22212

11920

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.

Marks

1. Attempt any FIVE of the following **10**

a) Define the term resistance and state its unit.

b) State Krichhoff's current law and Krichhoff's voltage law.

c) Give two types of capacitor and give one example of each.

d) Define the following terms and state their units

(i) MMF

(ii) Reluctance.

e) Draw Hysteresis loop for hard steel and Silicon steel.

f) State the expression to determine energy stored in a magnetic field.

g) Name the factors affecting the inductance of a coil.

Marks

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

a) Draw the symbol and characteristics of ideal voltage source and practical voltage source.

b) Define the following terms as related to electric circuits

(i) Node

(ii) Branch

(iii) Loop and

(iv) Mesh

c) Plot charging voltage and current curves of capacitor, also write expression for them.

d) Compare statically induced emf with dynamically induced emf (any four points).

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

a) Define electric work and electric power. Give their SI units.

b) A coil consists of 2000 turns of copper wire having a cross-sectional area of 0.8 mm^2. The mean length per turn is 80 cm and the resistivity of copper wire is 0.02 micro-ohm-meter. Find the resistance of the coil and the power adsorbed by the coil when connected across 110 V D.C supply.

c) Derive an expression for equivalent resistance in parallel connection.

d) List four factors affecting the capacitance of a capacitor.

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

a) State the effect of temperature on resistance.

b) Find the current I supplied by 100 V source in the Figure No. (1).

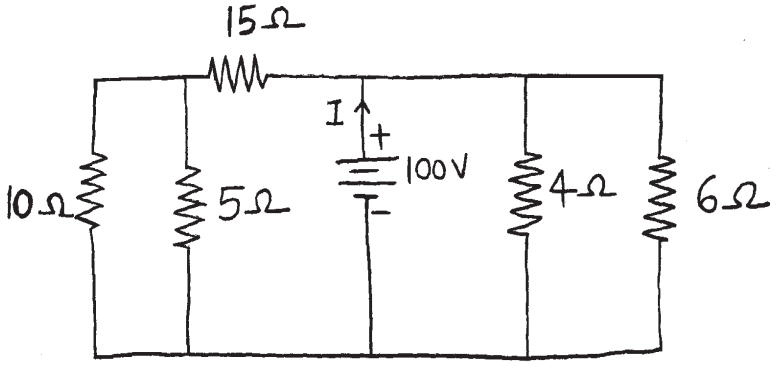

Fig. No. 1

Marks

c) By applying Kirchhoff's law find the current through 10Ω resistor Figure No. (2).

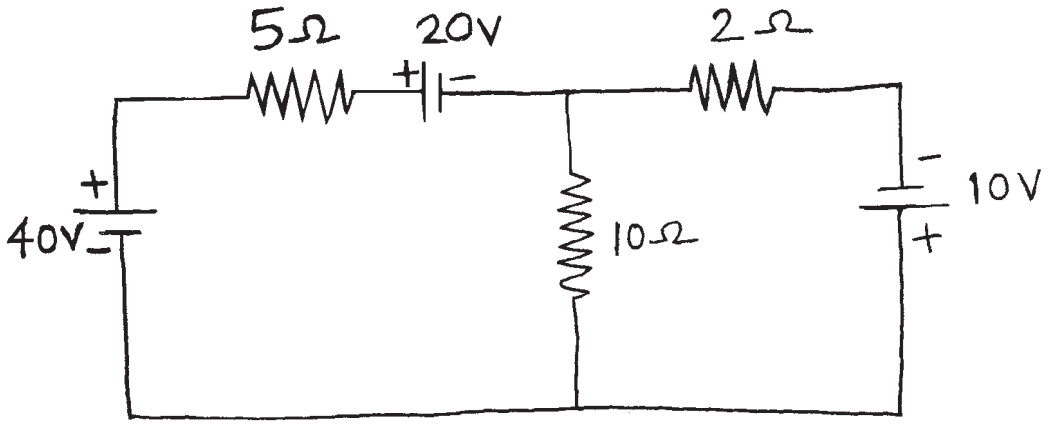

Fig. No. 2

d) Calculate the value of equivalent capacitance of the combination given in Figure No. 3.

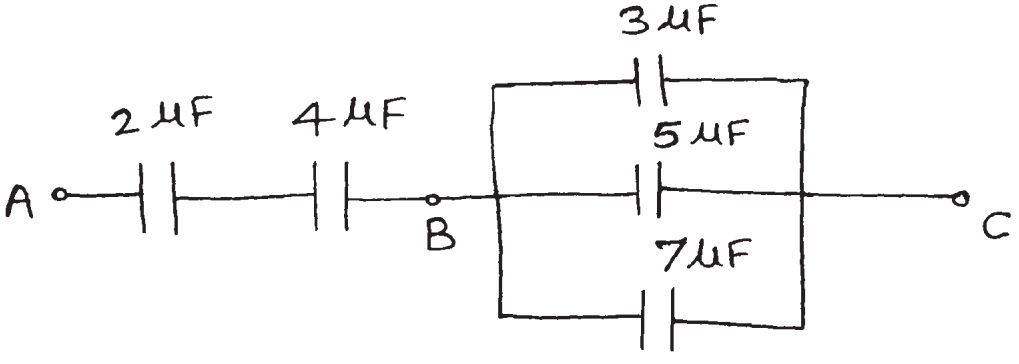

Fig. No. 3

e) Calculate the capacitance, charge, electric flux density and energy stored in a parallel plate capacitor of two metal plates 60 cm × 60 cm separated by a dielectric of 1.5 mm and relative permittivity is 3.5. The potential difference of 100 V is applied across it.

Marks

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

a) Give any six points of comparison between electric circuit and magnetic circuit.

b) A coil of 500 turns and resistance of 20Ω is wound uniformly on an iron ring of mean circumference 50 cm and cross sectional area 4 cm^2. It is connected to 24 V D.C supply. Relative permeability at material is 800, Find

(i) MMF

(ii) Magnetising Force

(iii) Total flux

(iv) Reluctance

c) Two coils A and B of 500 and 750 turns respectively are connected in series on the same magnetic circuit of reluctance 1.55×10^6 AT/Wb. Assuming that no leakage flux Calculate –

(i) Self inductance of each coil

(ii) Mutual inductance between coils.

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

a) Define useful flux and leakage flux with the help of neat diagram.

b) Define self inductance and prove that $L=N^2/S$ where N = number of turns S = reluctance.

c) (i) State the term Mutual inductance

(ii) Two coils of 800 and 200 turns are wound on a common magnetic circuit having a reluctance of 160×10^3 AT/Wb

(iii) Determine:

(1) The Mutual inductance

(2) The emf induced in the first coil when current is changing in the second coil at the rate of 500 A/second.

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