HISSAN CENTRAL EXAMINATION - 2079 (2022)

Class: XI **PHYSICS (1011 SET A)**

F.M : 75 **(11 Marks Obj+ 64 Marks Sub)** **Time: 3hrs**

GROUP A

Multiple Choice Questions: **Time : 25 Minutes**
Attempts all questions.

Tick the correct answer. **[11 × 1 = 11]**

1 In the relation F= a x + b t², where F is force, x is distance and t is time. The dimensions of $\frac{b}{a}$ is

a. $[LT^{-2}]$ b. $[LT^{-1}]$ c. $[LT^{-3}]$ d. $[L^2T^{-2}]$

3. The dot product of two vectors is equal to $\frac{1}{\sqrt{3}}$ times the magnitude of the cross product. The angle between them is

a. 90^0 b. 60^0 c. 50^0 d. 30^0

3. A body is dropped from the top of the tower; during its last second, it covers 25 m. the height of the tower is

a. 55m b. 45m c. 40m d. 35m

4. Figure shows a force-displacement graph of a moving body.
The work done by the body is

a. 42.5 J b. 40J c. 45J d. 36J

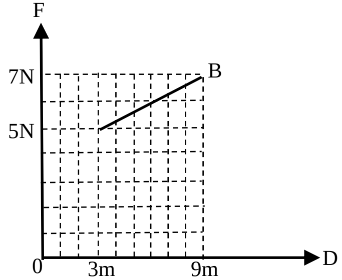


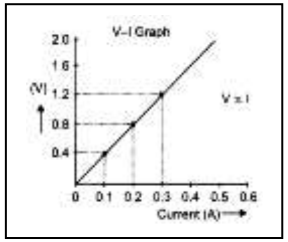
Figure- F-D graph

5. If the radius of the earth suddenly decreases by 10% of its present value keeping the mass of the earth remaining the same, the value of acceleration due to gravity will

a. Remain unchanged
b. Become 8.82 m/s^2
c. Increases by 19%
d. Increases about 23%

6. The resistance of the conductor calculated from the graph is

a. 1Ω b. 4Ω
c. 3Ω d. 5Ω



7. A boy walks towards a stationary plane mirror at a speed of 4 m/s. What is the relative speed of approach of the boy and his image?

a. Zero
b. 4 m/s
c. 8 m/s
d. 1.44 m/s

8. How long will the light take to travel a distance of 500m in water? The Refractive index for water is 1.33, and the velocity of light in a vacuum is 3×10^8 m/s.

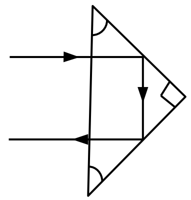
a. 2.21×10^{-6} sec.
b. 3.21×10^{-6} sec.
c. 1.21×10^{-6} sec.
d. 4.216×10^{-6} sec.

9. The focal length of a concave lens 20 cm. Its power is

a. + 20 D
b. – 5 D
c. – 20 D
d. $+\frac{1}{5}$ D

10. The figure represents the totally reflecting prism. In this case, the angle of deviation is

a. 90^0 b. 120^0 c. 0^0 d. 180^0



11. How do we define the mass number?

a. Number of protons in a nucleus
b. The complement of the atomic number
c. The number of protons plus the number of neutrons in the nucleus
d. Number of neutrons in a nucleus

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GROUP B

Short Answers Question: **[8 × 5=40]**

1. a. What is linear momentum? How impulse is related to change in linear momentum? [2]

   b. A student claim that he can produce linear momentum in carrom men with the help of a striker. Is his claim true? Explain. [2]

   c. State the principle of conservation of linear momentum. [1]

OR

A man filled helium gas in a balloon. When he released the balloon by tightening its mouth, he found that the balloon moved in an upward direction.

   a. The balloon gains potential energy and kinetic energy. Does it violets the law of conservation of energy? Explain. [2]

   b. State the principle of conservation of energy. [1]

   c. A pump fills a tank of capacity 300 m^3 in 5 hours. The tank is situated at a height of 20 m from the water level. If the efficiency of the pump is 65%, calculate the power of the engine which runs the pump (g =10m s^{-2}). [2]

