Code No. : 5330/N

FACULTY OF ENGINEERING
B.E. 2/4 (ECE) I Semester (New) (Main) Examination, Dec. 2011/Jan. 2012
BASIC CIRCUIT ANALYSIS

Time: 3 Hours] [Max. Marks: 75

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

PART – A **(25 Marks)**

1. The current waveform applied to 6 H inductor shown in Fig. 1 obtain the voltage waveform. **3**

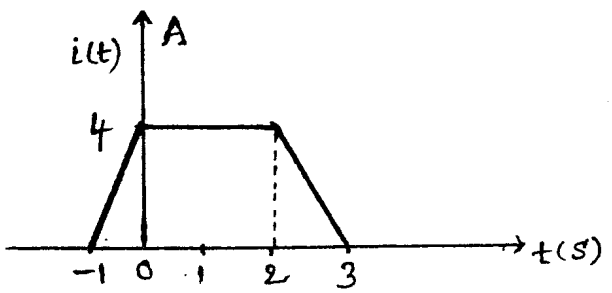

Fig. 1

2. Determine the value of resistance R using current division shown in Fig. 2. **3**

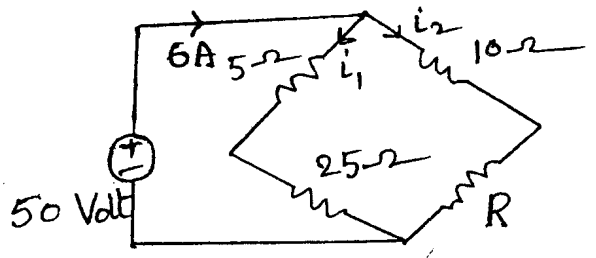

Fig. 2

3. Define zero input response and zero state response of a linear time invariant system. **2**
4. State and explain the reciprocity theorem. **3**
5. Draw the equivalent circuit using h-parameter. **2**
6. An ac circuit is fed from a voltage source $30\angle 30°$V and the current in the circuit is $i(t) = 200\sqrt{2}\cos(\omega t+30°)$ Determine impedance of the circuit. **2**

7. In the circuit of Fig. 3 find the maximum power delivered to load Z_L. 2

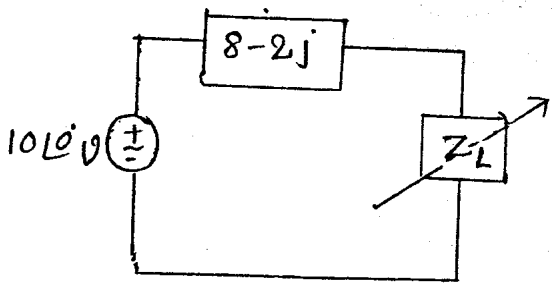

Fig. 3

8. A resonant circuit has its center frequency at 1 MHz and a Q of 100 sketch its frequency response indicating clearly the half-power points. 3

9. Find the bandwidth of a series resonant circuit with $R = 2\Omega$ $L = 2mH$ and $C = 1\mu F$. 3

10. Draw pole zero plot on complex plan for $Z(S) = S(S-4) / (S+4j)(S-4j)$. 2

PART – B

(50 Marks)

11. a) State and prove superposition theorem. 3

b) Determine the Thevenin's equivalent circuit of the given circuit in Figure 4 across the output terminals AB. Then calculate the power delivered to the load $(7+5j)\Omega$ across AB; Given the Norton's equivalent of same Thevenin's equivalent circuit. 7

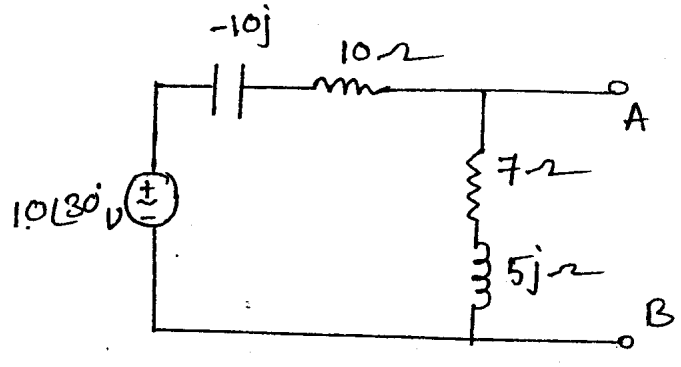

Fig. 4

12. a) Explain the geometrical method (Dot Method) of constructing the dual of a circuit with example. 3

b) For the network shown in Fig. 5 write tie set schedule. Obtain the values of branch voltages and branch currents. 7

