

Day & Date: 03/11/2023  
Period: 2 hours  
Total pages : 02

Total Marks: 50  
Time : 10.30 to 12.30

**Q. 1) Select the most correct alternative.**

- i) The gravitational force of attraction between two bodies separated by a distance  $r$  is proportional to ..... 10  
a)  $r^2$  b)  $\frac{1}{r^2}$  c)  $r^3$  d)  $\frac{1}{r^3}$
- ii) SI unit of gravitational constant is .....  
a)  $\text{Nm}^2 \text{kg}^2$  b)  $\text{Nm}^2 \text{kg}^{-2}$  c)  $\text{Nm}^2 \text{s}^2$  d)  $\text{Nm kg}^{-2}$
- iii) The displacement of a particle executing SHM is  $y = a \sin(\omega t)$  the acceleration after time  $t = T/4$  is ..  
a)  $A\omega$  b)  $a\omega^2$  c)  $-a\omega$  d)  $-a\omega^2$
- iv) The total energy of a body performing S.H.M. is  $E$ . Then average kinetic energy of the body over a period is  
a)  $E$  b)  $E/4$  c)  $E/2$  d)  $2E$
- v) The Section of the neutral surface by the plane of bending is called the .....  
a) bending axis b) Neutral axis c) free axis d) plane of axis.
- vi) The quantity  $Yak^2$  is called .....  
a) Geometrical moment of inertia b) flexural rigidity c) bending moment d) radius of gyration
- vii) The small amount of liquid set free in the air take spherical shape because of it's.  
a) High density b) elasticity c) viscosity d) Surface tension.
- viii) Moment of inertia in rotational motion is analogous to the ..... in translational motion.  
a) Momentum b) mass c) force d) torque.
- ix) The Period of GPS satellite is .....  
a) 4 hours b) 6 hours c) 9 hours d) 12 hours
- x) The periodic time of satellite ..... as height of the projection satellite is increased.  
a) increases b) Zero c) both a) and b) d) remain constant

**Section B**

**Q. 2 Attempt any two. (SA<sub>1</sub>)**

- 1) obtain an expression for period of satellite in circular orbit round the earth 20
- 2) What is cantilever derive and expression for the preparation of free end of cantilever into due a load.
- 3) derive the relation between surface tension of radius of curvature. Hence show that the axis pressure inside a soap bubble of radius are is  $\frac{4T}{r}$

**Section C**

**Q.3. Attempt any Four. (SA<sub>2</sub>)**

- 1) State and explain newton law of gravitation. 20
- 2) Derive differential equation of S.H.M.
- 3) Give molecular theory of surface tension.
- 4) State and explain application of surface.
- 5) Give the application of the satellites.