



Seabird International Secondary School/College

Madhyapur Thimi, Bhaktapur

Pre-Board Examination 2080

Class: XI(Science)
Subject: Physics (Set B)

2080/12/22
Time: 3 hrs.

F.M: 75
P.M: 27

Candidates are required to give their answers in their own words as far as practicable. The figures in margin indicate full marks.

Group "A" [1x11=11]

MCQ

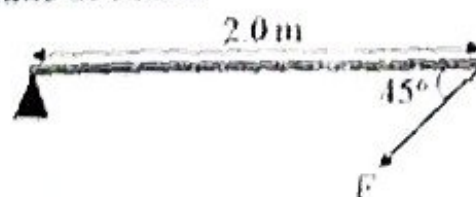
- The maximum value of the moment of a force is obtained if:
 - The angle between the position vector and the applied force is 60° .
 - The angle between the position vector and the applied force is 90° .
 - The angle between the position vector and the applied force is 180° .
 - None of the above
- At the top of the trajectory of a projectile, the acceleration is
 - Maximum
 - Minimum
 - Zero
 - g
- Which one is the correct expression for time period of the satellite?
 - $T = 2\pi \sqrt{\frac{(R+h)^3}{GM}}$
 - $T = 2\pi \sqrt{\frac{(R+h)^3}{gM}}$
 - $T = \sqrt{\frac{(R+h)^3}{GM}}$
 - $T = \sqrt{\frac{(R+h)^3}{gM}}$
- The number of significant figures in the measurement 0.00826 Kg are:
 - 2
 - 3
 - 5
 - 6
- A lens of power -4 D is placed in contact with a lens of power +2 D. The power of the lens combination will be
 - 6 D
 - +2 D
 - 2 D
 - 1 D
- The power produced by a prism of small angle A
 - depends on material of prism only
 - depends on A only
 - depends on both material and A
 - depends neither on material nor on A
- Two spheres of the same size are made of the same material but one is solid and the other is hollow. If both spheres are heated to the same temperature how do they expand?
 - Both spheres expand equally
 - Solid sphere expands more
 - Hollow sphere expands more
 - cannot be predicted
- Which of the following methods of heat transfer is based on gravity?
 - Convection
 - Conduction
 - Radiation
 - Convection and Conduction
- Ohm-meter is the SI unit of
 - Voltage
 - Resistivity
 - Resistance
 - Current

10. On which of the following, the total radiation emitted by a perfectly black body is proportional to?
- a) Absolute temperature b) Square of absolute temperature
c) Cube of absolute temperature d) Fourth power of absolute temperature
11. When pure germanium is doped with trivalent impurity like aluminum, the conduction is due to
- a) Electrons b) holes c) protons d) positrons

Group "B" [5x8=40]

Short Questions.

- 1 a) State and explain the principle of moment. [2]
b) The force F shown in the figure has a moment of 40Nm about the pivot. [2]
Calculate the magnitude of force.

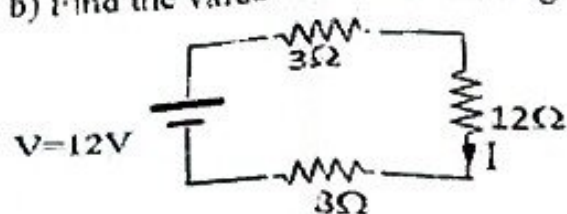


- c) Define torque due to the couple. [1]

OR

- 1a) Derive an expression for the escape velocity on the surface of earth. [3]
b) What is the significance of escape velocity? If the radius of Earth is increased by two times, then, what will be its effect in escape velocity? [1 + 1]
2a) A projectile is projected with velocity u at an angle θ with horizontal. Find the horizontal range. [2]
b) At height 45m from ground velocity of a projectile is $\vec{v} = (30\hat{i} - 40\hat{j})$ m/s. Find its initial velocity with direction. [3]
3a) What is an electron volt? Define potential gradient and electric field intensity. [1 + 2]
b) Establish a relation between them. [2]
4a) Develop an expression for emissive power of a black body in terms of its absolute temperature T . The absolute temperature of the surroundings is T_0 . [2]
b) Why ventilations are provided near the ceilings? Explain on the basis of mode of transfer of heat energy. [2]
c) At what condition will a piece of metal and a piece of wood feel equally hot to us while touching? [1]
5a) Why a ray of light in air deviates while entering into medium? What are the factors on which the deviation produced by a thin prism depends? [1+2]
b) A ray of light is refracted through a prism of angle 60° . Find the angle of incidence so that the emergent ray just grazes in the second face. Refracted index of the material of the prism is 1.45. [2]

- 6a) Define resistance. Why is Constantan used to make a standard resistor? [1+2]
 b) Find the value of current in the given figure. [2]



- 7a) Distinguish between emf and potential difference. [2]
 b) Derive the relation between drift velocity and electric current. [2]
 c) Why is it dangerous to put an electric switch on or off by a wet hand? [1]
 8a) What do you mean by intrinsic semiconductor? [1]
 b) Are p-type semiconductors positively charged? [2]
 c) A semiconductor crystal behaves as a perfect insulator at absolute zero temperature, how? Explain. [2]

