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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**

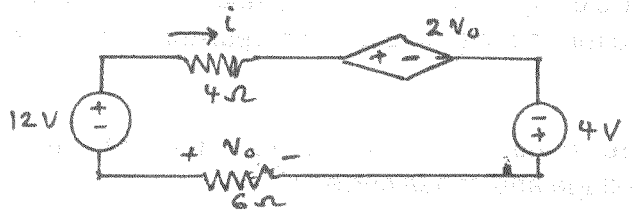

Fig. 1

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

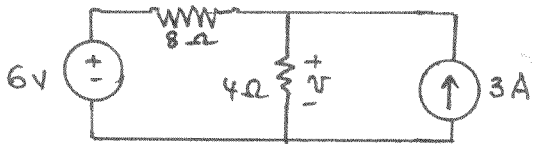

Fig. 2

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

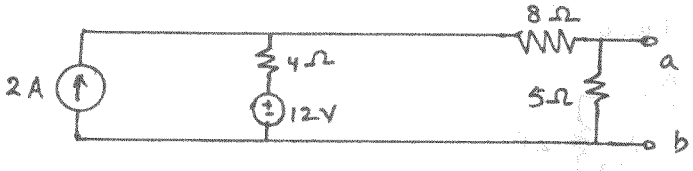

Fig. 3

5. Find the average value of the periodic wave form in Fig. 4 3

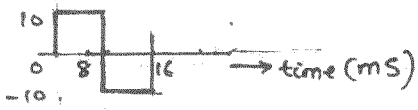

Fig. 4

6. For an inductive circuit draw
   a) Phaser diagram
   b) Power triangle 2

7. Find the average power dissipated in a network whose input current and voltage are the following :
   $i = 5 \sin (wt + 40°)$, $v = 10 \sin (wt + 40°)$. 2

8. A filter is 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 30 Ω 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.
    $v = 100 + 50 \sin wt + 25 \sin 2 wt$ 2

PART – B (50 Marks)

11. Find the current in the resistor R = 2 Ohms, Fig. 5 10

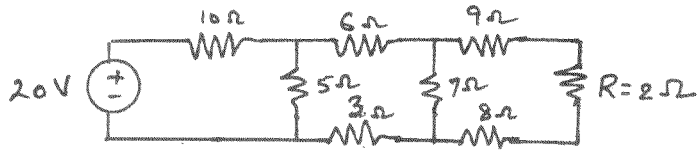

Fig. 5

12. Determine the three mesh currents Fig. 6 10

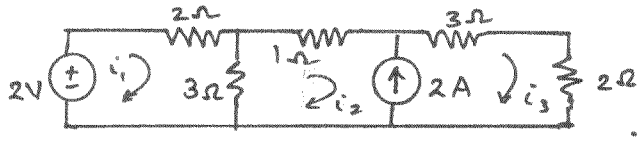

Fig. 6

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

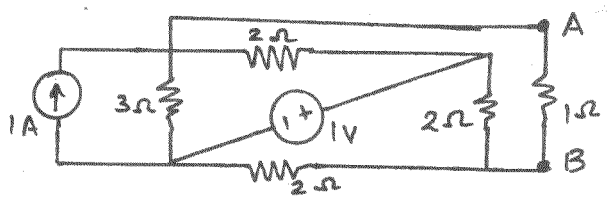

Fig. 7

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 th 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 hasits max. value, while it is reduced to one-half when the capacitance is 600 pF. Find :

i) The resistance

ii) The inductance

iii) 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**
