

11 R

Register No.

40

Second Mid-Term Test - 2024

Time : 1.30 Hrs.

PHYSICS

Marks : 50

PART - I

I. Choose the correct answer

10 x 1 = 10

- If the mass and radius of the Earth are both doubled, then the acceleration due to gravity g'
 - Remains same
 - $\frac{g}{2}$
 - $2g$
 - $4g$
- If the acceleration due to gravity becomes 4 times its original value, then escape speed
 - Remains same
 - two times of original value
 - become halved
 - 4 times of original value
- A planet moving along an elliptical orbit is closed to the Sun at distance r_1 and farthest away at a distance of r_2 if v_1 and v_2 are linear speeds at these points respectively. Then the ratio $\frac{v_1}{v_2}$ is
 - $\frac{r_1}{r_2}$
 - $\left(\frac{r_1}{r_2}\right)^2$
 - $\frac{r_2}{r_1}$
 - $\left(\frac{r_2}{r_1}\right)^2$
- According to Kepler's second law, the radial vector to a planet from the Sun sweeps out equal areas in equal intervals of time. This law is a consequence of
 - conservation of linear momentum
 - conservation of angular momentum
 - conservation of energy
 - conservation of kinetic energy
- The radius of the Moon is
 - 1.737 km
 - 17.37 km
 - 173.7 km
 - 1737.0 km
- If a wire is stretched to double of its original length, then the strain in the wire is
 - 1
 - 2
 - 3
 - 4
- The Young's modulus for a perfect rigid body is
 - 0
 - 1
 - 0.5
 - infinity
- The wettability of a surface by a liquid depends primarily on
 - viscosity
 - surface tension
 - density
 - angle of contact between the surface and the liquid.
- A small sphere of radius 2 cm falls from the nest in a viscous liquid. Heat is produced due to viscous force. The rate of production of heat when the sphere attains its terminal velocity is proportional to
 - 2^2
 - 2^3
 - 2^4
 - 2^5
- Angle contact between pure water and pure glass is
 - 0°
 - 45°
 - 60°
 - 90°

PART - II

II. Answer any five of the following question. Q.No.15 is compulsory.

5 x 2 = 10

- State Bernoulli's theorem.
- What are factors affecting the surface tension of the liquid?
- A spring balance shows wrong readings after using for a long time. Why?
- A wire 10m long has cross sectional area $1.25 \times 10^{-4} \text{ m}^2$. It is subjected to a load of 5kg. If Young modulus of the material is $4 \times 10^{10} \text{ Nm}^{-2}$. Calculate the elongation produced in the wire.

15. Consider two point masses $m_1 = 1\text{kg}$, $m_2 = 2\text{kg}$, which are separated by a distance of 10 metre. Calculate the force of attraction between them.
16. What are geostationary and polar satellites?
17. How will you prove the Earth itself its spinning?
18. Why energy of satellite is negative?

FIVE

24

PART - III

III. Answer any ~~six~~ questions. Q.No. ~~25~~ is compulsory.

5 x 3 = 15

19. State Kepler's law.
20. Define Gravitational potential.
21. Why is there no lunar eclipse and solar eclipse every month?
22. Define Newton's Gravitational law?
23. What are factors affect the surface tension?
24. A metal plate of area $2.5 \times 10^{-4} \text{ m}^2$ placed on a $0.25 \times 10^{-3} \text{ m}$ thick layer of castor oil. If a force of 2.5 N is needed to move the plate with a velocity $3 \times 10^{-2} \text{ ms}^{-1}$, calculate the coefficient of viscosity of castor oil.
25. State Pascal's law in fluids.
26. Distinguish between streamlined flow and turbulent flow.

PART - IV

IV. Answer all the questions.

3 x 5 = 15

27. State and prove Archimedes principle.
(OR)
Obtain an expression for the excess of pressure inside a
i) liquid drop, ii) liquid bubble, iii) air bubble
28. State and prove Bernoulli's theorem for a flow of incompressible, non-viscous and streamlined flow of fluids.
(OR)
Derive an expression for escape speed.
29. Explain in detail the idea of weightlessness using lift as an example.
(OR)
Explain the variation of g with altitude.