B.E / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR / MAY 2012

ELECTRONICS AND COMMUNICATION ENGINEERING
SECOND SEMESTER

EC 9152 CIRCUIT ANALYSIS

(Common to B.E BIO MEDICAL ENGINEERING)

REGULATIONS 2008

Time: 3 hr **Max Mark: 100**

Answer ALL Questions

Part – A **(10 x 2 = 20 Marks)**

1. An electric heater rated at 650 watts is turned on from 7am to 11.30am. What is the energy consumption in joules and kilowatts?

2. Determine the resistance 'R' to effect the division of current in the circuit shown in Fig.1

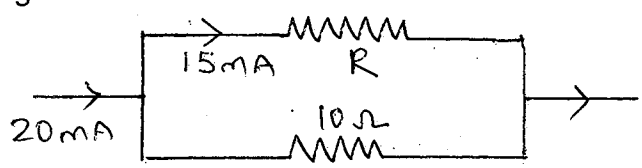

Fig.1

3. State maximum power transfer theorem.

4. Eight resistances of 8Ω each are joined as shown in Fig.2. Find the Thevenin's resistance for the circuit.

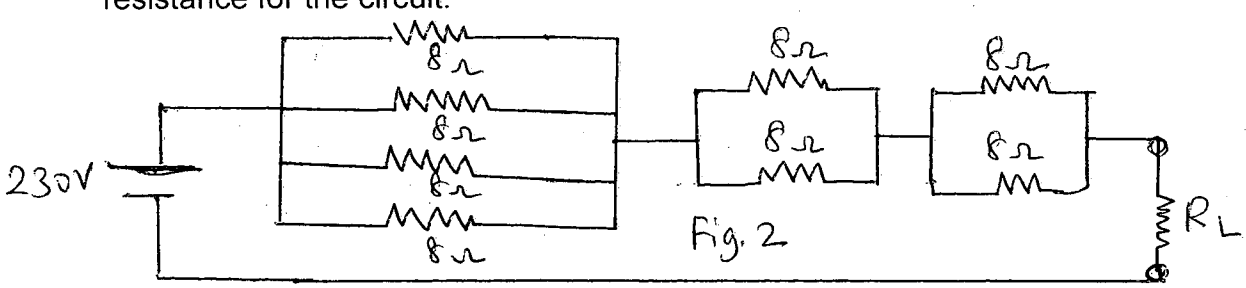

Fig. 2

5. An ac circuit is purely resistive, having an equivalent of 15Ω at the terminals. A 110-V 60Hz ac source is connected across the terminals. Calculate the power factor.

6. Two circuit elements are connected in parallel. The current through one of them is $i_1 = 3 \sin(\omega t - 60°)$A & the total line current drawn by the circuit is $i = 10\sin(\omega t + 90°)$A. Determine the rms value of the current through the second element.

7. The voltage across a 20μF capacitor varies with time and is given by $V_c = 10.75\text{-}1.5e^{-1000t}$ V. What is the current through the capacitor?
8. A 120V 20-Hz source supplies a series circuit consisting of a 5Ω capacitive reactance, a 1.6Ω resistor and a coil with resistance and inductive reactance of 3 & 1.2Ω respectively. Determine the input impedance and circuit current.

9. State ampere turn dot rule.

10. List the characteristics of link.

Part – B **(5 x 16 = 80 Marks)**

11. a. Determine the current supplied by the 100-V battery in the circuit shown in Fig-3. (12)

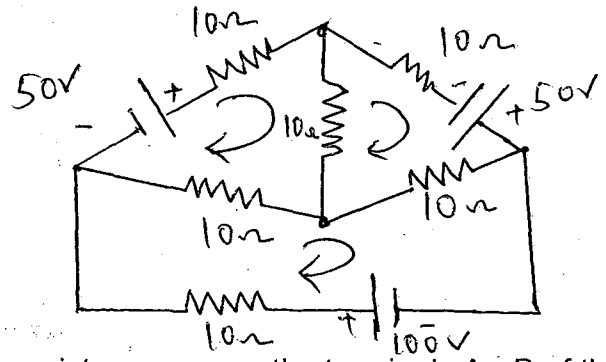

Fig.3

b. Find the resistance across the terminals A - B of the network shown in Fig.4 (4)

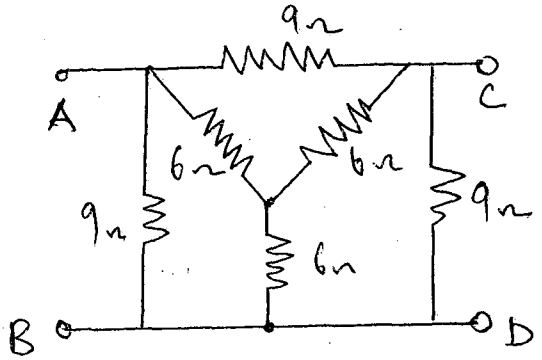

Fig.4

12. a.i. State and explain superposition theorem. (4)
ii. Using superposition theorem solve for the current in 2Ω resistor for the circuit shown in Fig.5 (12)

