W. E. F. 2016-17

B.Sc. PHYSICS SYLLABUS UNDER CHOICE BASED CREDIT SYSTEM
B.Sc. 1st Semester Physics
Paper I: Mechanics& Properties of Matter
(For Maths Combinations)

Work load: 60 hrs per semester   **4 hrs/week**

UNIT-I (10 hrs)
1. Vector Analysis
Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.

UNIT-II (10 hrs)
2. Mechanics of particles
Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, Collisions in two and three dimensions, Concept of impact parameter, scattering cross-section, Rutherford scattering - derivation.

UNIT-III (16 hrs)
3. Mechanics of Rigid bodies
Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum, Euler equations and its applications, precession of a top, Gyroscope, precession of the equinoxes.

4. Mechanics of continuous media
Elastic constants of isotropic solids and their relations, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

UNIT-IV (12Hrs)
5. Central forces
Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force. Derivation of Kepler's laws. Motion of satellites, idea of Global Positioning System (GPS).

UNIT-V (12 hrs)
6. Special theory of relativity
Galilean relativity, absolute frames. Michelson-Morley experiment, negative result. Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four-vector formalism.

REFERENCE BOOKS:
1. B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007

3. Unified Physics Vol., Mechanics, Waves and Oscillations, Jai Prakash Nath & Co. Ltd.
4. Fundamentals of Physics. Halliday/Resnick/Walker ,Wiley India Edition 2007.
5. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.
6. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
7. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004
8. Introduction to Physics for Scientists and Engineers. F.J. Buche. McGraw Hill.

Practical Paper II: Waves & Oscillations

Work load: 30 hrs per semester   **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Volume resonator experiment.
2. Determination of 'g' by compound/bar pendulum.
3. Simple pendulum normal distribution of errors - estimation of time period and the error of the mean by statistical analysis.
4. Determination of the force constant of a spring by static and dynamic method.
5. Determination of the elastic constants of the material of a flat spiral spring.
6. Coupled oscillators.
7. Verification of laws of vibrations of stretched string – sonometer.
8. Determination of frequency of a bar – Melde's experiment.
9. Study of a damped oscillation using the torsional pendulum immersed in liquid - decay constant and damping correction of the amplitude.
10. Formation of Lissajous figures using CRO.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars	- A topic from any of the Units is given to the student and asked to give a brief seminar presentation.
Group discussion	- A topic from one of the units is given to a group of students and asked to discuss and debate on it.
Assignment	- Few problems may be given to the students from the different units and asked them to solve.
Field trip	- Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.
Study project	- Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

*** Documental evidence is to be maintained for the above activities.

MODEL PAPER

THREE YEAR B.Sc DEGREE EXAMINATION

CHOICE BASED CREDIT SYSTEM

I SEMESTER: PART II: PHYSICS

Paper I: Mechanics & Properties of Matter
(For Mathematics Combinations)

Time: 3 Hours   Max. Marks: 75

Section-A (Essay type)

Answer All questions   **Marks :5X10 = 50**

1. a) Explain gradient of scalar field and divergence of vector field with physical significance.

OR

   b) State and prove Stroke's Theorem.

2. a) Derive an equation of motion of a rocket under constant gravitational field.

OR

   b) Obtain the Ruther Ford's scattering cross section formula.

3. a) Derive the expression for precessional velocity of a symmetric top.

OR

   b) Define the three coefficients of Elastic modulii and derive the relation between them.

4. a) Define a central force. Give two examples. Prove that a central force is a conservative.

OR

   b) State Kepler's laws. Derive Kepler's second law from Newton's law of gravitation.

5. a) Describe the Michelson-Morley Experiment and discuss the results.

OR

   b) Derive Lorentz transformation equations.

Section-B (Short answer type)

Answer any three questions   **Marks: 3X5 = 15**

6. Define scalar and vector fields explain with examples.
7. Define impact parameter and scattering cross-section.
8. Classify the different types of beams.
9. Explain the idea of GPS.
10. Explain the length contraction.

Section-C

Answer any two questions   **Marks: 2X5 = 10**

11. If A= iy + j(x^2 + y^2) +k (yz + zx) find Curl A at point (2, -2 , 2).

12. 2 Kg. mass moving with a velocity of 10m/s collides with another 6 Kg. mass moving in opposite direction with a velocity of 20 m/s. During collision they stick together. Find their common velocity.

13. The Young's modulus for steel is Y= 2 x 10^{11} ^{N}/m^2 and its rigidity modulus η=8 x 10^{10} N/m^2 Find the Poison's ratio and its bulk modulus.

14. The mean distance of mars from sun is 1.524 times the distance of the earth from the sun. Compute the period of revolution of mars around sun.

15. Find the velocity with which a body has to move so that its mass will be double to its rest mass.