

II PUC MID-TERM EXAMINATION, SEPT./OCT. - 2026

SUBJECT : PHYSICS (33)

Time : 3 Hrs.

Max Marks : 70

General Instructions :

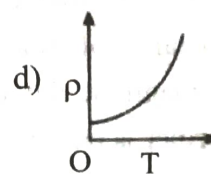
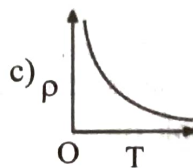
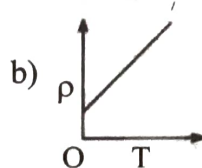
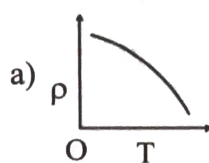
- 1) All parts (A to D) are compulsory.
- 2) For Part-A questions, first written answer will be considered for evaluation.
- 3) Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without relevant formula and detailed solutions will not carry any marks.

PART - A

I Pick the current option among the given options for ALL the following questions:

15x1=15

- 1) Two metallic spheres A & B of radii r_1 & r_2 are connected by a thin wire (where $r_2 > r_1$) the system is given certain charge. The charge will be greater.
a) equal on both
b) zero on both
c) on the surface of sphere A
d) on the surface of sphere B
- 2) The SI unit of electric flux is
a) Volt-meter
b) Joule per coulomb
c) newton per coulomb
d) Joule per second
- 3) Which of the following statements is / are correct for equipotential surface ?
i) The electric potential at all points on an equipotential surface is same
ii) Equipotential surface never intersect each other
iii) The direction of electric field is perpendicular to equipotential surface
a) (i) only
b) (ii) only
c) (i) & (ii)
d) (i), (ii) & (iii)
- 4) If a dielectric substance is introduced between the plates of a capacitor, the energy of the capacitor will
a) increase
b) decrease
c) becomes zero
d) remains unchanged
- 5) Ohm's law is valid when the temperature of the conductor is
a) very low
b) very high
c) constant
d) zero
- 6) Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper ?



- 7) The correct expression for current density is
a) $J = neAV_d$
b) $J = neV_d$
c) $J = nAV_d$
d) $J = eAV_d$
- 8) Two parallel conductor carrying current in the same direction
a) repel each other
b) attract each other
c) neither repel nor attract
d) have rotational motion
- 9) The magnetic field strength at a point p at a distance 'r' from a long straight wire carrying current I
a) $\frac{\mu_0 I}{2r}$
b) $\frac{\mu_0 I}{4\pi r}$
c) $\frac{\mu_0 I}{2\pi r}$
d) $\frac{\mu_0 I}{\pi r}$

(P.T.O.)

- 10) Below are two statements :
 Statement-I : Magnetic field lines always form closed loops.
 Statement-II : Moving charges produce a magnetic field
 a) Both statements I & II are correct and Statement II is correct explanation of Statement I
 b) Both statements I & II are correct and Statement II is not correct explanation of Statement I
 c) Statement-I is correct but Statement-II wrong
 d) Statement-I is wrong but Statement-II is correct
- 11) The magnetic susceptibility of a paramagnetic material is
 a) small and negative b) small and positive c) large and positive d) large and negative
- 12) The cause of induced emf in a closed coil is due to
 a) magnetic field b) magnetic flux c) change in magnetic flux d) none
- 13) The law which gives the polarity of induced emf in electromagnetic induction is
 a) Faraday law b) Ampere's circuital law
 c) Gauss law d) Lenz law
- 14) Identify the correct match :

Column-I	Column-II
(i) AC with pure resistor circuit	p) Voltage leads the current by $\frac{\pi}{2}$
(ii) AC with pure capacitor circuit	q) Current and voltage are in phase
(iii) AC with pure inductor circuit	r) Current leads the voltage by $\frac{\pi}{2}$

- a) (i) $\rightarrow$ q (ii) $\rightarrow$ p (iii) $\rightarrow$ r
 b) (i) $\rightarrow$ q (ii) $\rightarrow$ r (iii) $\rightarrow$ p
 c) (i) $\rightarrow$ p (ii) $\rightarrow$ q (iii) $\rightarrow$ r
 d) (i) $\rightarrow$ p (ii) $\rightarrow$ r (iii) $\rightarrow$ q
- 15) In case of alternating voltage applied to series LCR circuit at resonance
 a) $X_L = R$ b) $X_C = R$ c) $X_L > X_C$ d) $X_L = X_C$

II Fill in the blanks by choosing appropriate answer given in the bracket for ALL the following questions:

5x1=5

(zero, infinite, electric current, potential difference, $\sqrt{2}$, mutual induction)

- 16) When cells are connected in series same _____ flows through each cell.
 17) The resistance of an ideal voltmeter is _____.
 18) The net magnetic flux through a closed surface is _____.
 19) Transformer is based on the principle of _____.
 20) The ratio of peak value & r.m.s value of an ac is _____.

PART-B

III Answer any FIVE of the following questions:

5x2=10

- 21) State and explain Coulomb's law of electrostatics.
 22) What is electric dipole moment ? Mention its SI unit.
 23) Calculate the effective capacitance of two capacitors of capacitances $2\mu\text{F}$ & $4\mu\text{F}$ connected end to end.
 24) Give the significance of Kirchoff junction rule & Kirchoff mesh rule.
 25) Write the expression for magnetic moment and explain the terms.
 26) State and explain Lenz's law.

- 27) Define (a) magnetisation and (b) magnetic susceptibility
28) What is displacement current ? Mention the expression for it.

PART-C

IV Answer any FIVE of the following questions:

5x3=15

- 29) Derive an expression for torque on electric dipole in an electric field.
30) Give any three properties of electric lines of force.
31) Obtain the relation between electric potential and electric field.
32) Deduce the relation between current density, electrical conductivity and electric field using Ohm's law.
33) A galvanometer of resistance of 50Ω requires a current of 2mA for full scale deflection. How do you convert galvanometer into ammeter of range 0-3A ?
34) Write any three differences between diamagnetic and paramagnetic materials.
35) Derive an expression for motional emf.
36) Give any factors affecting power loss in transformer.

PART-D

V Answer any THREE of the following questions:

3x5=15

- 37) Derive an expression for electric field at a point near the surface of uniformly charged spherical shell, using Gauss law.
38) Derive an expression for capacitance of parallel plate capacitor.
39) Obtain the balanced condition of Wheatstone network using Kirchoff's laws.
40) Derive an expression for magnetic field at a point along the axis of a circular current loop.
41) What is AC generator ? Derive an expression for alternating emf induced in an AC generator.

VI Answer any TWO of the following questions:

2x5=10

- 42) Two point charges $6 \times 10^{-8} \text{ C}$ and $-4 \times 10^{-8} \text{ C}$ are located 10 cm apart. At what points on the line joining the two point charges is the electric potential zero ?
43) Two cells of emf 2 V and 4 V and internal resistance 1Ω and 2Ω respectively are connected in parallel, so as to send the current in the same direction through an external resistor of resistance 10Ω . Find the potential difference across 10Ω resistor.
44) A circular coil of mean radius 6.284 cm has 20 turns. If a current of 2A is passed through this coil, find the magnitude of the magnetic field at its center. Also find the magnetic dipole moment of this current coil.
45) A resistor of 100Ω , a pure inductance coil of inductance 0.5H and capacitor are in series in a circuit containing an ac source of 200V, 50 Hz. In the circuit, current is ahead of the voltage by 30° . Find the value of the capacitance.
