6/14-B

PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

(Long Answer Type Questions) 5 Each

1. State Gauss's law. Derive an expression for electric field due to an infinite line of charge.

Or

Give the principle, construction and working of van de Graff's generator.

2. State Biot Savart's law. Derive an expression for the magnetic field at the **centre of circular current carrying coil.**

Or

Give the principle, construction and working of moving coil galvanometer.

3. Define Impedance. Derive an expression for impedance and phase angle of LCR-circuit.

Or

Give the principle, construction and working of a.c. dynamo.

4. What is lens maker's formula ? Derive lens maker's formula for a convex lens.

Or

Define diffraction of light. Describe diffraction of light through a single slit.

(Short Answer Type Questions) 3 Eac

5. **Derive an expression for the energy stored in a capacitor.**

6. Derive relation between current and drift velocity.

7. A wire of resistance 10 ohms is stretched to double its original length. Calculate its new resistance.

8. State and explain Faraday's laws of electromagnetic induction in Mathematical form.

9. Explain why sky appears blue.

10. In Young's double slit experiment, the slits are 1.5 mm apart and are at a distance of 1 m from the screen. Find the fringe width for light of wavelength 5000 Å.

11. Draw binding energy per nucleon curve. What conclusion you draw from it ?

12. Define rectification. How is *p-n* junction diode used as a half-wave rectifier ?

(Very Short Answer Type Questions) 2 Each

13. Calculate the value of resistance needed to convert a galvanometer of resistance 50 ohm giving full scale deflection for a current of 10 mA into an ammeter of range 0–10 A.

14. **Write *two* uses of electromagnetic waves.**

15. Define angle of minimum deviation. Write the relation which connects **refractive index of the material of prism with angle of prism and angle of minimum deviation.**

16. Define work function and threshold frequency. Write relation between them.

17. **Calculate de Broglie wavelength of a mass of 1 g moving with a velocity of 10^3 m/s.**

18. **Give *two* properties of β-rays.**

19. **Give the truth table and logic symbol of OR-gate.**

20. **Why ground waves are not suitable for high frequencies ?**

(Objective Type Questions) 1 Each

21. Do as directed :

(i) **What is the condition for potentiometer to be most sensitive ?**

(ii) The magnetic force on a charge moving along the axis of current carrying solenoid is zero. (True/False)

(iii) The wave which is not electromagnetic wave is ..... .

(β-ray. γ-rays. X-rays)

(iv) In case of astronomical telescope in normal adjustment with objective lens of focal length 30 cm and eyepiece of focal length 5 cm. the length of telescope is ..... .

(v) Complete the nuclear reaction :

$$_3Li^7 + ? \rightarrow {}_3Li^6 + {}_1H^2$$

(vi) Write truth table of NAND gate.

(vii) If the current gain in common base transistor as an amplifier is 0.98. what is value of current gain in common emitter transistor ?

(viii) Define demodulation.

(ix) Name three elements of basic communication system.

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(x) The maximum distance up to which TV–transmission from a TV tower of height 'h' can be received, is proportional to :

($h^{1/2}$, $h^{1/3}$, h^2)