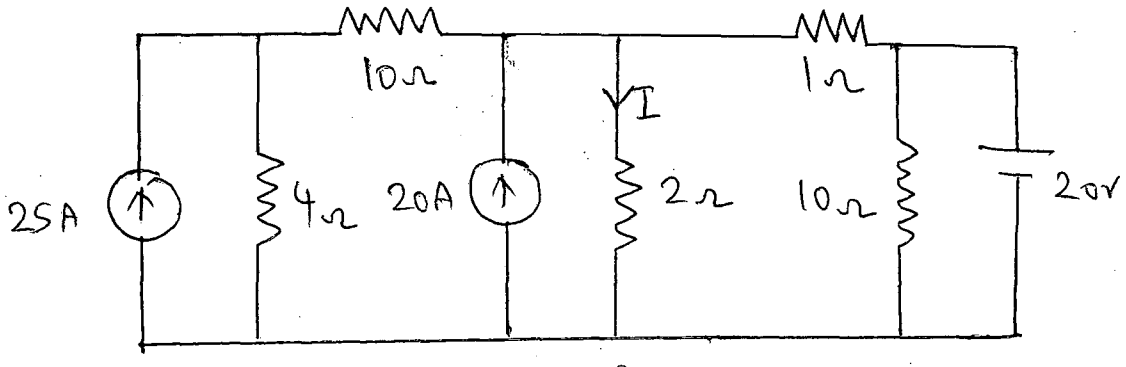

Fig.5

(OR)

b. Find the power dissipated in the 20-Ω resister for the circuit shown in Fig. 6 using Norton theorem. (16)

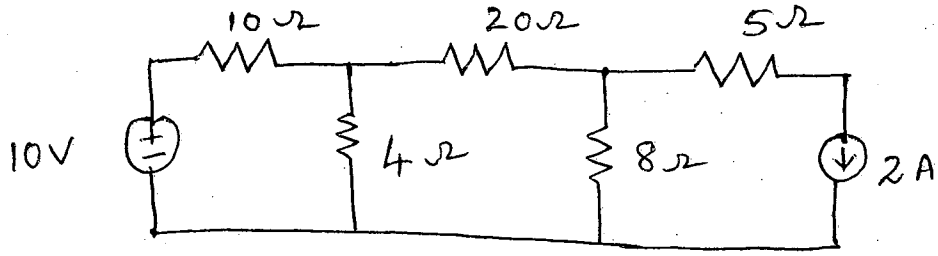

Fig. 6

13a. Determine the sum of the complex powers supplied by the three sources of the circuit shown in Fig.7. (16)

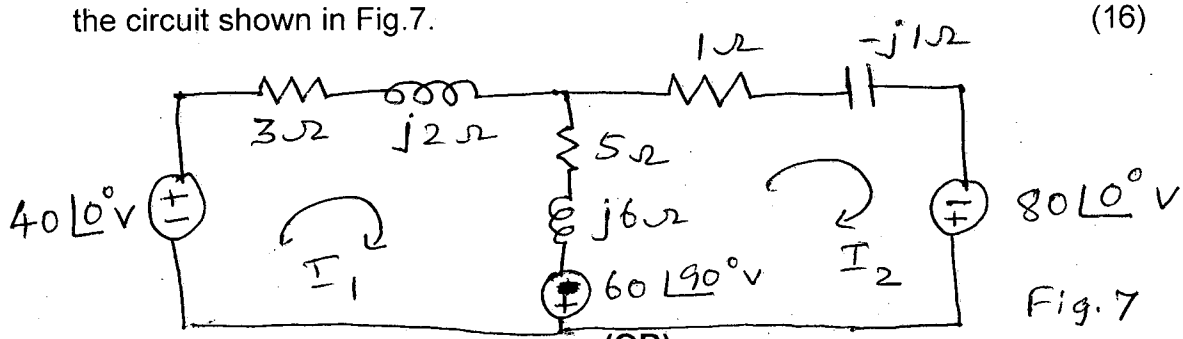

Fig. 7

(OR)

b. Obtain the Thevenin equivalent of the circuit shown in Fig.8 and determine the currents through the load (Z_L). (16)

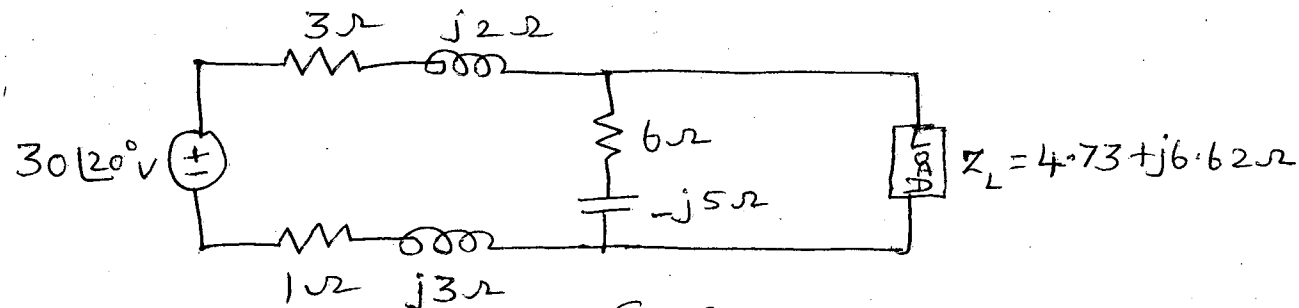

Fig. 8

14a.i. Derive the expression for the energy stored in the capacitor using RC transient approach. (10)

ii. The switch is initially kept at position 1, for a long time. At t = 0 the switch is moving from position 1 to 2 as shown in the Fig.9. Solve for the current. (6)

