

Basic Electrical Engineering (EE1201)

Full Marks: 30

Time: 45 minutes

- (i) Use a single answer-script for all the questions
- (ii) All parts of a question MUST be answered together

Part – A

(Answer all the questions)

1. Using Mesh analysis, determine the currents I_1, I_2 and I_3 in the circuit shown in the Fig.1

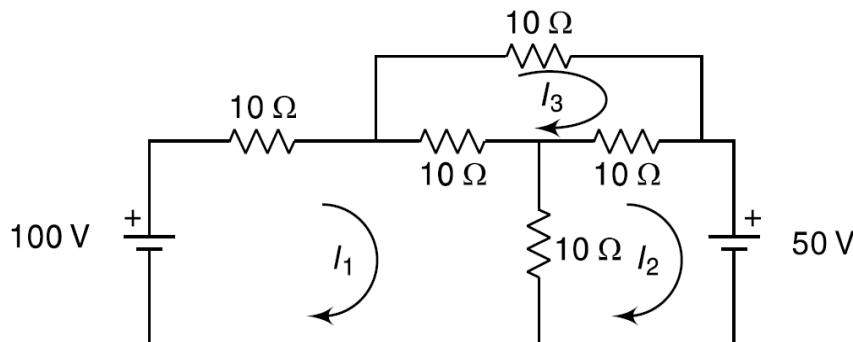


Fig. 1

[5]

2. Determine the value of R_L in the circuit in Fig.2, for which maximum power will be transferred to R_L . Also determine the maximum power.

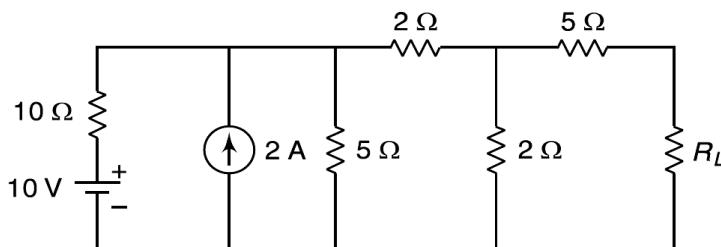


Fig. 2

[5]

3. An iron ring of cross-sectional area 6 cm^2 is wound with a wire of 100 turns and has a saw cut of 2 mm. Calculate the magnetising current required to produce a flux of 0.1 mWb if the mean-length of magnetic path is 30 cm and relative permeability of iron is 470. Neglect leakage and fringing of flux.

[5]

Part – B
(Answer all the questions)

4. a) The effective (RMS) voltage of a sinusoidal wave is 10V. Using the basic definition of effective (RMS) voltage, clarify this information. [2 $\frac{1}{2}$]
- b) The form factor of a wave is 1. What sort of waveform it is? Justify your answer. [1+1 $\frac{1}{2}$]
5. A series combination of a resistance of 10 Ohms, inductive reactance of 20 Ohms and a capacitive reactance of 25 Ohms is excited by a sinusoidal voltage. The current passing through the circuit is 1A.
- Draw a neat circuit diagram for the circuit stated above.
 - Draw a neat phasor diagram for the circuit.
 - Is the current leading or lagging the supply voltage? Justify.
 - Find out the phase angle between the supply voltage and current. [1+1+1+2]
6. a) Show that the line voltage is $\sqrt{3}$ times the phase voltage in case of star connected 3-phase system. [3]
- b) Draw the connection of a single phase fan rated 230V A.C., 50 Hz and a 3-phase motor rated 400V A.C. 50 Hz, to a star-connected 3-phase 400 V(line), 50Hz system,. [2]
-