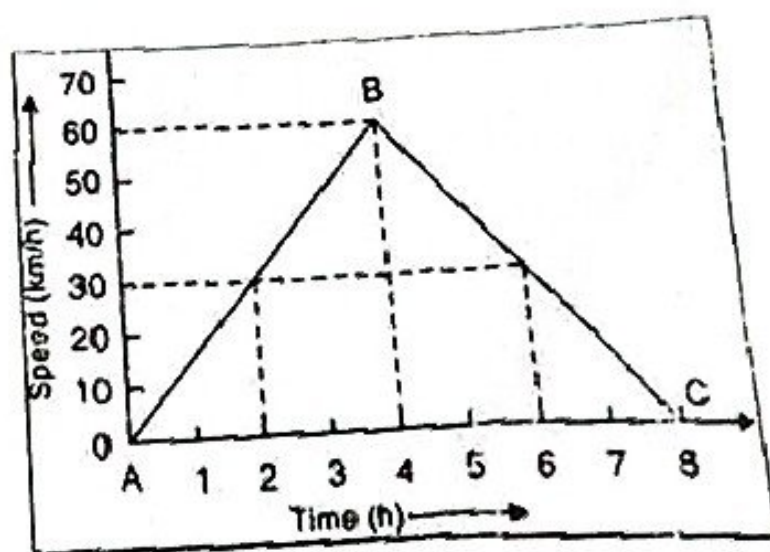
OR

- 8a) What is binding energy of a nucleus? [1]
 b) What is nuclear fusion reaction? [1]
 c) The energy released by fission of one U^{235} atom is 200 MeV. Calculate the energy released in KWh, when one gram of uranium undergoes fission. [3]
 (Assume, Avogadro's constant = $6.02 \times 10^{23} \text{ mol}^{-1}$)

Group "C" [8x3=24]

Long Questions.

- 1a) The speed-time graph of a car is shown in the figure:

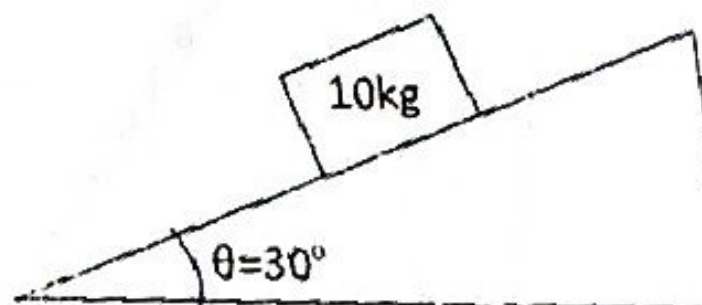


- i) What is the total distance travelled by the car? [2]
 ii) What is the average speed of the car? [2]
 iii) Can a body have zero velocity and still be accelerating? [2]

- iv) A bomb is dropped from a fighter plane flying horizontally when it is just vertically above a target. Will it hit the target? Justify your answer. [2]

OR

- 1a) Define gravitational potential energy. [1]
 b) Derive formula for gravitational potential energy on the earth's surface. [3]



- c) If the earth suddenly stops rotating about its axis, what would be the effect on 'g'? Would this effect be the same at all places? [2]
- d) Find the velocity of escape at the moon given that its radius is 1.7×10^6 m and the value of g at its surface is 1.63 m/s. [2]
- 2a) Which one; an ice at 0°C or water at 0°C is more effective in cooling liquor item like beer? [1]
- b) Define triple point. Draw a figure to indicate triple point in phase diagram. [2]
- c) Tea cools faster in winter than summer, why? Explain on the basis of Newton's Law of cooling. [2]
- d) In an experiment on the specific heat of a metal, a 300 gm block of metal at 120°C is dropped in a copper calorimeter of mass 240 gm containing 150 cm^3 of water at 25°C . If the final temperature is 44°C , calculate the specific heat of the metal. [Specific heat capacity of copper = $0.092\text{ cal g}^{-1}\text{K}^{-1}$] [3]
- 3a) Define capacitance. Does the capacitance of parallel plate capacitor depend on nature of dielectric used? Justify. [1+2]
- b) Derive a relation for the energy stored in a capacitor when it is charged to a potential difference of V volts. [2]
- c) A parallel plate air capacitor has a capacitance of 10^{-9} F . What potential difference is required for a charge of 10×10^{-5} ? What is the total energy stored? [2+1]

OR

- 3a) Explain how Rutherford's α -scattering experiment suggested that the nucleus of an atom is very small, very dense and positively charged. [3]
- b) Considering that the α -particles carry average kinetic energy of $2 \times 10^{10}\text{ J}$, calculate the maximum size of the gold nucleus. [Atomic number of gold is 79 and $e = 1.60 \times 10^{-19}\text{ C}$] [3]
- c) Explain why the radius of the gold nucleus must be much smaller than the value calculated in the 3(b) above. [3]

---Good Luck---

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