

2022-25

Full Marks : 75

Time : 3 Hours

Candidates are required to give their answer in their own words as far as practicable. Their figures in the margin indicate full marks.

Answer from both Groups as directed.

Group – A

(Compulsory)

1×10=10

1. (a) Define Null Vector.

(b) Which Law of Motion is called Law of Inertia ?

(c) What is the gravitational unit of work ?

(d) Is Energy, a scaler or vector quantity ?

(e) Define Angular Velocity.

(f) Write mathematical form of Newton's Law of gravitation.

(g) Define Strain.

(h) Sharper is the resonance, the band width will be ?

(i) What is the speed of light in vacuum ?

(j) What is the rest mass of Photon ?

2. Differentiate between Angle of twist and angle of Shear. 5×1=5

OR

What are Kepler's Law of Planetary motion ?

Group – B

Answer any **four** of the following : 15×4=60

3. State and prove the principle of conservation of linear momentum.

4. Define torque and angular momentum of a particle. Show that the time rate of change of angular momentum of a particle is equal to the torque acting on it is $\vec{\tau} = \frac{d\vec{j}}{dt}$.

5. What is Elasticity ? Establish interrelation between different elastic constants.

6. Define simple harmonic motion. Obtain differential equation for simple harmonic motion and solve it.

7. State and prove the principle of conservation of energy. Show that the total energy of a body remains conserved during its free fall.

8. Write short notes on any **two** : 7.5×2=15

   (a) Sharpness of resonance.

   (b) Geostationary Satellites.

   (c) Mass Energy equivalence.

   (d) Time dilation.

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