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No. of Printed Pages: 4

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PART - IIIஇயற்பியல் / **PHYSICS**

(English Version)



Time Allowed : 3.00 Hours]

[Maximum Marks : 70

- Instructions :**
- (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
 - (2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

- Note :**
- (i) Answer **all** the questions. **15x1=15**
 - (ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. Dielectric is inserted after the battery is disconnected the voltage is
 (a) constant (b) increases (c) decreases (d) None of the above
2. Which of the following electromagnetic radiation is used for viewing objects through fog
 (a) microwave (b) gamma rays (c) X- rays (d) infrared
3. In Joule's heating law, when R and t are constant, if the H is taken along the y- axis and I^2 along the x axis, the graph is
 (a) straight line (b) parabola (c) circle (d) ellipse
4. Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work done in moving 50 electrons from A to B is
 (a) $8.80 \times 10^{-17} \text{J}$ (b) $-8.80 \times 10^{-17} \text{J}$ (c) $4.40 \times 10^{-17} \text{J}$ (d) $5.80 \times 10^{-17} \text{J}$
5. A toaster operating at 220V has a resistance of 110Ω . The power is
 (a) 240W (b) 440W (c) 2W (d) 480W
6. Stars twinkle due to,
 (a) reflection (b) total internal reflection
 (c) refraction (d) polarisation

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7. The force experienced by a particle having mass m and charge q accelerated through a potential difference V when it is kept under perpendicular magnetic field \vec{B} is
- (a) $\sqrt{\frac{2q^3BV}{m}}$ (b) $\sqrt{\frac{q^3B^2V}{2m}}$ (c) $\sqrt{\frac{2q^3B^2V}{m}}$ (d) $\sqrt{\frac{2q^3BV}{m^3}}$
8. Fraunhofer lines are an example of _____ spectrum.
- (a) line emission (b) line absorption (c) band emission (d) band absorption
9. Two coherent monochromatic light beams of intensities I and $4I$ are superposed. The maximum and minimum possible intensities in the resulting beam are.
- (a) $5I$ and I (b) $5I$ and $3I$ (c) $9I$ and I (d) $9I$ and $3I$
10. A wire of length l carries a current I along the Y direction and magnetic field is given by $\vec{B} = \frac{\beta}{\sqrt{3}}(\vec{i} + \vec{j} + \vec{k})T$. The magnitude of Lorentz force acting on the wire is
- (a) $\sqrt{\frac{2}{\sqrt{3}}}\beta Il$ (b) $\sqrt{\frac{1}{\sqrt{3}}}\beta Il$ (c) $\sqrt{2}\beta Il$ (d) $\sqrt{\frac{1}{\sqrt{2}}}\beta Il$
11. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?
- (a) 30° (b) 45° (c) 60° (d) 90°
12. If the velocity and wavelength of light in air is V_a and λ_a and that in water is V_w and λ_w , then the refractive index of water is,
- (a) $\frac{V_w}{V_a}$ (b) $\frac{V_a}{V_w}$ (c) $\frac{\lambda_w}{\lambda_a}$ (d) $\frac{V_a\lambda_a}{V_w\lambda_w}$
13. When the current changes from $+2A$ to $-2A$ in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is
- (a) 0.2 H (b) 0.4 H (c) 0.8 H (d) 0.1 H
14. In a series RL circuit, the resistance and inductive reactance are the same. Then the phase difference between the voltage and current in the circuit is
- (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{6}$ (d) zero
15. A step-down transformer reduces the supply voltage from 220 V to 10 V and increase the current from 6 A to 100 A. Then its efficiency is
- (a) 1.2 (b) 0.83 (c) 0.75 (d) 0.9

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PART - II

Note : Answer **any six** questions. Question No. **24** is **compulsory**.

6x2=12

16. Define quality factor.
17. Write the uses of ultra-violet rays.
18. Pure water has refractive index 1.33. What is the speed of Light through it?
19. Define action of point.
20. What are the properties of the substance used as heating element?
21. How the current sensitivity of galvanometer can be increased?
22. Define electric dipole moment. Give its unit.
23. State Fleming's Left Hand Rule.
24. Two materials X and Y are magnetized, whose intensity of magnetization are 500 Am^{-1} and 2000 Am^{-1} , respectively. If the magnetizing field is 1000 Am^{-1} , then which one among these materials can be easily magnetized?

PART - III

Note : Answer **any six** questions. Question No. **33** is **compulsory**.

6x3=18

25. Derive the relation between f and R for a spherical mirror.
26. Obtain the expression for energy stored in the parallel plate capacitor.
27. How Galvanometer can be converted in to Ammeter.
28. Explain various energy losses in a transformer.
29. Two light sources with amplitudes 5 units and 3 units respectively interfere with each other. Calculate the ratio of maximum and minimum intensities.
30. Obtain relation between current and drift velocity.
31. What are the advantages and disadvantages of AC over DC?
32. Write down any six properties of electromagnetic waves.
33. Find the impedance of a series RLC circuit if the inductive reactance, capacitive reactance and resistance are 184Ω , 144Ω and 30Ω respectively. Also calculate the phase angle between voltage and current.

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PART - IV**Note :** Answer **all** the questions.

5x5=25

34. Explain the principle, construction and working of transformer.

(OR)

Obtain the equation for Path difference and band width in Young's double slit experiment.

35. Write down Maxwell equations in integral form.

(OR)

Explain the determination of the internal resistance of a cell using voltmeter.

36. Calculate the electric field due to a dipole on its axial line.

(OR)

Obtain an expression for the force on a current carrying conductor placed in a magnetic field.

37. State Gauss law in electrostatics. Obtain an expression for electric field due to an infinitely long charged wire.

(OR)

Obtain the condition for bridge balance in Wheatstone's bridge.

38. Show that the mutual inductance between a pair of coils is same ($M_{12} = M_{21}$)

(OR)

Derive the mirror equation and the equation for lateral magnification.

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