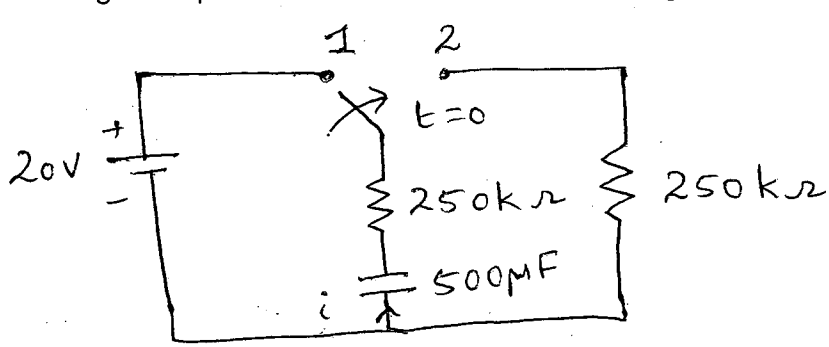

Fig. 9

(OR)

b i. Obtain the expression for bandwidth of a series RLC circuit, in terms of circuit elements. (10)

ii. For the circuit shown in Fig.10, Determine the input impedance, input current and verify whether the given circuit is at resonant condition. (6)

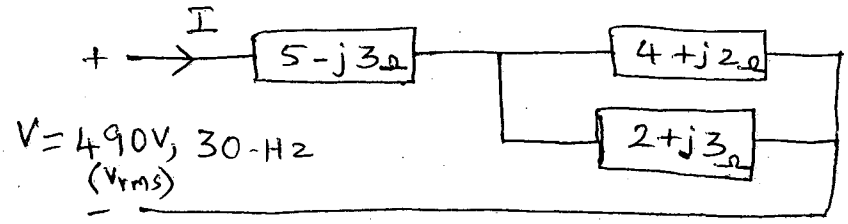

Fig. 10

15a.i. Find the input impedance for the circuit shown in Fig.11. (10)

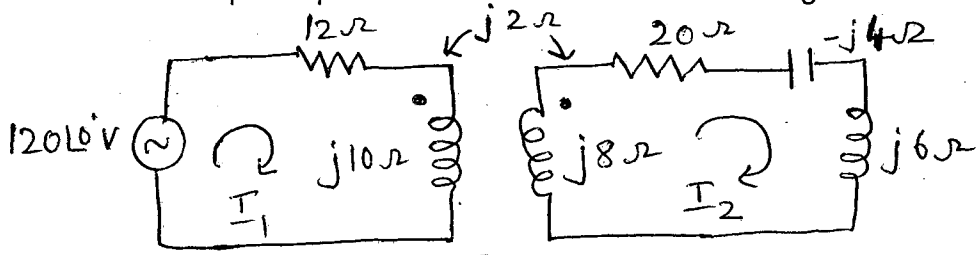

Fig.11

ii. A 15 mH coil is connected in series with another coil. The total inductance is 70 mH. When one of the coils is reversed, the total inductance is 30 mH. Find the self inductance of second coil, mutual inductance and coefficient of coupling. (6)

(OR)

15.b. Obtain the branch currents and voltages for the circuit shown in Fig.12 using tie set approach. (16)

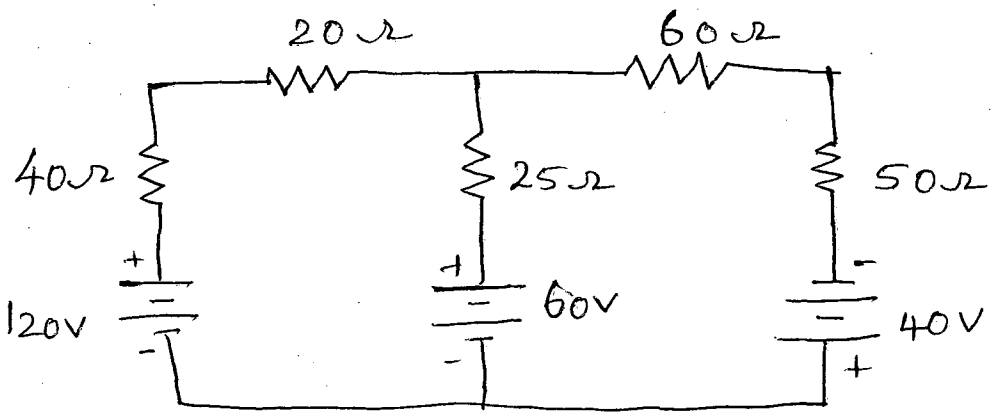

Fig. 12