Introduction, Fermat's principle, Deduction of laws of reflection and refraction by Fermat's principle, Chromatic and Spherical aberration, methods to minimize Chromatic and Spherical aberrations.

Topic 2 – Optical Instruments **08**

Introduction, Types of eye-pieces, Gauss eye piece, Ramsden's eye-piece, Huygen's eye-piece, Construction, working and Application of Spectrometer and Optical bench.

Topic 3 – Interference **08**

Introduction, Interference in parallel faced thin film (Reflected light only), wedge shaped film, Newton's rings and its applications.

Topic 4 – Diffraction **08**

Introduction, Types of diffraction, Plane diffraction grating and its elementary theory, its application to determine wavelength, Comparison between prism and grating spectra

Topic 5 – Laser

08

Introduction, Spontaneous and Stimulated emission and absorption, Einstein's Coefficients, Population inversion, Optical Pumping, Cavity resonator, He-Ne and Ruby Laser, Properties and application.

Reference books:-

1. Ray Optics by R K Verma.
2. Text Book of Optics (new edition) – Brijlal and Subramanyam
3. Optics(second edition) – Ajay Ghatak
4. Concept of Physics – H C Verma
5. Laser and Optics – B. B. Loud
6. Optics by Mathur

Paper – III Heat and Thermodynamics

Topic 1 –Transport Phenomenon

08

Introduction, mean free path, Claussius expression for mean free path (Collision cross section), Transport Phenomenon, Coefficient of Viscosity, Thermal Conductivity and its dependence on temperature and pressure

Topic 2 - Liquefaction of Gases

08

Liquefaction of gases by J-T effect, Linde's air liqefier; cooling by adiabatic demagnetization and expression for fall in temperature, experimental setup for adiabatic demagnetisation of paramagnetic substances, properties of liquid helium

Topic 3 – Thermodynamics

10

Laws of thermodynamics, Reversible and Irreversible processes, Isothermal and adiabatic process, Adiabatic relations, work done during isothermal and adiabatic processes, Entropy change in reversible and irreversible processes.

Topic 4 – Heat engines **08**

Introduction, Carnot's heat engine and its efficiency; Heat engine, Otto cycle and its efficiency, Diesel cycle and its efficiency, comparison between Otto and diesel engine.

Topic 5 –Refrigerator **08**

General principle, Refrigeration Cycle, coefficient of performance of refrigerator, Vapor compression Refrigerator, Air conditioning (principle and applications)

Reference books:-

- 1) Treatise on heat – Saha & Shrivastav
- 2) Kinetic theory of gases – V.N. Kelkar
- 3) Heat and Thermodynamics – Brijlal & Subrahmanyam

Paper – IV - Electricity, Magnetism and Basic Electronics

Topic 1 – Varying Current: **08**

Introduction, Growth and decay of current in L-R circuit, Charging and discharging of capacitor through resistor and inductor separately. Time constant of LR and CR circuit.

Topic 2 – A.C. Circuits: **08**

Complex number, J-Operator and its applications to AC circuits, Reactance, Susceptance, Impedance, Admittance and power factor, L-C-R circuit, series and parallel resonance circuits, sharpness of resonance and quality factor, AC bridge(Owen's bridge).

Topic 3 – Magnetostatics and Ballistic Galvanometer: **08**

Introduction, Biot and Savart's law & its application to determine magnetic induction at a point on the axis of current carrying coil of single turn and Solenoid.

Construction, theory and working of Ballistic Galvanometer, Constants of B G.

Topic 4 – Electronic circuit components and Devices :**09**

Classification of electronic circuit components as passive and active (Resistor, Capacitor, Inductor, Transformer, Switches, Relays, Diodes, Transistor, FET, SCR, UJT and IC) with their symbol and specification.

Bridge rectifier with Pie-Filter, Clippers, Clampers, Zener diode and its application as a voltage regulator.

Topic 5 – Bi-junction transistor:**09**

Construction and working of transistor, input-output and transfer characteristics of CE & CB mode, Relation between α and β . Transistor as amplifier (CE mode)

Reference books:-

- 1) Principles of electronics –V.K. Mehta
- 2) Electronics principles- Malvino
- 3) Basic electronics & linear circuits- Bhargav, Kulshrstha &Gupta
- 4) Electricity and Magnetism – Khare & Shrivastav
- 5) Foundations of electromagnetic theory- Reitz & Milford
- 6) Electronic devices & circuits-Allen Mottershed

Practical**Group I – General Physics, Heat**

1. Bar pendulum
2. Bifiler's pendulum
3. Torsional pendulum
4. Moment of Inertia of disc by annular ring
5. Poisson's ratio
6. Surface Tension liquid drop method
7. Thermal conductivity of insulator by Lee's method.
8. Viscosity of water by poiseullie's method
9. Viscosity by stoke's method
10. Frequency of AC mains by magnetic and nonmagnetic wire

Group II – Electricity, electronics, and optics

1. Use of Spectrometer to determine Angle of prism
2. Dispersive power of prism
3. Diffraction grating to determine its grating element
4. LASER (to determine its wavelength of LASER beam by using diffraction grating)
5. Newton's ring (to determine Wavelength and Radius of curvature of Plano-convex lens)
6. Photo cell (verification of inverse square law)
7. Bridge rectifier and π filter - β & γ
8. Out Put Characteristics Transistor amplifier in CE mode (transfer characteristics to determine β)
9. Zener diode as a voltage regulator
10. Temperature coefficient of resistance of Copper wire

Reference Books:-

- 1) Advanced Practical physics –Nelkon
- 2) Practical physics - Rajopadhye and Purohit

Solapur University, Solapur

Nature of question paper for semester pattern to B.Sc. I Physics

(w.e.f. June 2013)

Time :- 2 hrs.

Total

Marks-50

Q. No.1) Multiple choice questions.

(10)

1) -----

a)..... b)..... c)..... d).....

2)do.....

3)do.....

4)do.....

5)do.....

6)do.....

7)do.....

8)do.....

9)do.....

10)do.....

Q.No.2) Answer any five of the following

(10)

i) ii) iii)

iv) v) vi)

Q.No.3) A) Answer any two of the following

(06)

i) ii) iii)

B) Write the Answer/Solve/Problem/Note (compulsory)

(04)

Q.No.4) Answer any Two of the following

(10)

i) ii) iii)

Q.No.5) Answer any one of the following

(10)

i) ii)

N.B: -

- 1. Two numerical based sub-questions must be asked in question number one.**
- 2. One mathematical example of 2 marks must be asked in question number two.**
- 3. One mathematical example of 3 marks must be asked in question number 3A.**
- 4. One mathematical example of 5 marks must be asked in question number four.**
- 5. Example of 3 marks may add in fifth broad answer type question if derivation is asked.**
- 5. Weightage for each topic must be given as per period allotted to complete the topic.**
- 6. Weightage for each topic must not be less than 10 and it should not exceed 15 marks.**