

Model Question Paper 1 2
Gravitation and Space Science 2

11th Standard

Physics

Reg.No. :

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Answer all the Questions

Time : 01:00:00 Hrs

Total Marks : 40

Part A

5 x 1 = 5

- 1) Force due to gravity is least at a latitude of
(a) 0° (b) 45° (c) 60° (d) 90°
- 2) The escape speed on earth is 11.2 km s^{-1} . Its value for a planet having double the radius and eight times the mass of the Earth is
(a) 11.2 km s^{-1} (b) 5.6 km s^{-1} (c) 22.4 km s^{-1} (d) 44.8 km s^{-1}
- 3) If r represents the radius of orbit of satellite of mass m moving around a planet of mass M . The velocity of the satellite is given by
(a) $v^2 = \frac{GM}{r}$ (b) $v = \frac{GM}{r}$ (c) $v^2 = \frac{GMm}{r}$ (d) $v = \frac{Gm}{r}$
- 4) If the earth is at one-fourth of its present distance from the sun, the duration of the year will be
(a) one-fourth of the present year (b) half the present year (c) one-eighth the present year
(d) one-sixth the present year
- 5) Which of the following objects do not belong to the solar system?
(a) Comets (b) Nebulae (c) Asteroids (d) Planets

Part B

4 x 2 = 8

- 6) What is escape speed? Obtain an expression for it.
- 7) What is orbital velocity? Obtain an expression for it.
- 8) What will happen to the orbiting satellite, if its velocity varies?
- 9) What are the called geo-stationary satellites?

Part C

4 x 3 = 12

- 10) Assuming the Earth to be a sphere of uniform density, how much would a body weigh, one-fourth down to the centre of the Earth, if it weighed 205 N on the surface?
- 11) What is the value of acceleration due to gravity at an altitude of 500 km? The radius of the Earth is 6400 km.
- 12) What should be the angular velocity of the Earth, so that bodies lying on equator may appear weightless? How many times this angular velocity is faster than the present angular velocity? (Given: $g = 9.8 \text{ m s}^{-2}$; $R = 6400 \text{ km}$)
- 13) Show that the orbital radius of a geo-stationary satellite is 36000 km.

Part D

3 x 5 = 15

- 14) An artificial satellite revolves around the Earth at a distance of 3400 km. Calculate its orbital velocity and period of revolution. Radius of the Earth = 6400 km; $g = 9.8 \text{ m s}^{-2}$.
- 15) A satellite of 600 kg orbits the Earth at a height of 500 km from its surface. Calculate its (i) kinetic energy, (ii) potential energy and (iii) total energy ($M = 6 \times 10^{24} \text{ kg}$; $R = 6.4 \times 10^6 \text{ m}$)
- 16) A satellite revolves in an orbit close to the surface of a planet density 6300 kg m^{-3} . Calculate the time period of the satellite. Take the radius of the planet as 6400 km.

