SOLAPUR UNIVERSITY, SOLAPUR
Choice Based Credit System Syllabus
B.Sc. Part I Physics (w. e. f. June 2016)

N. B.:-

i) There will be two theory papers of 100 (70 % UA & 30 & CA) marks for each semester.
Practical examination at the end of second semester will be of 100 (70 % UA & 30 & CA)marks.
Total marks for physics subject will be 500 (70 % UA & 30 & CA) and 5 + 5 + 4 = 14 Credits.

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

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

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

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

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

Semester - I

(Theory Course)

Titles of theory papers

Core Subject: Physics Paper I – Mechanics and properties of matter.

100 (70 % UA and 30 % CA) Marks and (**2.5 Credits**)

Core Subject: Physics Paper II – Optics and Laser.

100 (70 % UA and 30 % CA) Marks and (**2.5 Credits**)

Semester – II

(Theory Course)

Titles of theory papers

Core Subject: Physics Paper III – Heat and Thermodynamics.

100 (70 % UA and 30 % CA) Marks and (**2.5 Credits**)

Core Subject: Physics Paper IV – Electricity, Magnetism and Basic Electronics.

100 (70 % UA and 30 % CA) Marks and (**2.5 Credits**)

Practical Course of Semester – I & II

(Practical Course examination at the end of second semester)

Titles of Practical Groups

Core Subject Physics Practical: Group I – General Physics and Heat

50 (35 UA and 15 CA) Marks and (**2 Credits**)

Core Subject Physics Practical: Group II – Electricity, electronics, and optics

50 (35 UA and 15 CA) Marks and (**2 Credits**)

ANNUAL PRACTICAL EXAMINATION AT THE END OF 2nd SEMESTER OF 100 Marks (UA – 70 Marks + CA – 30 Marks)

Group (I & II) experiments UA (25 * 2) + CA (15 * 2) = 50 + 30 = 80 Marks

Scale down of 25 Marks for UA per Group: As per given in the practical slips
Scale down of 15 Marks for CA per Group: -
(10 Marks for experimental performance, 03 Marks for attendance and 02 Marks for Oral)

Scale down of UA 20 marks of practical Assessment part during University Practical examination by external examiner only.
1. Journal …...…..…………………………………………20 Marks
    Certified Journal……………………….12 Marks
    Neatness & Punctuality (4+4)...……......08 Marks

Any 10 experiments from each group are required to certify the Journal. 20 Marks for certified journal should not be given in case of loss certificate. Student may appear practical examination for 25+25=50 marks with prior permission of his/her Principal. External Examiner will allow him/her only after submission of permission letter of their Head of Physics Department / Principal.

NATURE OF QUESTION PAPER FOR PHYSICS PAPER I & II

[COLLEGE ASSESMENT (CA) OF 30 MARKS]

(Internal examination taken by the college as per its own time table)

Time: - 1 hrs   Total marks: - 20

Q.No.1) Select the correct answer from the given alternatives.   **(05)**

    1) ---

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

    2) ………. ..Do ……….

    3) ………… Do ……….

    4) ………… Do ……….

    5) ………… Do ……….

Q.No.2) Answer any one of the following   **(05)**

    1)

    2)

Q.No.3) A) Answer any one of the following   **(10)**

    1)

    2)

AND ASSIGNMENT OF 10 MARKS FOR EACH PAPER

CORE PAPER: PHYSICS PAPER - I

Title: - 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, Bassel'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

CORE PAPER: PHYSICS PAPER - II

Title: - 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

CORE PAPER: PHYSICS PAPER - III

Title: - 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

CORE PAPER: PHYSICS PAPER - IV

Title: - 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 the LR and CR circuits.

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

CORE PAPER: PHYSICS PRACTICAL OF 04 CREDITS

Group I – General Physics and Heat

1. Bar pendulum
2. Bifiler's pendulum
3. Tortional 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
11. Newton's law of cooling – Specific heat capacity of any given liquid.
12. L C of various measuring various instruments, Errors: Instrumental errors; Bench error; Correction to the errors for more accuracy of any type of measurements. .

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: determination of β)
9. Zener diode as a voltage regulator
10. Temperature coefficient of resistance of Copper wire
11. Liquid lens to determine the refractive index of any liquid
12. Clipper / Clamper

Reference Books:-1) Advanced Practical physics –Nelkon

2) Practical physics - Rajopadhye and Purohit

3) Practical Physics – P R Sasi Kumar

Solapur University, Solapur

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

(w.e.f. June 2016)

Time :- 2 hrs.30 min.   **Total Marks-70**

Q. No.1) Multiple choice questions.   **(14)**

      1) ---
      a)……………   **b)**……………   **c)**……………   **d)**……………
      2) ……. do……
      3) ……. do……
      4) ……. do……
      5) ……. do……
      6) ……. do……
      7) ……. do……
      8) ……. do……
      9) ……. do……
      10) …….do……
      11) …….do……
      12) …….do……
      13) …….do……
      14) …….do……

Q.No.2) Answer any seven of the following   **(14)**

      1)

      2)

      3)

      4)

      5)

      6)

      7)

      8)

Q.No.3)   A) Answer any two of the following   **(10)**

      1)

      2)

      3)

B) Write the answer **(04)**

Q.No.4 Solve any two of the following **(14)**

       1)

       2)

       3)

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

       1) Essay type long answer question / Derive an expression **(10)**

       Example **(04)**

       2) ………. Do ……….

NB:

1. **At least two numerical based questions should be asked in Question No. 1**

2. **Question No. 2, 3A and 4 must be included one example to solve.**

3. **Weightage for each topic must be given as per period allotted to complete the topic.**

4. **Weightage for each topic must not be less than 10 and it should not exceed 15 marks.**