

## **B.Sc. (Semester-I)**

### **Syllabus for the examinations to be held in Dec. 2016, 2017, 2018**

**Subject: Physics (Theory)**

**Course Code/No.: UPHTC101**

**Title of the Course: Mechanics, Oscillations & Relativity Total Marks-100**

**No. of Credits: 04**

**Internal Assessment Test: 20 marks**

**Duration: 3 hours**

**End Semester University Examination: 80 marks (External)**

*The question paper shall be of 80 marks. There shall be 10 questions in the paper with two from each unit. Each question shall be of 16 marks. The students have to attempt 5 questions selecting one from each unit.*

#### **UNIT –I: Mechanics- I**

Unit vectors, displacement, area element, volume element, velocity and acceleration in plane polar, Cartesian, Spherical polar and cylindrical coordinate system.

Inertial and non inertial frames of references, uniformly rotating frame; Coriolis force and Centrifugal force, effect of centrifugal force due to rotation of the earth and coriolis force acting on a freely falling body, Geographical effects of coriolis force (qualitative)

#### **UNIT-II: Mechanics –II**

Two body system; laboratory and centre of mass system, relationship between displacements, velocities, kinetic energies and angles in lab and centre of mass system.

Inverse square law of force: Concept of central and non- central forces, equivalent one body problem. Angular momentum conservation in a central force field, Energy of reduced mass & its conservation, differential equation of orbit in a central force field, Turning points of motion, relation between eccentricity and energy, Kepler's laws & Satellite motion (Satellite Launching, Orbital speed, Escape Speed, altitude motion and time period).

#### **UNIT-III: Oscillation -I**

Differential equation and its solution, energy of simple harmonic oscillator, examples: Compound pendulum, Torsional pendulum, bifilar oscillations, Helmholtz resonator, LC circuit, Oscillation of two masses connected by a spring.

Nature of damping force, Damped simple harmonic oscillator, Differential equation and its solution, energy power dissipation, logarithmic decrement, relaxation time, quality factor, resistance and electromagnetic damping. Example of damping in physical systems, resistance damping, oscillatory discharge of a capacitor through circuit containing resistance and inductance, Electromagnetic damping in a moving coil galvanometer.

#### **UNIT-IV: Oscillation –II**

Driven harmonic oscillator, transient and steady state behaviour , solution of differential equation, velocity of the mechanical forced oscillator in the steady state, behaviour of displacement with driving force frequency , behaviour of velocity versus driving force frequency, power absorption and power dissipation, Sharpness of resonance, Quality factor, Electrical resonance.

#### **UNIT-V: Theory of Relativity**

Galilean transformations and conservation laws: conservation of momentum and energy. Search for ether and Michelson-Morley experiment.

Postulates of special theory of relativity, Lorentz transformations, Consequences of Lorentz transformations, Length contraction, time dilation, experimental evidence in support of time dilation, twin paradox, simultaneity of events, velocity theorem, variation of mass with velocity, mass energy equivalence, energy-momentum relation, Illustrative examples in support of mass-energy equivalence, transformation relations between momentum and energy, particle with a zero rest mass, Doppler effect.

#### **Scheme for Internal Assessment Test**

Upto 50% (after 45days) completion of the syllabus there shall be an internal assessment test of 20 Marks. It will carry two long answer type questions of 10 marks each and 8 short answer type questions out of which atleast two should be numerical problems. The students shall be asked to attempt one long answer and five short answer type questions.

#### **Note for examiners/paper setters**

There will be two questions from each unit. The students have to attempt one question. Each question comprise part A (Short answer type questions of 04 marks each) and B (Long answer type question of 12 marks each). Part A can be short answer type/numerical and part B would be long answer type. There should be atleast two numerical in part-A of the question paper.

#### **Text & Reference Books**

1. Mechanics by Hans and Puri.
2. Mechanics by Sikri.
3. Mechanics by D.S. Mathur
4. Classical Mechanics by Kumar and Gupta.
5. Classical Mechanics by Goldstien.
6. Waves and Vibrations by S.P. Puri.
7. Waves and oscillation by Brij Lal and Subramanum.
8. Waves and oscillation by A.P. French.
9. Waves and oscillation by S.L. Kakani.
10. Theory of Relativity by R. Resnick.
11. Theory of Relativity by French.
12. Theory of Relativity by Patharia.

## B.Sc. (Semester-I)

Syllabus for the examinations to be held in Dec. 2016, 2017, 2018

Subject: Physics (Practical)

Course Code/No.: UPHPC102

No. of Credits: 04

Internal Assessment: 50 marks

Final Practical Examination: 50 Marks

Total Marks-100

### List of the Practicals

1. To find the value of 'g' by bar pendulum.
2. To find the surface tension of water by Jaeger's Method.
3. To find Moment of Inertia of Fly-Wheel.
4. To find the Young Modulus by bending beam Method.
5. To find the frequency of AC supply by Electrical Vibrator.
6. To find the variation of magnetic field with distance.
7. To find low resistance by Carey Foster Bridge without calibrating.

### Reference Books

1. B. Sc Practical Physics by C. L. Arora.
2. Practical Physics by G L Squires Cambridge University Press
3. Advanced Practical Physics for Students by Worsnop and Flint
4. Practical Physics by R K Shukla
5. B.Sc Practical Physics by Harnam Singh

**Note: The candidates are required to complete at least 5 practicals.**

### Instructions for Internal/External Assessment

Internal Assessment:-

Total Marks=50

- i. Attendance (20% weightage)=10Marks
  - ii. Internal Test and day to day performance(60% weightage)=10(test)+20=30Marks
  - iii. Viva Voice(20% weightage)=10Marks
- a) External Practical Examination
- i. External Practical Paper=40Marks