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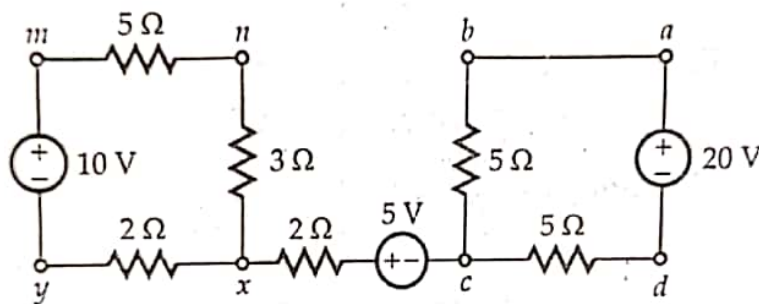
MID TERM EXAMINATIONS – October-November 2023

Programme	: B.Tech.	Semester	: Fall 2023-2024
Course Title/ Course Code	: Electric Circuits and Systems/ EEE1001	Slot	: A11+A12+A13
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
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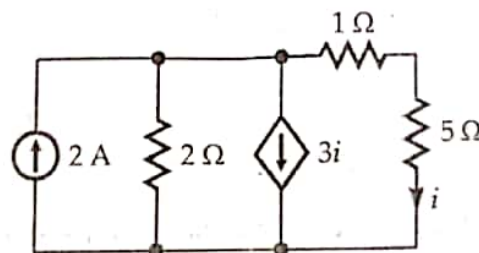
- 1 Find the drop between terminals y and d in the network shown in Fig. 1. Also find out the power dissipation through those two $5\ \Omega$ (ohm) resistances.



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Fig.1

- 2 a) Find the current through $5\ \Omega$ (ohm) using Thevenin's theorem for the circuit shown in Fig.2.



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Fig. 2

- (b) Find the value of R such that maximum power transfer takes place from the current source to the load resistance R in the circuit shown in Fig.3. Calculate the amount of maximum power transfer to R . 5

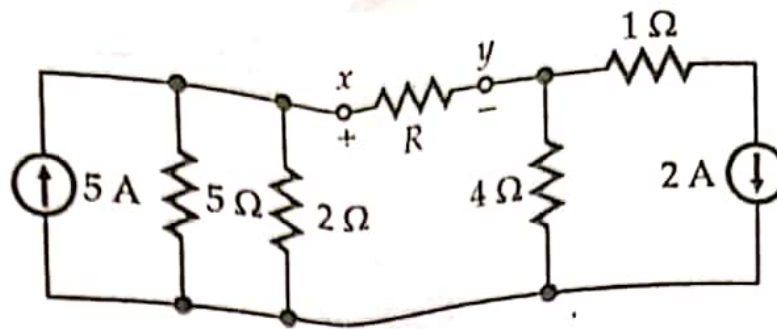


Fig.3

- 3 (a) An impedance of $10\angle 37^\circ \Omega$ (ohm) is in parallel with another impedance $18\angle 56.3^\circ \Omega$ (ohm) and a voltage of $250\angle 0^\circ$ V is applied across the combination. Find the source current and show the phasor diagram of the currents with respect to the applied voltage.

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- 3 (b) Find V_2 in the circuit of Fig. 4 such that current in the left hand loop is zero. Assume $V_1 = 25\angle 0^\circ$ V

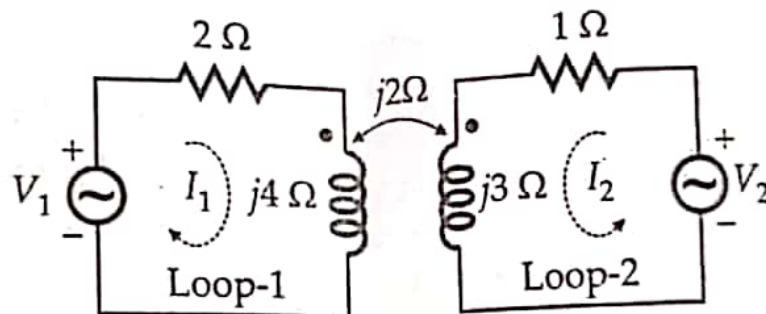


Fig.4

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- 4 Consider a linear time inverse continuous system given by $\frac{d^2 y(t)}{dt^2} - 9 \frac{dy(t)}{dt} + 14y(t) = \frac{dx(t)}{dt} + 2x(t)$ the input is $x(t) = e^{-2t} u(t)$.

Find, (i) Natural response
(ii) Forced response.
for initial condition

$$y(0^+) = 1, \frac{dy(0^+)}{dt} = 0$$

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- 5 Elucidate the construction and operation of PN junction diode with its VI characteristics.

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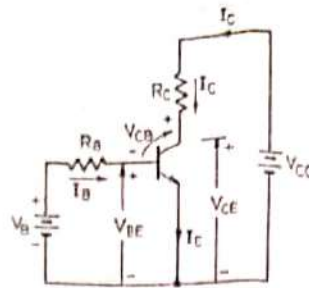


Fig. 5.

For a power transistor, typical switching waveforms are shown in Fig. 5. The various parameters of the transistor circuit are as under:

$V_{CC} = 220 \text{ V}$, $V_{CES} = 2 \text{ V}$, $I_{CS} = 80 \text{ A}$, $t_d = 0.4 \mu\text{s}$, $t_r = 1 \mu\text{s}$, $t_n = 50 \mu\text{s}$,
 $t_s = 3 \mu\text{s}$, $t_f = 2 \mu\text{s}$, $t_o = 40 \mu\text{s}$, $f = 5 \text{ kHz}$.
 Collector to emitter leakage current $I_{CEO} = 2 \text{ mA}$.

Determine the average power loss due to collector current during t_{on} and t_n . Find also the peak instantaneous power loss due to collector current during turn on time.