2. a. Define Specific heat capacity? Why steel bowls are painted with copper in base. [2]

   b. Which method and principle is used to determine the specific heat the capacity of solid. [2]

   c. Draw the diagram to determine the specific heat capacity of the solid. [1]

3. Figure shows the temperature – heat energy graph for water. Answer the following question using a graph.

   a. Indicate the position of fusion and vaporization in the graph. [1]

   b. Why the slope of line RS is less than the slope of line PQ? Explain. [2]

   c. Define the term latent heat of fusion and latent heat of vaporization. [2]

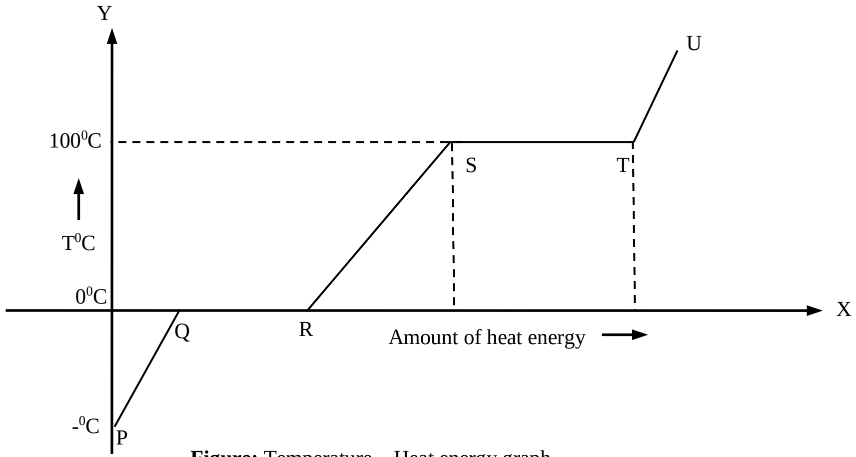


Figure: Temperature – Heat energy graph

4. a. What is an ideal gas? [1]

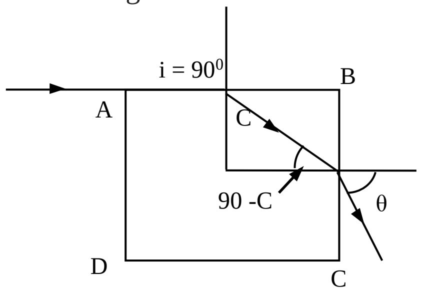
   b. Derive the ideal gas equation. [2]

   c. A room contains oxygen and hydrogen molecules in the ratio of 3:1. The temperature of the room is 27°C. The molar mass of oxygen is 32, and hydrogen is 2. The value of gas constant R is 8.31 J $mol^{-1}K^{-1}$. Calculate rms speed of oxygen and hydrogen molecules. [2]

5. a. Define lateral shift. [1]

   b. What will be the lateral shift when the angle of incidence is 90^0? [1]

   c. ABCD is a plane glass cube. A horizontal beam of light enters the face AB at grazing incidence. Show that the angle θ which any ray emerging from BC would make with the normal to BE is given by sinθ = cotC where c is the critical angle. [3]



OR

a. What happens to the focal length of the lens if it is dipped in water? [1]

b. Discuss the formula for the focal length of two thin lenses in contact. [2]

c. For a 60^o glass prism, the angle of minimum deviation is 37.2^o. Calculate its refractive index. [2]

6. a. What is drift velocity? [1]

b. Discuss the mechanism of metallic conduction and find the expression of drift velocity. [3]

c. Drift velocity in 1mm copper wire is 10^{-3}m/s, but the speed of electricity is so fast. How will you convince a confused student? [1]

7. a. What is electric potential? [1]

b. What distance must an electron move in a uniform potential gradient 200 V/cm in order to gain K.E. of 3.2×10^{-18} J?
[Given that $e = 1.6\times10^{-19}$ C $m_e = 9.1\times10^{-31}$ kg.] [3]

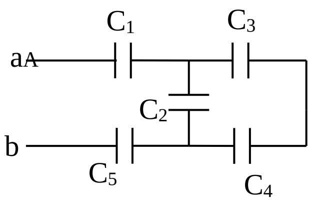
c. Why two equipotential surfaces never intersect each other? [1]

8. a. What is capacitor? Give its two applications. [2]

b. In the given capacitor circuit applied potential between ab is 220V.

