

312310

25226

3 Hours / 70 Marks

Seat No.

--	--	--	--	--	--	--	--

- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define resistance and state its unit.
- (b) State Ohm's law applied to an electrical circuit & express it in the form of equation.
- (c) Define capacitance and state its unit.
- (d) Define Magnetic Hysteresis.
- (e) Define reluctance & permeance with respect to magnetic circuit.
- (f) List two types of induced emf.
- (g) State Fleming's right hand rule.



2. Attempt any THREE of the following :**12**

- (a) State any four advantages of alternating current over direct current.
- (b) State and explain Kirchhoff's voltage law.
- (c) Three capacitors having capacitances of $15\ \mu\text{F}$, $18\ \mu\text{F}$ & $12\ \mu\text{F}$ are connected in circuit. Find equivalent capacitance when they are connected in (i) series (ii) parallel.
- (d) Draw the symbol and characteristics of ideal voltage source and practical voltage source.

3. Attempt any THREE of the following :**12**

- (a) Define electric work and electric power. Give their SI units.
- (b) A resistance of $10\ \Omega$ is connected in parallel with $15\ \Omega$. If current through the combination is $10\ \text{A}$, calculate current through each resistance.
- (c) List any four types of capacitor and their applications.
- (d) Compare electric circuit and magnetic circuit. (any four points)

4. Attempt any THREE of the following :**12**

- (a) Calculate current, resistance and energy consumed by an electric iron rated $250\ \text{V}$, $3\ \text{kW}$ when used for 12 hours.
- (b) Explain the working of capacitor with neat sketch.
- (c) List the different types of inductors along with their applications.
- (d) Draw and label series magnetic circuit and parallel magnetic circuit.
- (e) Derive the expression for energy stored in magnetic field.

5. Attempt any TWO of the following :**12**

- (a) Define following terms :
- (i) Active and Passive Network
 - (ii) Linear and Non-linear circuit
 - (iii) Unilateral and Bilateral circuit
- (b) Two capacitors $100\ \mu\text{F}$ and $50\ \mu\text{F}$ are connected in parallel. This parallel combination is then connected in series with a $200\ \mu\text{F}$ capacitor. Finally this series – parallel combination is connected across $100\ \text{V}$ dc supply.

Calculate :

- (i) Voltage across each capacitor
 - (ii) Charge on each capacitor
 - (iii) Energy stored in each capacitor
- (c) An air-cored coil has a mean diameter of $5\ \text{cm}$ and a length of $50\ \text{cm}$. It has 500 turns of wire. Find the inductance of the coil and hence the e.m.f. induced when a current of $10\ \text{A}$ flowing through it dies in 0.01 seconds.

6. Attempt any TWO of the following :**12**

- (a) Find the current through $1\ \Omega$ resistance of Figure No. 1 using Kirchhoff's laws :

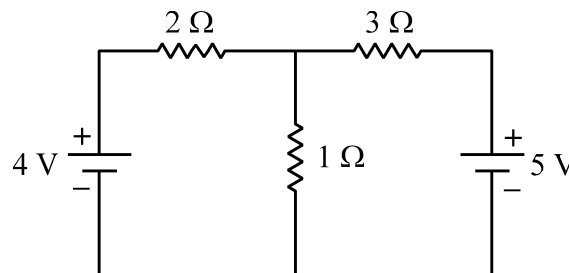


Fig. No. 1

P.T.O.

- (b) An iron ring of 20 cm diameter and 5 cm^2 cross-sectional area is wound with 300 turns. Flux density of iron is 1 Wb/m^2 and permeability of 500. Find (i) Reluctance (ii) Flux (iii) M.M.F. (iv) Current.
- (c) Draw hysteresis loop for hard steel, cast steel, sheet steel and non-magnetic material, also write one application for each material.
-