Note:-
      1. All Questions are compulsory.
      2. Numbers on the right indicate full marks.

Section A

Q.1 Select and Write the correct answer.   **(4)**

   1. Which of the following statements regarding a satellite moving around earth is wrong?

     A) It falls freely   B) It moves with constant speed

     C) It suffers no acceleration   D) Its angular momentum remains constant

   2. If a body is taken from the equator to the pole, its mass

     A) goes on increasing   B) goes on decreasing

     C) remains unchanged   D) increases if it taken to the north pole and decreases if it is taken to the south pole

   3. The tidal waves on the sea are primarily due to

     A) Gravitational effect of the moon on the earth   B) Gravitational effect of the sun of the earth

     C) Gravitational effect of the sun and moon on the earth   D) Gravitational effect of the earth on the sun

   4. If escape velocity from the earth's surface is 11.2 km/sec then escape velocity from a planet of mass same as that of earth but radius one fourth as that of earth is

     A) 11.2 km/sec   B) 22.4 km/sec

     C) 5.65 km/sec   D) 44.8 km/sec

Q.2 Answer the following.   **(3)**

   1. Define : Gravitational Force.

   2. Draw a graph showing the variation of gravitational acceleration due to the depth and altitude from the Earth's surface.

   3. Define : Escape velocity of a satellite.

Section B
Attempt any Four

Q.3   Explain why gravitational field inside hollow sphere is zero.   **(2)**

Q.4   State Newton's law of gravitation.   **(2)**

Q.5   Why an astronaut an orbiting satellite have a feeling of weightlessness?   **(2)**

Q.6   Derive an expression for binding energy of a body at rest on the Earth's surface of a satellite.   **(2)**

Q.7 The mass of Jupiter is 1.9×10^{27} kg and that of sun is 2×10^{30} kg. The mean distance of Jupiter **(2)** from sun is 7.8×10^{11} m. Calculate the gravitational force the sun exerts on Jupiter. ($G = 6.67 \times 10^{-11}$ Nm^2/kg^2)

Q.8 Calculate the value of acceleration due to gravity on the surface of Mars if the radius of Mars **(2)** $= 3.4 \times 10^3$ km and its mass is 6.4×10^{23} kg

Section C
Attempt any Two

Q.9 Define escape speed. Derive an expession for the escape speed of an object from the surface of **(3)** the each.

Q.10 State Kepler's law equal of area. **(3)**

Q.11 A body weights 5.6 kgwt on the surface of the Earth. How much will be its the weight on a **(3)** planet whose mass is 1/7th mass of the Earth and radius twice that of the Earth's radius.

Section D
Attempt any One

Q.12 Explain gravitational potential. **(4)**

Calculate the escape velocity of a body from the surface of the earth. [Given : $G = 6.67 \times 10^{-11}$ Nm^2/kg^2, R = 6400 km, g = 9.8 m/s^2]

Q.13 Explain concept of apparent weight with acceleration of moving lift. **(4)**