

# Model Question of HSC Examination 2020 (All Board)

## Physics Second Paper (Creative)

Sub Code : 

|   |   |   |
|---|---|---|
| 1 | 7 | 5 |
|---|---|---|

**Time: 2Hrs 35 min**

**Full marks: 50**

*[Read the following stems and answer any five of the following questions:]*

1. ► In young double slit experiment, the distance between two slits is 2 mm. The separation between two consecutive fringes at distance 1m from the slit is found to be 0.295 mm.

- a. Define coherent source. 1
- b. What do you mean by visible light? 2
- c. Calculate the wavelength of light. 3
- d. How is the distance between two slits changed so that the wavelength of light is  $7800 \text{ \AA}$ . Explain with mathematical logic. 4

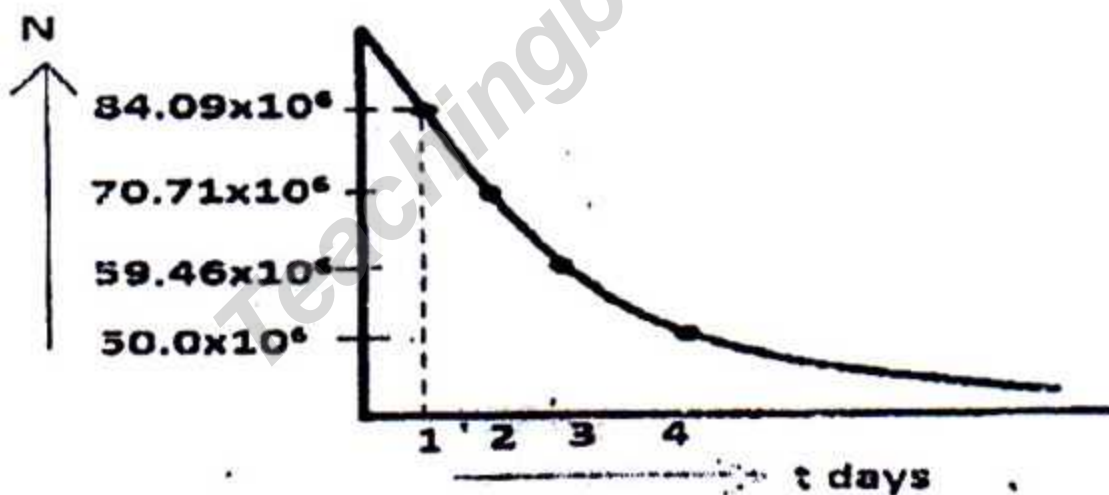
2. ► Karim was working with a convex lens whose radii of curvature were 12 cm and 15 cm.  ${}^a\eta_g = \frac{3}{2}$ ,  ${}^a\eta_w = \frac{4}{3}$ .

- a. What is black hole? 1
- b. What do you mean by spiral galaxies? 2
- c. Calculate the focal length of the lens in air. 3
- d. If the lens is immersed in water then whether its power will change or not. Give your opinion with mathematical analysis. 4

3. ★ The work function of metal – P and metal – Q are 5 eV and 4 eV respectively. There are two light ray of wavelength of  $7000 \text{ \AA}$  and  $700 \text{ \AA}$  fall on the surface separately on the metal— P and Q respectively.

- What is the relation between Beequerel and curie? 1
- Explain stopping potential. 2
- Determine the threshold wavelength of metal-A. 3
- Does the photoelectric effect occur in case of both metal, A and B? Give your opinion with mathematical analysis. 4

4. ►

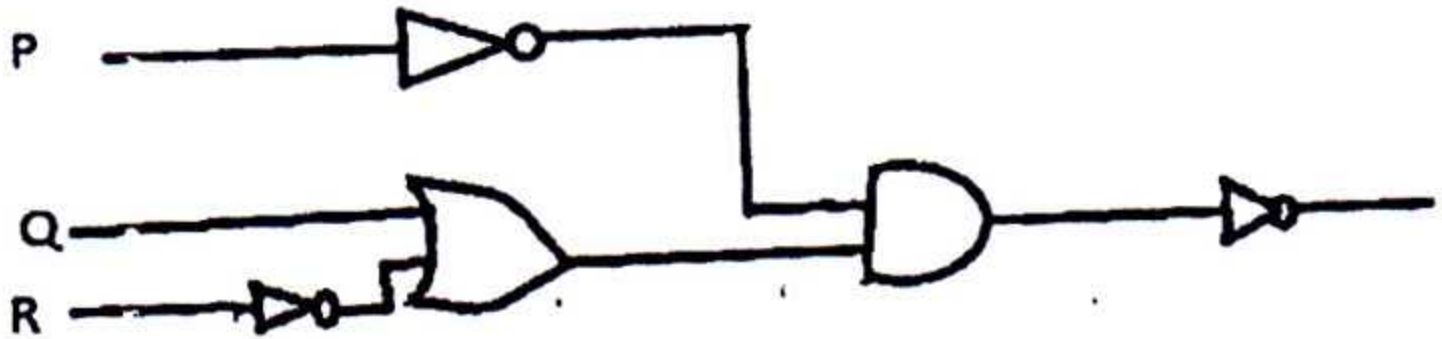


The number of unchanged atom of a radioactive element 'X' with respect to time is shown in the above graph.

