

Sethu Bhaskara Matriculation Higher Secondary School

Common Quarterly Examination - 2026-27

Physics - Answer Key

Class: 12

Max. Marks 70

PART-I

I Choose the appropriate answer and write with option 15X1=15

- | | | |
|----|-------------------------------------|----|
| 1 | d. 820°C | 1m |
| 2 | a. $1.414 \times 10^{-8} \text{ T}$ | 1m |
| 3 | c. 0.46 W | 1m |
| 4 | c. $+20 \text{ V}$ | 1m |
| 5 | b. Concave | 1m |
| 6 | c. 500Ω | 1m |
| 7 | b. 1.2 Am^2 | 1m |
| 8 | a. 30° | 1m |
| 9 | c. 10^6 T | 1m |
| 10 | b. its wavelength | 1m |
| 11 | a. $\pi/4$ | 1m |
| 12 | c. 0.1 J | 1m |
| 13 | d. energy density | 1m |
| 14 | b. $\frac{1}{r^2}$ | 1m |
| 15 | a. Wb A^{-1} | 1m |

PART-II

6x2=12

Q Answer Any six questions. Q.No. 24 is Compulsory

- | | | |
|-----|---|---|
| 16. | Ammeter is always connected in series. It offers low resistance, so there is no change in current | 2m |
| 17. | (i) Satellite Communication | 1m |
| | (ii) Radar System | 1m |
| | (or) | |
| | Any 2 uses | 2m |
| 18. | $W = \frac{n_v - n_r}{n_g - 1}$ $W = \frac{1.632 - 1.613}{1.620 - 1}$ $W = 0.0306$ | <p>1m</p> <p>$\frac{1}{2}m$</p> <p>$\frac{1}{2}m$</p> |
| 19. | (i) Workdone = 0 | 1m |
| | (ii) Electric field is perpendicular to the surface | 1m |
| 20 | Stretch the thumb, fore finger and middle finger of the right hand mutually perpendicular. | 1m |
| | Forefinger - direction of magnetic field | |
| | thumb - direction of motion of conductor | |
| | middle finger - direction of induced current | 1m |

21. Resistance offered to the current flow by the conductor of unit length of unit area of cross section of the conductor

(or)

$$\rho = \frac{RA}{l}$$

22. Blue colour has shorter wavelength is scattered more than Red colour which has longer wavelength.

23. Ratio of magnetisation produced in material to the applied magnetic field strength.

(or)

$$\chi = M/H$$

24. $\phi = NBA \cos \theta$

$$\theta = 60^\circ$$

$$A = S \times S$$

$$= 30 \times 10^{-2} \times 30 \times 10^{-2}$$

$$= 900 \times 10^{-4} \text{ cm}^2$$

$$\phi_B = 500 \times 0.4 \times 900 \times 10^{-4} \times \cos 60^\circ$$

$$= 9 \text{ wb}$$

PART-III

6x3=18

III Answer Any Six questions. Q.No. 33 is Compulsory

25. (i) Core loss (or) Iron loss - * Transformer core is magnetised and demagnetised repeatedly.

* Minimized by using steel of high Silicon Content

(ii) Copper loss : * When electric current flows through them, some amount of energy is dissipated due to joule heating.

* Minimized by using wires of larger diameter

(iii) Flux leakage :- * When magnetic lines of primary coil are not completely linked with secondary coil.

* Minimized by winding coils one over the other

26 Explanation

Diagram

$$V = - \int_{\infty}^r E dr$$

$$E = \frac{1}{4\pi\epsilon_0} \frac{q}{r^2}$$

$$V = - \int_{\infty}^r \frac{1}{4\pi\epsilon_0} \frac{q}{r^2} dr$$

$$V = \frac{1}{4\pi\epsilon_0} \frac{q}{r}$$

27.

$$C_p = C_1 + C_2$$

$$= C_0 + C_0 = 2C_0$$

$$\frac{1}{C_s} = \frac{1}{C_p} + \frac{1}{C_3}$$

$$= \frac{1}{2C_0} + \frac{1}{C_0} = \frac{3}{2C_0}$$

$$C_s = \frac{2C_0}{3}$$

(4)

