

SS

2037

ANNUAL EXAMINATION SYSTEM

PHYSICS (Theory)

(Common for Science & Agriculture Groups)

(English Version)

(Evening Session)

Time allowed : Three hours

Maximum marks : 70

- Note :** (i) You must write the subject-code/paper-code **052/B** in the box provided on the title page of your answer-book.
- (ii) Make sure that the answer-book contains 30 pages (including title page) and are properly serialized as soon as you receive it.
- (iii) Question/s attempted after leaving blank page/s in the answer-book would not be evaluated.
- (iv) Use of unprogrammable calculator/log tables is allowed.
- (v) Answers should be to the point and supported by relevant formulas / law / principle/ diagram.
- (vi) Question no. 1 to 8 will be of one mark each.
- (vii) Question no. 9 to 16 will be of two marks each.
- (viii) Question no. 17 to 23 will be of four marks each. There will be internal choice in any two questions.
- (ix) Question no. 24 to 26 will be of six marks each. There will be internal choice in them.

1. A fuse wire is a wire of

- (a) Both low resistance and low melting point.
- (b) High resistance and low melting point.
- (c) Low resistance and high melting point.
- (d) Both high resistance and high melting point.

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(2)

2. The following truth table represents

A	B	y
0	0	1
1	0	1
0	1	1
1	1	0

- (a) AND gate (b) NOR gate (c) OR gate (d) NAND gate

3. The minimum wavelength of the X-rays produced by electrons accelerated through a potential of 'V' (in volt) is directly proportional to

- (a) \sqrt{V} (b) V^2
 (c) $\frac{1}{\sqrt{V}}$ (d) $\frac{1}{V}$

4. Write whether the given statement is true or false : A diamagnetic substance is feebly attracted by a magnet.

5. Among α (alpha), β (beta) and γ (gamma) radiations, which one is not affected by a magnetic field?

6. Define the SI unit of self-inductance. *henry*

7. What is function of transducer?

8. Write the following radiations in a descending order of their frequencies : red light, X-rays, microwaves, radio-waves.

9. A resistance of a tungsten filament at 150°C is 133Ω . What will be its resistance at 500°C ? The temperature coefficient of resistance of tungsten at 0°C is $0.0045^\circ\text{C}^{-1}$.

10. Which material is preferred for making permanent magnets? Give reason for your choice?

11. Why is the coil of a dead-beat galvanometer wound on a metal frame?

12. Microwaves are used in RADAR, why?

13. Define (i) critical angle (ii) polarising angle.

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14. For a common emitter amplifier, dc (direct current) current gain is 60. If the emitter current is 6.6 mA, calculate the collector and base current. 2
15. What is space wave propagation? Give one example of communication system, which use space wave mode. 2
16. What is the focal length of the combination of a convex lens of focal length 30 cm in contact with a concave lens of focal length 20 cm? Is the system a converging or diverging lens? Ignore thickness of the lenses. 2
17. Derive an expression for the capacitance of parallel plate capacitor when a dielectric slab is introduced between the plates of capacitor. 4

or

Two charges $6 \times 10^{-6} \text{ C}$ and $-4 \times 10^{-6} \text{ C}$ are located 10 cm apart. At what points on the line joining the two charges is the electric potential zero? Take the potential at infinity to be zero. 4

18. What is the principle of a potentiometer? With the help of circuit diagram, explain the use of potentiometer measure internal resistance of a given primary cell. 4
19. Give the principle of a transformer, construction of a step-down transformer. Give any two energy losses of a transformer. 4
20. State the laws of photoelectric emission. 4

or

Light of wavelength 5500 Å (angstrom) falls on a photosensitive plate with work function 1.7 eV. Find (a) energy of photon in eV (electron volt), (b) maximum kinetic energy of photoelectron and (c) stopping potential. 4

21. With the help of circuit diagram, explain the working of npn transistor as an amplifier in common emitter configuration. 4
22. Draw the graph showing variation of binding energy per nucleon with mass number. Write the inferences drawn from the graph. 4
23. Derive the expression : $-\frac{\mu_1}{u} + \frac{\mu_2}{v} = \frac{\mu_2 - \mu_1}{R}$, when refraction occurs from rarer to denser medium at convex spherical refracting surface ($\mu_1 < \mu_2$). (Where u, v and R, are object distance, image distance and radius of curvature of spherical surface respectively). 4

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(4)

- ~~24~~ (a) What would be the work done, if a point charge '+q' is taken from a point A to a point B on the circumference of a circle drawn with another point charge +q at the centre ? 1
- (b) State Gauss's theorem in electrostatics. Using Gauss's theorem in electrostatics, derive an expression for electric field intensity at a point due to infinite sheet of charge. How does the electric field change for a thick sheet of charge ? 1,3,1

or

- (a) Define the SI unit of electric charge. 1
- (b) Two point charges q and -q is placed at a distance 2a apart. Calculate the electric field at a point P situated at a distance r along the axial line of an electric dipole. What is the electric field when $r \gg a$? Also, give the direction of electric field w.r.t. electric dipole moment. 3,1,1

- ~~25~~ (a) State the rule that is used to find the direction of field acting at a point near a current carrying straight conductor. 1
- (b) State Ampere's circuital law. Using this law, obtain an expression for the magnetic field due to an infinitely long wire carrying current. 1,4

or

- (a) An electric charge enters in electric field at right angles to the direction of electric field. What is the nature of the path followed ? 1
- (b) With the help of labelled diagram, give the principle, construction and theory of cyclotron. 1,1,1,2

- ~~26~~ (a) Define power of a lens. 1
- (b) By giving assumptions made, derive the lens maker formula for a double convex lens. 1,4

or

- (a) What are coherent sources of light ? 1
- (b) State the necessary conditions for sustained interference pattern. Derive an expression for the fringe width using Young's double slit method for interference of light. 2,3

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