SQs:

1. Why an astronaut in a space capsule orbiting the earth experiences a feeling of weightlessness?
2. A person sitting on an artificial satellite of earth feels weightlessness, but a person standing on moon has weight through the moon is a satellite of the earth. Why?
3. If the earth suddenly stops rotating about its axis, what would be the effect on $'g'$? At the poles and equator.
4. An astronaut releases a spoon out of a satellite in the space. Will the spoon fall on the earth?
5. Distinguish between gravitational potential and gravitational field strength.
6. What do you mean by geo-stationary satellite? Explain.
7. Explain why the moon has no atmosphere?
8. The weight of a body is less inside the earth than on the surface. Explain.
9. What is escape velocity?
10. Assuming the earth to be perfectly spherical, give sketch graphs to show how, acceleration due to gravity varies inside and outside the earth surface with distance.
11. Does the change in gravitational energy of a body between two points depend upon the nature of path followed? Explain with reason.
12. Why do different planets have different escape velocities?
13. The space rockets are launched from west to east. Explain.
14. What are the differences between inertial mass and gravitational mass?
15. Why is gravitational potential energy negative?
16. What are the necessary conditions for geo-stationary satellite?
17. What is the orbital velocity of satellite?
18. What is GPS? Explain its working principle.

Numerical:

1. Calculate the amount of work done to move $1Kg$ mass from the surface of earth to a point $10^5 km$ from the center of the earth.
2. Assuming that the earth is a uniform sphere of radius $6.37 \times 10^6 \ m \ and \ mass \ 5.97 \times 10^{24} \ kg$, calculate the work done in taking a $10kg$ mass from the earth's surface to a point where the earth's gravitational field is negligible.
3. An artificial satellite revolves round the earth in $3 \ hrs$ in a circular orbit. Find the height of the satellite above the earth assuming earth as a sphere of radius $6370km$.
4. A remote sensing satellite of the earth revolves in a circular orbit at a height of $250km$ above the earth surface. What is the orbital speed and period of revolution of the satellite?
5. A man can jump $1.5m$ on earth. Calculate the approximate height he might be able to jump on a planet whose density is one quarter of the earth and radius is one third that of the earth.
6. Taking the earth to be uniform sphere of radius $6400km$, calculate the total energy needed to raise a satellite of mass $1000kg$ to a height of $600km$ above the ground and to set it into circular orbit at that altitude.
7. An earth satellite moves in a circular orbit with a speed of $6.2 kms^{-1}$. Find the time of one revolution and its centripetal acceleration.
8. A $200kg$ satellite is lifted to an orbit of $2.2 \times 10^4 km$ radius. If the radius and mass of the earth are $6.37 \times 10^6 m$ and $5.98 \times 10^{24} kg$ respectively, how much additional potential energy is required to lift the satellite?
9. Two binary stars, masses $10^{20} kg$ and $2 \times 10^{20} kg$ respectively, rotates about their common center of mass with an angular velocity ω. Assuming that the only force on a star is the mutual gravitational force between them, calculate ω. Assume that the distance between the stars is $10^6 m$.
10. A period of moon revolving under the gravitational force of earth is 27.3 days. Find the distance of moon from the center of the earth is mass of earth is $5.97 \times 10^{24} kg$.