

Allowed Tables and Charts: (None), Total marks: 50

Answer of the following questions and assume any missing data.

**Question (1)**

**(20 Marks)**

(1-a) Discuss the factors affecting the resistivity of electrical materials.

(1-b) What are the factors influencing severity of electrical shock?

(1-c) The field of a d.c. motor is connected across a 440 V supply. When the room temperature is  $17^{\circ}\text{C}$ , winding current is 2.3 A. After the machine has been running for few hours, the current has fallen to 1.9 A, the voltage remaining constant. Calculate the final winding temperature, assuming the resistance temperature coefficient of copper is  $0.00426/^{\circ}\text{C}$  at  $0^{\circ}\text{C}$ .

**Question (2)**

**(20 Marks)**

(2-a) In the circuit shown in Fig. 1, find the battery current. All resistances are in ohms.

(2-b) Apply Kirchhoff's Law to find current through 3 ohm resistance in the network shown in Fig. 2. Also, find the power delivered by 0.5 A current source.

(2-c) For the circuit shown in Fig. 3, calculate the current in the 2 ohm resistance. Use Thevenin's theorem only.

**Question (3)**

**(10 Marks)**

(3-a) Two impedances  $Z_1$  and  $Z_2$  when connected separately across a 230-V, 50-Hz supply consumed 100 W and 60 W at power factors of 0.5 lagging and 0.6 leading respectively. If these impedances are now connected in series across the same supply, find: (i) total power absorbed and overall p.f. (ii) the value of the impedance to be added in series so as to raise the overall p.f. to unity.

(3-b) A  $\Delta$ -connected balanced 3-phase load is supplied from a 3-phase, 400-V supply. The line current is 20 A and the power taken by the load is 10,000 W. Find (i) impedance in each branch (ii) the line current, power factor and power consumed if the same load is connected in star.

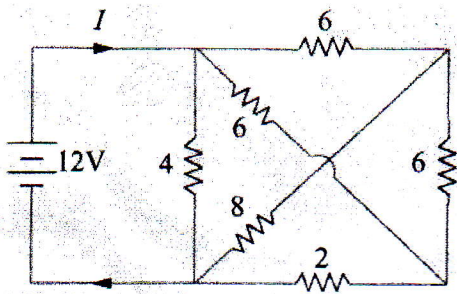


Fig. 1

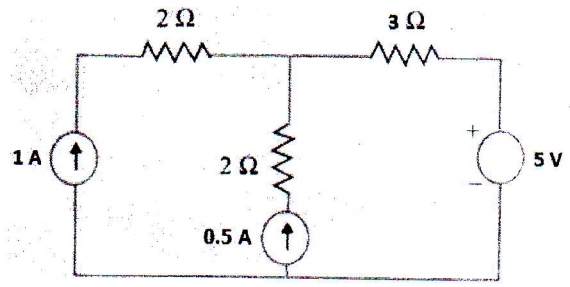


Fig. 2

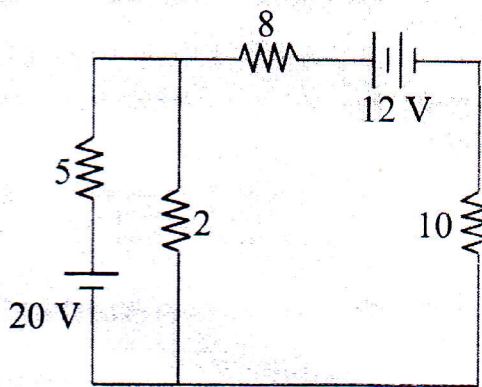


Fig. 3

Good Luck ..... Ass. Prof. Amr Abdel-Hady