- What is mass defect? 1
- What is meant by chain reaction? 2
- Determine the decay constant of element 'X'. 3

- d. "The time required for the decay off 75% of the element of the above stem is double of its half life." Prove it with mathematical analysis. 4

5. ★



- a. What is doping? 1
- b. Why is the frequency of output signal of a rectifier zero? 2
- c. Determine the Boolean equation for the logic circuit of the above stem. 3
- d. If P, Q and R all are firstly on (1) and again all are off (0), then show two truth tables and compare the output of two cases. 4

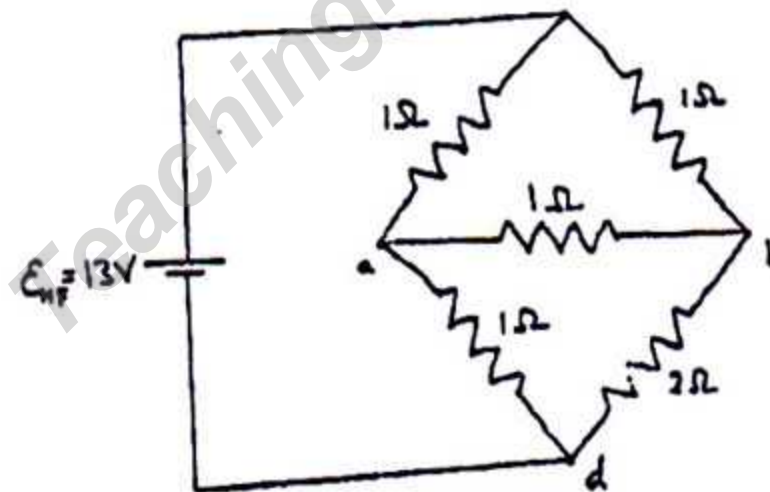
6. ★ The charges of point A, B and C are  $+25C$ ,  $-5C$  and  $+30C$  respectively in straight line. Point A is placed between B and C point. The distance from point B to A is 2.5cm and point C to A is 5 cm.

- a. What is electric dipole? 1
- b. Gauss's law is a special form of Coulomb's law. Explain it. 2
- c. How much force will work upon point A? 3
- d. How much work will be done to decrease the distance from C to A by 1cm. Give mathematical analysis. 4

7. ► 0.1 kg ice is converted into steam at  $80^{\circ}\text{C}$ . (Specific heat of ice and water are 2100 and 4200 J/kg/K. Latent of fusion of ice and vaporization of water are 336000 and 2268000 J/kg respectively).

- What is isothermal process? 1
- Write down the difference between reversible and irreversible process. 2
- Find the change in entropy. 3
- If you convert the ice into steam at  $100^{\circ}\text{C}$ , will you observe any difference in change in entropy? Explain it mathematically. 4

8. ★ A Wheatstone bridge circuit has been given below.



- What is co-efficient of resistance of a material? 1
- Why does Shunt use in parallel connection? 2
- Calculate the current between a and b and find out the direction by using Kirchoff's law. 3
- By using Kirchoff's law, calculate the total current and resistance in the above circuit. 4

# Model Question of HSC Examination 2020 (All Board)

## Physics Second Paper (MCQ)

Sub Code : **175**

Time : 25 Minutes

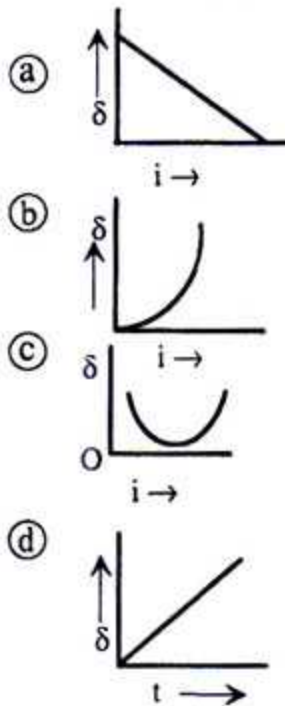
Full Marks : 25

[ N.B. Fill the circle of the correct answer with a black ball point pen. Each question bears 1 mark. ]