28. Explanation

$\frac{1}{2}m$

Diagram

$\frac{1}{2}m$

$$n_1 \sin i = n_2 \sin r$$

$$\sin i = \tan i, \quad \sin r = \tan r$$

$$n_1 \tan i = n_2 \tan r$$

$\frac{1}{2}m$

$$\tan i = \frac{DB}{DO} \quad \text{and} \quad \tan r = \frac{DB}{DI}$$

$$n_1 \frac{DB}{DO} = n_2 \frac{DB}{DI}$$

$\frac{1}{2}m$

$$\text{upto} \quad d' = \frac{n_2}{n_1} d$$

$$n_2 = 1 \quad ; \quad n_1 = n$$

$$d' = \frac{d}{n}$$

$\frac{1}{2}m$

The bottom appears to be elevated

$\frac{1}{2}m$

$$d - d' = d - \frac{d}{n} = d \left(1 - \frac{1}{n} \right)$$

29. Kirchhoff's current rule

$\frac{1}{2}m$

Statement

Diagram

$\frac{1}{2}m$

Rules

$\frac{1}{2}m$

Kirchhoff's voltage rule

$1m$

Statement

Diagram

$\frac{1}{2}m$

Rules

30. Continuous absorption Spectrum with explanation

Line absorption Spectrum with explanation

Band absorption Spectrum with explanation

(or)

only types

31. Explanation

Diagram

$$I = \frac{\text{total emf}}{\text{total resistance}} = \frac{n\varepsilon}{nr + R}$$

Case (i) $r \ll R$ $I = \frac{n\varepsilon}{R} \approx nI,$

Case (ii) $r \gg R$ $I = \frac{n\varepsilon}{nr} = \frac{\varepsilon}{r}$

32. Explanation

$$\vec{F}_m = q(\vec{v} \times \vec{B})$$

(i) $F_m \propto B$

(ii) $F_m \propto v$

(iii) $F_m \propto \text{Sine of the angle between the velocity and magnetic field.}$

(iv) $F_m \propto q$

(v) $F_m \perp$ to $\vec{v}$ and $\vec{B}$

(vi) F_m for negative charge is opposite to the direction of positive charge

(6)

(vii) If $\vec{v}$ along $\vec{B}$, $\vec{F}_m = 0$

$\frac{1}{2}m$

33. $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$

$1m$

$$\frac{1}{f} = \frac{1}{-10} + \frac{1}{150} = \frac{80}{10500}$$

$1m$

$$f = -131.25 \text{ cm}$$

$\frac{1m}{2}$

$$P = \frac{1}{f} = -0.76 D$$

$\frac{1}{2}m$

PART-IV

5x5=25

Qr Answer all Questions

34a) Explanation

$\frac{1}{2}m$

Diagram

$\frac{1}{2}m$

$$\Phi_E = \oint \vec{E} \cdot d\vec{A}$$

$$\Phi_E = \int_{\text{c.s.}} \vec{E} \cdot d\vec{A} + \int_{\text{Top}} \vec{E} \cdot d\vec{A} + \int_{\text{Bottom}} \vec{E} \cdot d\vec{A}$$

$\frac{1}{2}m$

For Top and Bottom

$\frac{1}{2}m$

$$\Phi_E = 0$$

$$\Phi_E = \int E dA = \frac{Q_{\text{enc}}}{\epsilon_0}$$

$$E \cdot 2\pi r L = \frac{\lambda L}{\epsilon_0}$$

$$E = \frac{1}{2\pi\epsilon_0} \frac{\lambda}{r}$$

$1m$

$$\vec{E} = \frac{1}{2\pi\epsilon_0} \frac{\lambda}{r} \hat{r}$$

$1m$

(7)

$\lambda > 0$ $\vec{E}$ points outward

$\lambda < 0$ $\vec{E}$ points inward

1m

b. Explanation

$\frac{1}{2}m$

Diagram

$\frac{1}{2}m$

$$C_0 = \frac{Q_0}{V_0}$$

$\frac{1}{2}m$

$$Q_0 = \text{Constant}$$

$\frac{1}{2}m$

$$E = \frac{E_0}{\epsilon_r}$$

$\frac{1}{2}m$

$$V = Ed = \frac{V_0}{\epsilon_r}$$

$\frac{1}{2}m$

$$C = \frac{Q_0}{V} = \epsilon_r C_0$$

1m

$$C = \frac{\epsilon_r \epsilon_0 A}{d} = \frac{\epsilon A}{d}$$

$$V_0 = \frac{1}{2} \frac{Q_0^2}{C_0}$$

$$U = \frac{U_0}{\epsilon_r}$$

1m

35a) Explanation

$\frac{1}{2}m$

Diagram

$\frac{1}{2}m$

$$V_d = \frac{dx}{dt}$$

$$dx = V_d dt$$

$$\text{No. of electrons} = Adx \times n$$

(8)