i) What is the equivalent capacitance of the network between a and b? Given, $C_1 = C_5 = 3\mu F$ and $C_2 = C_3 = C_4 = 4\mu F$. [2]

ii) Find the charge stored. [1]



GROUP C

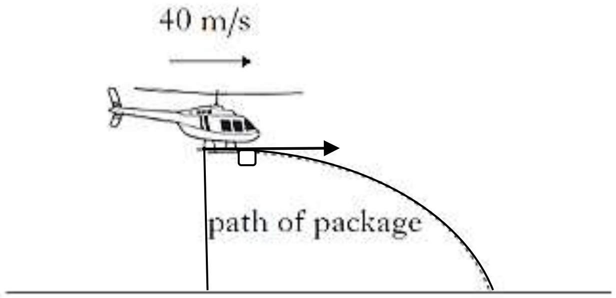
Give long answers to the following questions. [3 × 8 = 24]

9. a. Define Projectile motion with an example. [1]

b. A projectile is projected from the ground. Show that its path is a parabolic. [2]

c. At what point velocity and acceleration of the projectile are perpendicular? Draw the diagram to show the angle. [2]

d. A package is released from a helicopter flying horizontally at a constant velocity 40m/s. If the helicopter is flying at a height 100m from the ground



as shown in figure.

(i) What is the time of flight of package to reach ground?

(ii) How far will the package hit the ground horizontally? [3]

OR

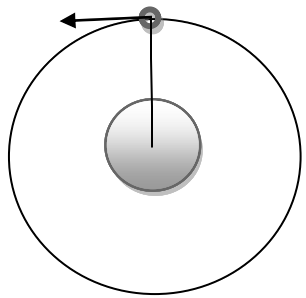
a. What is a geostationary satellite? Give its applications. [2]

b. An artificial satellite revolves around the earth, as shown in the figure.

i) Does the satellite require energy to revolve around the earth? Explain. [2]

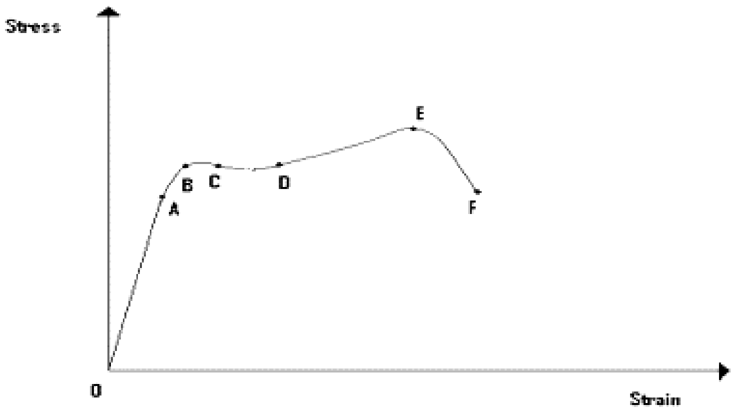
ii) The satellite is 35950 km above the earth`s surface. Calculate the time period of satellite.
[$G = 6.67 \times 10^{-11}$ Nm^2/kg^{-2}, $R = 6.4 \times 10^6$m, $M_e = 6\times10^{24}$ kg] [2]

iii) The satellite has negative energy. What is its meaning? [2]



10. a. Define the terms stress and strain. [2]

b. Figure shows the Stress – strain curve for ductile materials. Label the name of points A, D and F in the figure. [2]



Stress - Strain Curve for Ductile materials

c. In which portion of graph Hooke's law is followed. [1]

d. The rubber cord of a catapult has a cross-sectional area $1mm^2$ and total unstretched length 10.00cm. It is stretched to 12.00cm and released to project a missile of mass 4.00 gm. Calculate the velocity of projection. [Young's modulus of rubber $= 5 \times 10^8 Nm^{-2}$] [3]

11. a. Explain how Rutherford's α-scattering experiment suggested that the nucleus of an atom is very small, very dense and positively charged.[3]

b. What are binding energy and packing fraction? [2]

c. Find mass defect and binding energy of the helium nucleus. Mass of ${}_2He^4$ = 4.0015 a.m.u., m_p = 1.00727 a.m.u. and m_n = 1.00866 a.m.u. [1amu = 931MeV] [3]

THE END