- What is the magnitude of dielectric constant in vacuum?  
(a) 0.01                      (b) 0.1  
(c) 1                            (d) 1.0005
  - ★ On what factor does the direction of flow of charge depend when two charged bodies are connected to each other?  
(a) electric field  
(b) electric intensity  
(c) electric potential  
(d) quantity of charge
  - In a Carnot engine what do we use as working substance?  
i. ideal gas  
ii. heat conducting substance  
iii. heat insulating substance  
Which one is correct?  
(a) i & ii                      (b) ii & iii  
(c) i & iii                      (d) i, ii & iii
  - An engine absorbs 2500 J heat and rejects 1500 J heat. What is the efficiency of the engine?  
(a) 30%                        (b) 35%  
(c) 40%                        (d) 45%
- Read the stem and answer the questions 5 and 6.  
The mass of an atomic particle is  $2.5 \times 10^{-27}$  kg.
- What is its rest energy in eV?  
(a)  $2.25 \times 10^{-10}$  eV    (b)  $1.5 \times 10^9$  eV  
(c)  $1.4 \times 10^{-10}$  eV    (d)  $1.4 \times 10^9$  eV
  - What is its total energy when it moves with a velocity of  $0.9c$ ?  
(a)  $5.61 \times 10^{-10}$  J    (b)  $5.16 \times 10^{-10}$  J  
(c)  $5.53 \times 10^{-10}$  J    (d)  $5.15 \times 10^{-19}$  J
  - Depending on which principle the post office box is constructed?  
(a) Principle of Wheatstone bridge  
(b) Principle of conservation of energy  
(c) Principle of conservation of charge  
(d) Principle of conservation of momentum
  - ★ What is the unit of magnetic field?  
(a) Nm                        (b) N/m  
(c) NA/m                      (d) Tesla
  - The apparatus for measuring resistance is—  
i. meterbridge  
ii. potentiometer  
iii. post office box  
Which one is correct?  
(a) i & ii                      (b) ii & iii  
(c) i & iii                      (d) i, ii & iii
  - For which the energy difference is 0.7 eV between valence band and conduction band?  
(a) Alloy                      (b) Metal  
(c) Insulator                (d) Semiconductor
  - At a place the horizontal component of the geomagnetic field is 36 A/m and the vertical component is 24 A/m. What is the total geomagnetic field at that place?  
(a) 40 A/m                      (b) 45 A/m  
(c) 49 A/m                      (d) 56 A/m
  - The peak value of an alternating current is 5 A. What is its root mean square value?  
(a) 2 A                        (b) 3 A  
(c) 3.53 A                      (d) 3.63 A
  - The refractive index of an equilateral prism is  $\sqrt{2}$ . What is the angle of minimum deviation?  
(a)  $30^\circ$                       (b)  $40^\circ$   
(c)  $45^\circ$                       (d)  $50^\circ$
  - The temperature of triple point of water is considered as —  
(a) 100 K                      (b) 212.15 K  
(c) 273.16 K                (d) 280.16 K
  - ★ The focal length of a convex lens is 10 cm. A candle is kept 15 cm away on the left hand side of its principal section. Which of the following statement regarding image of the candle is correct?  
(a) real, on right side of the lens, magnified and inverted.  
(b) real, on right side of the lens, magnified and erect.  
(c) real, on right side of the lens, diminished and inverted  
(d) virtual, on left side of the lens, magnified and erect.

16. Which one is the milk way?
- A galaxy of the universe
  - One of the solar systems
  - A planet of the solar system
  - The centre of the solar system, sun

17. Which one of the following is correct in case of angle of incidence (i) versus angle of deviation ( $\delta$ )?



18. The mean life of radium is 2500 y. What is the value of decay constant?

- $2.5 \times 10^4/y$
- $3.5 \times 10^4/y$
- $4 \times 10^4/y$
- $4.5 \times 10^4/y$

19. The sun radiates energy continuously and keeps its brightness, what is the cause for it?

- Carbon is burnt in its core.
- Chemical reaction occurs in it.
- Fusion of neutron produces helium
- Fusion of helium produces hydrogen

20. The characteristics of gamma rays are—

- they are used to destroy cancer cells

- they are emitted from radioactive nucleus
- they can be detected by Geiger Muller counter

Which one is correct?

- i & ii
- ii & iii
- i & iii
- i, ii & iii

21. ★ A source of light is moving towards an observer with a velocity  $0.25c$ .

Which velocity of light will appear to the observer?

- $1.25c$
- $0.75c$
- $c$
- $3c$

22. The characteristics of electromagnetic wave are—

- they are transverse wave
- they are the combination of electric and magnetic field
- medium is necessary for the propagation of electromagnetic wave

Which one is correct?

- i & ii
- i & iii
- ii & iii
- i, ii & iii

23. What is equivalent energy of 1 gram mass?

- $10 \times 10^{13} \text{ J}$
- $9 \times 10^{13} \text{ J}$
- $8 \times 10^{13} \text{ J}$
- $7 \times 10^{13} \text{ J}$

24. Which of the following two rays exhibit same property?

- X-rays and alpha-rays
- Gamma-rays and beta-rays
- X-rays and gamma-rays
- Alpha-rays and beta-rays

25. In a transformer, the voltage of primary coil is 220V and current is 6A. If the voltage of secondary coil is 110V, what will be the current of secondary coil?

- 8A
- 12A
- 18A
- 24A

|      |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Ans. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|      | c | c | c | c | d | b | a | d | c | d  | b  | c  | a  | c  | a  | a  | c  | c  | c  | d  | c  | a  | b  | c  | b  |