

FACULTY OF ENGINEERING
B.E. 2/4 (E & EE) I Semester (New) (Main) Examination, December 2011
ELECTRICAL CIRCUITS – I

Time : 3 Hours]

[Max. Marks : 75

Note : Answer all questions of Part A. Answer any five questions from Part B.

PART – A

(25 Marks)

1. Explain passive sign convention. 2
2. Find " V_o " and " i " in the circuit shown in Fig. 1 3

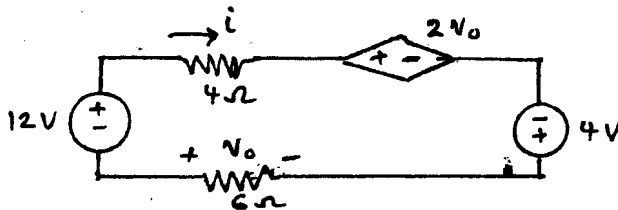


Fig. 1

3. Find the voltage " V " in the circuit shown in Fig. 2 3

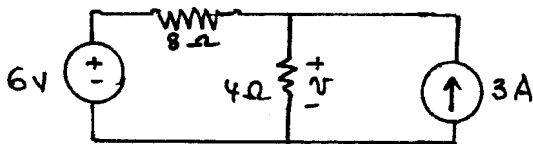


Fig. 2

4. Find the Norton equivalent at terminals a-b in Fig. 3 3

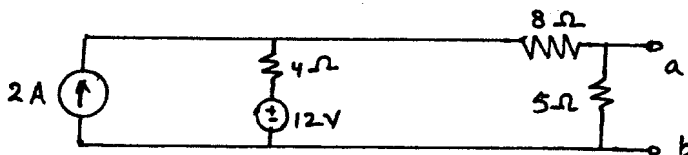


Fig. 3

5. Find the average value of the periodic wave form in Fig. 4

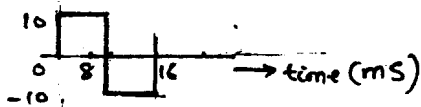


Fig. 4

3

6. For an inductive circuit draw

a) Phasor diagram

b) Power triangle

2

7. Find the average power dissipated in a network whose input current and voltage are the following :

$$i = 5 \sin(\omega t + 40^\circ), v = 10 \sin(\omega t + 40^\circ).$$

2

8. A filter in the form of a RLC series circuit is designed to operate at a resonant frequency of 10 KHz. Included with the filter is a 10 mH inductor and a 5 ohm resistor. Determine the bandwidth of the filter.

2

9. Three leads each of resistance 30Ω are connected in star to a 415 V, three phase supply. Determine the system phase voltage and phase currents.

3

10. Find the average and effective values of the following non-sinusoidal wave.

$$v = 100 + 50 \sin \omega t + 25 \sin 2 \omega t$$

2

PART - B

(50 Marks)

11. Find the current in the resistor $R = 2\text{ Ohms}$, Fig. 5

10

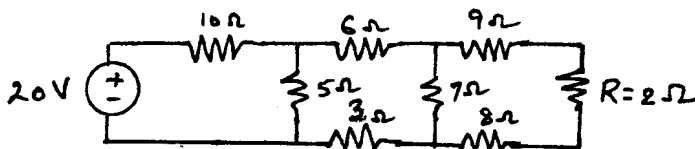


Fig. 5

12. Determine the three mesh currents Fig. 6

10

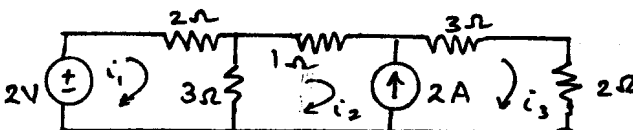


Fig. 6

13. Using Norton's theorem determine the current in the 1- Ohm resistor connected across A-B, Fig. 7 10

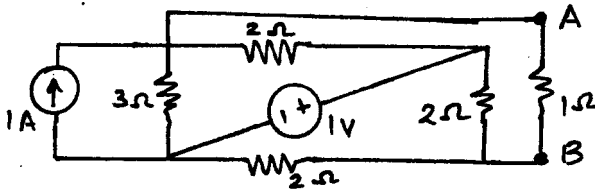


Fig. 7

14. In a series- parallel circuit, the parallel branches B and C are in series with A. The impedances are $Z_A = (2 + j8)$, $Z_B = (4 + j3)$, $Z_C = (4 - j5.33)$ Ohms. If the current in the series impedance Z_A is $(25 + j0)$ amps, determine the branch currents, branch voltages and the total voltage. Draw the complete Phasor diagram. 10
15. A constant voltage at a frequency of 1 MHz is applied to an inductor in series with a variable capacitor, when the capacitor is set 500 pF, the current has its max. value, while it is reduced to one-half when the capacitance is 600 pF. Find :
- The resistance
 - The inductance
 - Q-factor of the inductor. 10
16. Three 100 – Ohm non-inductive resistances are connected in a) star, b) delta across a 400 V, 50 Hz, 3-phase supply. Calculate the power taken from the supply in each case. In the event of one of the three resistances getting open-circuited, what would be the value of total power taken from the mains in each of the two cases ? 10
- 17.a) Write short notes on dependent sources. Showing their schematic symbols. 5
- b) Explain why three phase systems are preferred over single phase systems for transmission of power. 5