Physics (New Book) - 9th Class Physics Chapter 5 Long Question Preparation

Q1. Describe the motion of artificial satellite and derive the formula for the orbital speed of the artificial satellite

Ans 1: Artificial satellite: Artificial satellites are launched for space research and telecommunication. With their help, we are able to enjoy live coverage of cricket matches, Olympic games and many other programs directly on our television sets.
Artificial satellites keep on revolving around the earth in different geo stationary satellite orbits with uniform speed due to gravitational force

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Q2. Q no: (B) A polar satellite is launched at 850 km above earth. Find its orbital speed.

Ans 1: Solution:
Height= 850 km
= 850 x 1000m
850000m = 8.5×10^5m
orbital speed = v=?
$V=\sqrt{GMe/(R+h)}$
$=\sqrt{6.673 \times 10^{-11} \times 6 \times 10^{24}/(6.4 \times 10^6 + 8.5 \times 10^5)}$
= 743.13 ms^{-1}

Q3. Q no: 6 (A) State Law of gravitation and derived the equation.

Ans 1: Everybody in the universe attracts every other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres.
F x m1m2
F x $1/d^2$
F x $m1m2/d^2$
F= $Gm1m2/d^2$

Q4. Q no: (B) A polar satellite is launched at 850 km above earth. Find its orbital speed.

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= 743.13 ms^{-1}

Q5. State and explain Newtons law of gravitation. Also derive its equation

Ans 1: Law of gravitation: Every object in the universe attracts every other object with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.

Ans 2: Note; we don not feel the gravitational force between different objects around us because it is very small. However we can observe the effect of gravitational force easily, if the mass of one or both objects is very large . Since the mass of earth is very large, it attracts nearby objects with a significant force. The weight of an object on the earth is a result of the gravitational fore between the two masses.

Q6. Q no: 5 (A) What ismeant by the force of gravitation? Also explain the law of gravitation.

Ans 1: everybody in the universeattracts every other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres.

According to the law of gravitation the gravitationalforce of attraction F with which the two masses m1 and m2 separated by a distance `d' attract each other is given by:
F x m1m2
F x $1/d^2$
F x $m1m2/d^2$
F=G $m1m2/d^2$

Q7. What do you mean by artificial satellite

Ans 1: Satellite: an object that revolves around a planet is called a satellite
Natural satellite: the moon revolves around the earth so moon is a natural satellite of the earth
Artificial; scientists have sent many objects into space. Some of these objects revolve around the earth. These are called artificial satellites.

Ans 2: Uses of artificial satellite: Most of the artificial satellites , orbiting around the earth are used for communication purpose. Artificial satellites carry instruments or passengers to preform experiments in space. Large number of artificial satellites have been launched in different orbits around the earth.
Dish antennas sending and receiving the signals from them have fixed direction depending upon their location on the earth.

Q8. State and explain gravitational field

Ans 1: Gravitational pull of earth acting on the body whether the body is in contact with earth or not is called the field force and the are for this force around the earth is called gravitational field

Ans 2: For example: the velocity of a body, thrown up, goes on decreasing while on return its velocity goes on increasing. It is due to the gravitational pull earth acting on the body, which is a field force. It is assumed that a gravitational field exists all around the earth. This field is directed towards the center of the earth. The gravitational field becomes weaker and weaker as we go farther and farther away from the earth

Ans 3: Gravitational field strength: in the gravitational field of the earth, the gravitational force per unit mass is called the gravitational field strength of the earth. At any place its value is equal to the value of g at that point

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Q9. Q no: 6 (B) Calculate the value of g at a height of 3600 km above the surface of the Earth.

Ans 1: Solution:
g_n =?
h = 3600km = 3600 x 1000m
R = 6400 x 10^3 m
G = 6.673 x 10^{-11} Nm^2kg^{-2}
Me = 6x 10^{24} kg
g = GMe/R^2

$g_n = Gme/(R+h)^2$

$6.673 \times 10^{-11} \times 6 \times 10^{24}/6400 \times 10^3 + 3600 \times 10^3$

$g_n = 4ms^{-2}$

Q10. What is the effect of the following on the gravitational acceleration

1. Mass of the freely falling body
2. Distance of the freely falling body from the center of the earth,(I>E> variation of "g" with altitude0 OR explain the variation in value of 'g' with altitude

Ans 1: We know that

$g = GM_e/R^2$

where Me is mass of earth. Hence this equation does not include the mass of the freely fallingbody. The value of g does not depend on the mass of the body. All bodies either lighter or heavier fall freely with the same gravitationalacceleration. Thus mass has no effect on g

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