



Q.1. Give short answers of the following: (15x2=30)

- i. What is meant by divergence of a vector?
- ii. Steel is more elastic than rubber. Explain what does it mean?
- iii. What is the difference between elastic and inelastic collisions?
- iv. What is the difference between reflection and refraction?
- v. State work energy theorem.
- vi. How does the viscosity of liquids and gases vary with temperature?
- vii. What are the elastic properties of matter?
- viii. Define polarization.
- ix. Define pseudo forces. Give any two examples?
- x. What is the difference between conservative and non-conservative forces?
- xi. What is Fresnel diffraction?
- xii. A ball of mass 20kg falls from a height of 50cm. Calculate decrease in potential energy of the ball?
- xiii. Does the center of mass of a solid object necessarily lie within the object? If not, give example.
- xiv. What do you understand by gravitational potential energy?
- xv. What is an interferometer?

Give brief answers of the followings.

Q.2. (a) Calculate the work done on an object by a spring force in one dimension? (5 Marks)

(b) State and prove Stoke's theorem. (5 Marks)

Q.3. (a) Explain the effect of drag force on the speed of an object moving through air. (6 Marks)

(b) A body of mass $m=4.5g$ is dropped from rest at a height $h= 10.5m$ above the earth's surface. Neglecting air resistance, what will its speed be just before it strikes the ground? (4 Marks)

Q.4. (a) When a transparent material is inserted into one of the beams in a Michelson interferometer, Calculate the relationship between the phase change of the light (in terms of λ) and the material's thickness and index of refraction. (6 Marks)

(b) Two slits of width a and separation d are illuminated by a coherent beam of light of wavelength λ . What is the linear separation of the bright interference fringes observed on a screen that is at a distance D away? (4 Marks)