SANGFORD SENIOR SECONDARY SCHOOL

CHAPTER: GRAVITATION **CLASS:** XI, **SUBJECT: PHYSICS**
TOTAL MARKS: DURATION: 45 Mnts, EXAM NO: J00PHY0107
INVIGILATOR'S SIGNATURE :_____
STUDENT NAME:_____ DATE:_____

NEET
National Eligibility Cum Entrance Test

NEET – PHYSICS – GRAVITATION

- *Each question will contain four **marks**. Total four **marks** will be given for each correct answer.*

- *There will be **negative marking** in this examination; one **mark** will be deducted for each incorrect response.* <mark>Total marks will be Correct Answer – Incorrect Answer</mark>

- *Candidates are required to use only blue/black ball point pen to **mark** their answers.*

Correct Answer 10 x 4 = 40 Marks,   *10 x 1 = 10 for Incorrect Answer*

1. The earth is just an approximate sphere. If the interior contained matter which is not of the same density everywhere, then on the surface of the earth, the acceleration due to gravity

(a) Will be focused on the centre but not the same everywhere.
(b) Will have the same value everywhere but not directed towards the centre.
(c) Will be same or constant everywhere in magnitude directed towards the centre.
(d) Cannot be zero at any point.

Ans. *(d): If the density of the earth is non-uniform then 'g' at different point on the surface of the earth will be different.*

$$\left(\because g = \frac{4}{3}\pi pGR \right)$$

If we substitute any value of density, g ≠ 0 at any point.

<mark>*Need Explanation for why (a), (b), (c) are incorrect*</mark>

(a)

(b)

(c)

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2. As observed from Earth, the sun seems to move in an approximate circular orbit. For the motion of another planet like Mercury as observed from Earth, this would

(a) be equally true.
(b) not be true because the force between Earth and Mercury is not inverse square law.
(c) not be true because the major gravitational force on Mercury is due to Sun.
(d) not be true because Mercury is influenced by forces other than gravitational forces.

3. Different points in the earth are at slightly different distances from the sun and hence experience different forces owing to gravitation. For a rigid body, we know that if various forces act at various points in it, the resultant motion is as if a net force acts on the c.m. (centre of mass) causing translation and a net torque at the c.m. causing rotation around an axis through the c.m. For the Earth-Sun system (approximating the earth as a uniform density sphere)

(a) the torque is zero.
(b) the torque causes the earth to spin.
(c) the rigid body result does not apply since the earth is not even approximately a rigid body.
(d) the torque causes the earth to move around the sun.

4. Satellites orbiting the earth have a finite life and sometimes debris of satellites fall to the earth. This is because,

(a) the solar cells and batteries in satellites run out.
(b) the laws of gravitation predict a trajectory spiralling inwards.
(c) of viscous forces causing the speed of satellite and hence height to gradually decrease.
(d) of collisions with other satellites.

5. Both earth and moon are subject to the gravitational force of the sun. As observed from the sun, the orbit of the moon

(a) will be elliptical.
(b) will not be strictly elliptical because the total gravitational force on it is not central.
(c) is not elliptical but will necessarily be a closed curve.
(d) deviates considerably from being elliptical due to influence of planets other than earth

6. In our solar system, the inter-planetary region has chunks of matter (much smaller in size compared to planets) called asteroids. They

(a) will not move around the sun since they have very small masses compared to the sun.
(b) will move along an irregular path because of their small masses and will drift away into outer space.
(c) will move around the sun in closed orbits but not obey Kepler's laws.
(d) will move in orbits like planets and obey Kepler's laws.

7. Choose the wrong option.

(a) Inertial mass is a measure of difficulty of accelerating a body by an external force whereas the gravitational mass is relevant in determining the gravitational force on it by an external mass.
(b) The gravitational mass and inertial mass are the same in an experimental result.
(c) The acceleration due to gravity on earth is the same for all bodies due to the equality of gravitational mass and inertial mass.
(d) Gravitational mass of a particle like a proton depends on the presence of neighbouring heavy objects but the inertial mass does not.

8. Particles of masses 2M, m and M are respectively at points A, B and C, where distance

$$AB = \frac{1}{2}(BC), m << M$$; and at time t = 0, they are all at rest (as shown in the figure). At subsequent times before any collision takes place:

A	B		C
2M	m		M
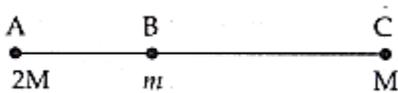
(a) m will remain at rest.
(b) m will move towards M.
(c) m will move towards 2M.
(d) m will have oscillatory motion.

9. Which of the following options are correct?
(a) Acceleration due to gravity decreases with increasing altitude.
(b) Acceleration due to gravity increases with increasing depth (assume the earth to be a sphere of uniform density).
(c) Acceleration due to gravity increases with increasing latitude.
(d) Acceleration due to gravity is independent of the mass of the earth.

10. If the law of gravitation, instead of being inverse-square law, becomes an inverse-cube law:
(a) planets will not have elliptic orbits.
(b) circular orbits of planets is not possible.
(c) projectile motion of a stone thrown by hand on the surface of the earth will be approximately parabolic.
(d) there will be no gravitational force inside a spherical shell of uniform density.