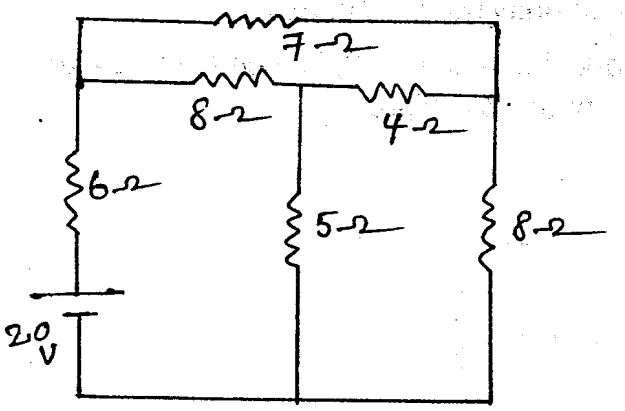

Fig. 5

13. a) Write integro differential equations for series RC, RL and parallel RLC circuits. **4**

b) Determine $v(0^+)$, $i(0^+)$ and v(2 ms) for circuit shown in Fig. 6. **6**

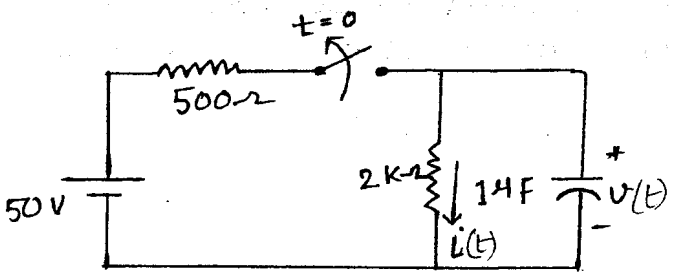

Fig. 6

14. a) Define the term :

i) Active power ii) Apparent power for AC circuit. **2**

b) In the circuit of Fig. 7 determine the current $i_1(t)$ and $i_2(t)$ and power supplied by the signal source v(t). Draw the phasor diagram. **8**

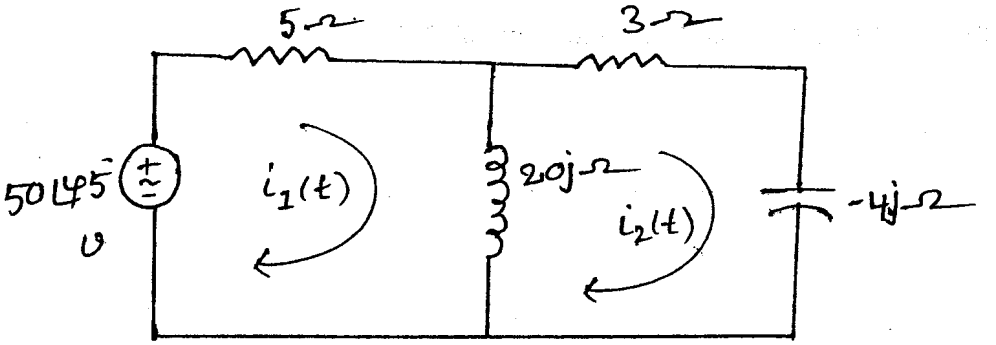

Fig. 7

15. a) Explain ideal transformer models for unity coupled inductor. 3

    b) Find the z-parameter of the network shown in Fig. 8. Hence calculate the y-parameters. Find whether the network is reciprocal. 7

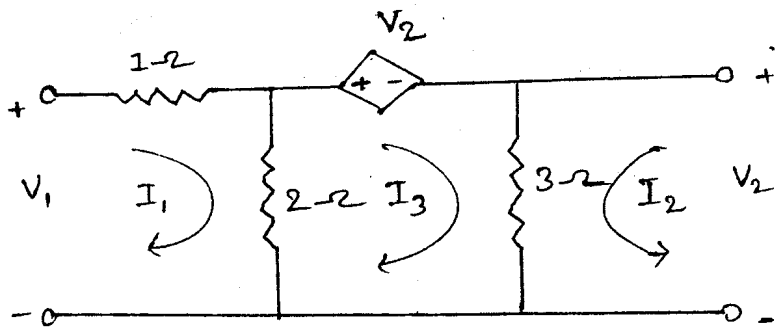

Fig. 8

16. A 400 V, 200 Hz ac source is connected in series with a capacitor and a coil whose resistance and inductance are 20 mΩ and 6 mH, respectively. If the circuit is in resonance at 200 Hz find 10

    a) The value of capacitor C

    b) The circuit current

    c) Voltage across the capacitor

    d) The maximum instantaneous energy stored in the coil

    e) The half-power frequencies for the circuit.

17. Write short notes on the following :

    a) Magnetic coupled circuits. 3

    b) Reduced incidence matrix. 3

    c) State the necessary conditions for transfer function. 4