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शर्थ - 030

PHYSICS PAPER - II : PHY-112
Electricity and Magnetism
(112102)

P. Pages : 4

Time : Two Hours

Max. Marks : 60

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Figures to the right indicate full marks.
6. Draw a neat labelled diagram wherever necessary.
7. Use of logarithmic table or standard electronic calculator is allowed.
8. Symbols have their usual meanings.

1. a) Attempt **any six** of the following. Select the correct option and rewrite the following. **6**

   i) The S. I. unit of electric charge is ----------
      - a) Coloumb
      - b) Microcoulomb
      - c) Ampere
      - d) None of the above

   ii) The relation between current density vector and volume charge density is known as ----------.
      - a) Equation of continuity
      - b) Equation of conductivity
      - c) Equation of resistivity
      - d) None of these

   iii) If 'I' is the current passing through the coil, then magnetic flux (ϕ) linked with coil is ----------.
      - a) LI^2
      - b) LI
      - c) L^2I
      - d) None of these

   iv) The group of atomic magnets formed due to interaction are called -----
      - a) Resistances
      - b) Inductances
      - c) Domains
      - d) None of these

v) An example of paramagnetic material is --------
   a) Gold
   b) Benzene
   c) Chromium
   d) Magnesium

vi) The time constant of inductive circuit is -----------.
   a) R/L
   b) RL
   c) L/R
   d) L.t

vii) S. I. unit of mutual inductance is -----------.
   a) Farad
   b) Ohm
   c) Henry
   d) Volt

viii) The effective inductance for two coils connected in parallel when mutual inductance is neglected is $\dfrac{1}{L_P} = -----$
   a) $\dfrac{1}{L_1} + \dfrac{1}{L_2}$
   b) $\dfrac{1}{L_1} - \dfrac{1}{L_2}$
   c) $L_1 - L_2$
   d) $L_1 + L_2$

b) Attempt **any six** of the following. Answer in one sentence.   6

i) State Kirchhoff's Current Law (KCL)

ii) Define step-up and step-down transformer.

iii) Give the unit of magnetic permeability.

iv) Define short circuit current.

v) A 60 watt lamp working for 48 hours will consume approximately how many units.

vi) State Thevenin's theorem.

vii) Define one Henry.

viii) Give any one application of inductive Kick.

2. Attempt **any six** of the following. **12**

i) What are hard magnetic materials.

ii) State Ohm's law and give its mathematical form.

iii) Define time constant for decay of current in L-R circuit.

iv) State the formula for mutual inductance between two co-axial solenoids.

v) Practically why the efficiency of transformer is always less than one?

vi) What is transient current?

vii) Explain the origin of magnetism.

viii) Define self inductance and mutual inductance.

ix) Define current density. What is its S. I. unit?

3. Attempt **any four** of the following. **12**

i) State maximum power transfer theorem and derive necessary condition.

ii) A condenser of capacity $1\mu F$ is discharged through $1M\Omega$ resistance. Find the time in which the charge on it falls to 36.8% of its initial value.

iii) Describe briefly ferromagnetism.

iv) Explain in brief losses in transformer.

v) Discuss the discharge of a condenser through a resistance.

vi) Write a short note on Ferrite.

4. Attempt **any three** of the following. **12**

i) Using Norton's theorem find out the current passing through load resistance R_L.
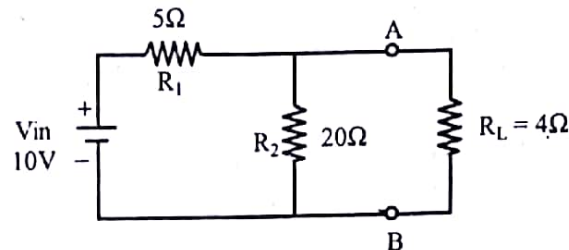
ii) State and explain Joulels Law of heating effect.

iii) What are soft magnetic materials? Mention their example and properties.

iv) Describe the importance of hysteresis cycle.

v) Obtain an expression for energy stored in inductor.

5. Attempt **any two** of the following. **12**

i) Give the different steps to Thevenize the circuit. Take suitable example.

ii) Describe the construction of a transformer and explain its working.

iii) Obtain the relation $B = \mu_0 (H + M)$. Where symbols have their usual meanings.

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