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MID TERM EXAMINATIONS – October-November 2023

Programme	:	**B.Tech.**	Semester	:	**Fall 2023**
Course Title/ Course Code	:	**Electric Circuits and Systems/ EEE1001**	Slot	:	**C11+C12+C13**
Time	:	**1 ½ hours**	Max. Marks	:	**50**

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1		Find the current through each of the sources and their power dissipation in the network shown in Fig. 1 by identifying a suitable technique on your own.	10

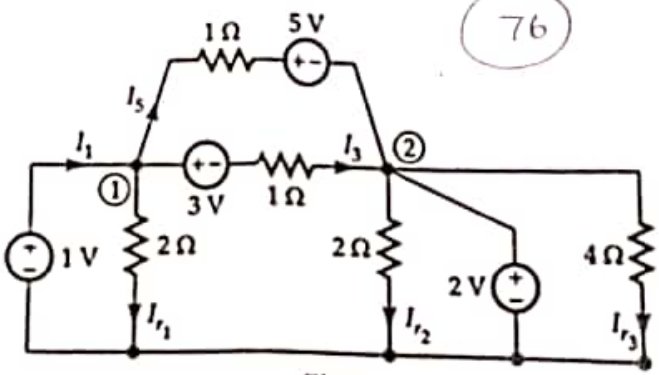

Fig.1

2	a)	Find the current through r_L using Thevenin's theorem for the circuit shown in Fig.2	5

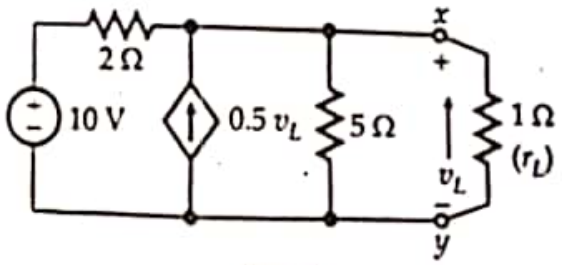

Fig. 2

2 (b) Calculate the amount of maximum power transfer to R in the circuit shown in Fig.3

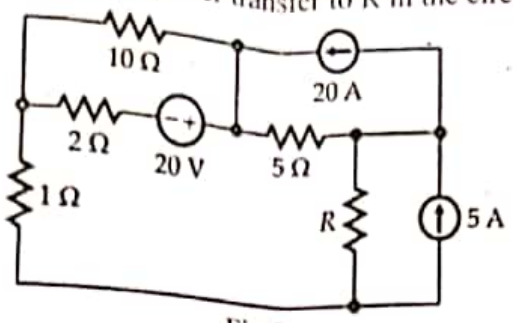

Fig.3 5

3 (a) A choke coil is connected across a 250 V, 50 Hz supply. If the input current be 10 A and power loss in the choke be 1 kW, find the impedance, resistance and inductance of the choke.
What is the power factor of the circuit?
What would be the value of input current if a capacitor of C Farad is connected in series with the coil and such that the power factor of the entire circuit becomes unity. 5

3 (b) Consider a series RLC circuit, in which the maximum inductor voltage is twice the capacitor voltage maximum. However, the circuit current lags the applied voltage by 30° and the instantaneous drop across the inductance is given by $v_L = 200 \sin 377\, t\ V$. Assuming the resistance being 40 Ω, find the values of inductance and capacitance. 5

4 Consider a linear time inverse continuous system given by
$\frac{d^2y(t)}{dt^2} + 9\frac{dy(t)}{dt} + 14y(t) = \frac{dx(t)}{dt} + 3x(t)$ the input is
$x(t) = e^{-t}\,u(t)$.
Find (i) Natural response for initial condition $y(0^+) = 5, \frac{dy(0^+)}{dt} = 0$ 10
(ii) Forced response and (iii) Total response.

5 (a) A full-wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at 20 Ω. The transformer r.m.s. secondary voltage from centre tap to each end of secondary is 50 V and load resistance is 980 Ω. Find : (i) the mean load current (ii) the r.m.s. value of load current. 5

5 (b) A half-wave rectifier is used to supply 50V d.c. to a resistive load of 800 Ω. The diode has a resistance of 25 Ω. Calculate a.c. voltage required. 5

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