$\frac{1}{2}m$

$$\text{No. of } e^-s = AV_d dt n$$

$$\text{Charge } dq = e n A V_d dt$$

$$I = n A e V_d$$

$$J = \frac{I}{A} = \frac{n e A V_d}{A} = n e V_d$$

$$\vec{J} = -\frac{n e^2 t}{m} \vec{E} = -\sigma \vec{E}$$

$$\vec{J} = \sigma \vec{E}$$

$$\sigma = \frac{n e^2 t}{m} \rightarrow \text{Conductivity}$$

b

Construction

Diagram

At B and D

$$I_1 - I_g - I_3 = 0$$

$$I_2 + I_g - I_4 = 0$$

At ABDA

$$I_1 P + I_g G - I_2 R = 0$$

At ABCDA

$$I_1 P + I_3 Q - I_4 S - I_2 R = 0$$

$$I_g = 0$$

$$I_1 = I_3$$

$$I_2 = I_4$$

$$I_1 P = I_2 R$$

$$I_3 Q = I_4 S$$

(9)

$$\frac{P}{Q} = \frac{R}{S}$$

3a) Single Phase AC generator

Construction

Diagram

Working

$\vec{B} \perp^r$ to PQRS

$$\theta = 0^\circ$$

$$\mathcal{E} = 0$$

$\vec{B} \parallel^l$ to PQRS

$$\theta = 90^\circ$$

$$\mathcal{E} = \mathcal{E}_m$$

$\vec{B} \perp^r$ to PQRS

$$\theta = 180^\circ$$

$$\mathcal{E} = 0$$

$\vec{B} \parallel^l$ to PQRS

$$\theta = 270^\circ$$

$$\mathcal{E} = -\mathcal{E}_m$$

$\vec{B} \perp^r$ to PQRS

$$\theta = 360^\circ$$

$$\mathcal{E} = 0$$

Wave diagram

b). Explanation

Circuit diagram

$$V = V_m \sin \omega t$$

$$\mathcal{E} = -L \frac{di}{dt}$$

$$V + \mathcal{E} = 0$$

$$i = \frac{V_m}{\omega L} (\cos \omega t) + C$$

$$i = I_m \sin(\omega t - \pi/2)$$

Phasor & wave diagram

31a). Explanation

Diagram

$$n_1 \sin i = n_2 \sin r$$

$$n_1 i = n_2 r$$

$$\tan \alpha = \frac{PN}{PO} ; \tan \beta = \frac{PN}{PC} ; \tan \gamma = \frac{PN}{PI}$$

$$i = \alpha + \beta$$

$$r = \beta - \gamma$$

$$n_1 (\alpha + \beta) = n_2 (\beta - \gamma)$$

$$\text{upto } \frac{n_1}{PO} + \frac{n_2}{PI} = \frac{n_2 - n_1}{PC}$$

$$PO = u ; PI = +v \text{ and } PC = R$$

$$\frac{n_2}{v} - \frac{n_1}{u} = \frac{n_2 - n_1}{R}$$

$$n_2 = n ; n_1 = 1$$

$$\frac{n}{v} - \frac{1}{u} = \frac{n-1}{R}$$

b

Explanation

Diagram

$$n_1 \sin i_c = n_2 \sin 90^\circ$$

$$n_1 \sin i_c = n_2$$

$$\sin i_c = \frac{n_2}{n_1}$$

$$\sin i_c = \frac{R}{\sqrt{d^2 + R^2}} = \frac{n_2}{n_1}$$

$\frac{1}{2} + \frac{1}{2}m$

$$R = d \sqrt{\frac{n_2^2}{n_1^2 - n_2^2}}$$

$\frac{1}{2}m$

$$n_2 = 1 \quad n_1 = n$$

$\frac{1}{2}m$

$$R = \frac{d}{\sqrt{n^2 - 1}}$$

$\frac{1}{2}m$

38a) (i) The line integral of magnetic field over a closed loop is equal to μ_0 times the current enclosed by the loop.

2m

$$(ii) \quad B = \frac{\mu_0 I}{2\pi r}$$

1m

$$= \frac{4\pi \times 10^{-7} \times 1}{2\pi \times 1} = 2 \times 10^{-7} T$$

$\frac{1}{2}m$

$$B_{earth} \approx 10^{-5} T$$

$\frac{1}{2}m$

B is one hundred times smaller than B_{earth} . $\frac{1}{2} + \frac{1}{2}m$

b) (i) Electromagnetic waves does not require any medium for propagation

2m

$$(ii) \quad V = \frac{c}{\sqrt{\mu_r \epsilon_r}} = \frac{3 \times 10^8}{\sqrt{1 \times 2.25}}$$

1+1

$$V = 2 \times 10^8 \text{ m/s}$$

1m

(12)

Handling Teachers

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