Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 71763

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

ECE-I

Second Semester

Electronics and Communication Engineering

EE 6201 – CIRCUIT THEORY

(Common to Biomedical Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Medical Electronics Engineering)

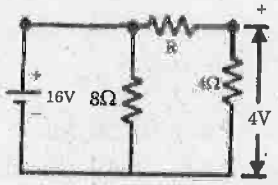
(Regulations 2013)

Time : Three hours Maximum : 100 marks

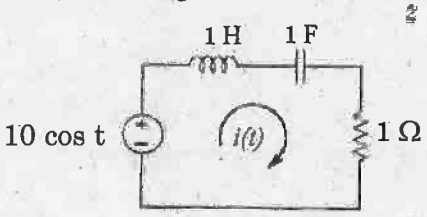
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find 'R' in the circuit shown below.



2. Determine the current i(t) for the given circuit

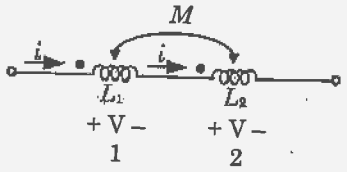


3. A star connected load of 5Ω each is to be converted in to an equivalent delta connected load. Find the resistance be used.

4. A load is connected to a network of the terminals to which load is connected, R_{th} = 10 ohms and V_{th} = 40V. Calculate the maximum power supplied to the load.

5. Define self inductance and mutual inductance of a coil.

6. Given the circuit, what is the equivalent inductance of the system shown below.



7. Define time constant for RL circuit. Draw the transient current characteristics

8. When a two port network is said to be reciprocal?

9. Draw the phasor diagram of line currents and line voltages of a balanced delta connected load.

10. Distinguish between unbalanced supply and unbalanced load.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the potential difference between points A and B given in fig. 11 (a) (i) (8)

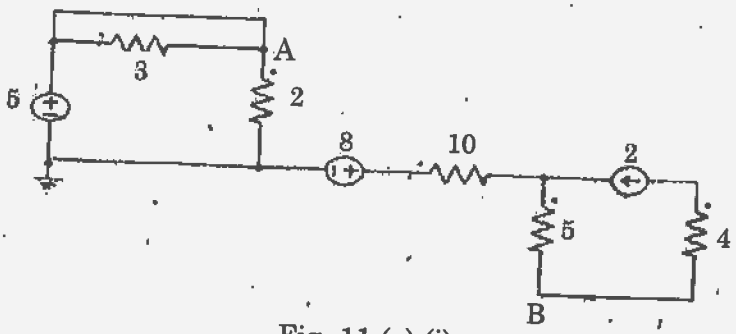


Fig. 11 (a) (i)

(ii) Using Mesh analysis, find the current I_o n the circuit shown fig. 11 (a) (ii). (8)

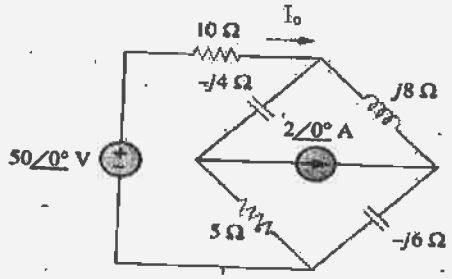


Fig. 11 (a) (ii)

Or

(b) (i) Determine v_x and i_x in the given fig 11 (b) (i). (10)

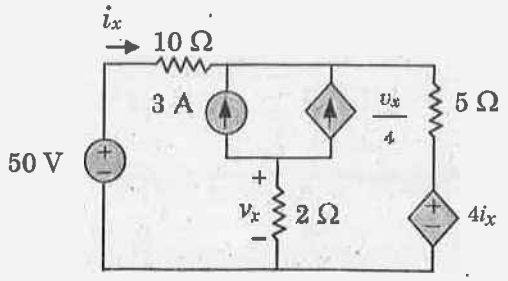


Fig 11 (b) (i).

(ii) Write the mesh equation and nodal equation for the network in fig. 11(b) (ii) by inspection method. (6)

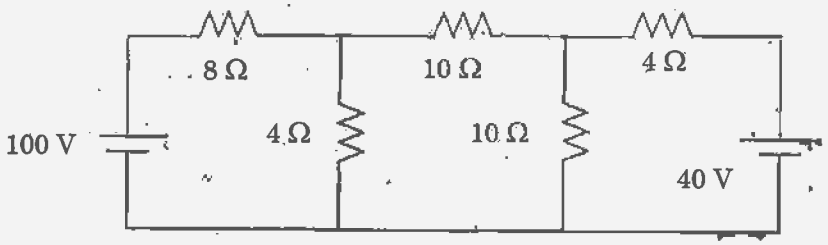


Fig. 11 (b) (ii)

12. (a) (i) Apply source transformation technique to determine current i_o in Fig. 12 (a) (i). (8)

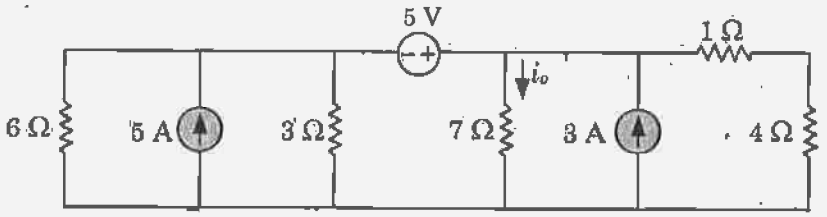


Fig. 12 (a) (i)

(ii) Find the power delivered by the 20V source using superposition theorem. (8)

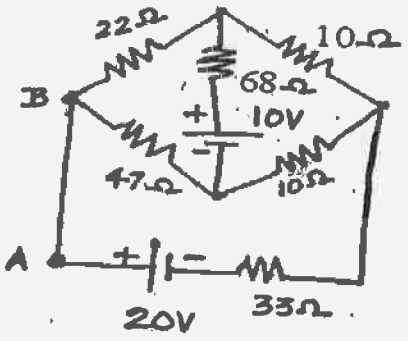


Fig. 12 (a) (ii)

Or

(b) Apply Norton theorem to determine current I_o for the given circuit in Fig. 12 (b). (16)

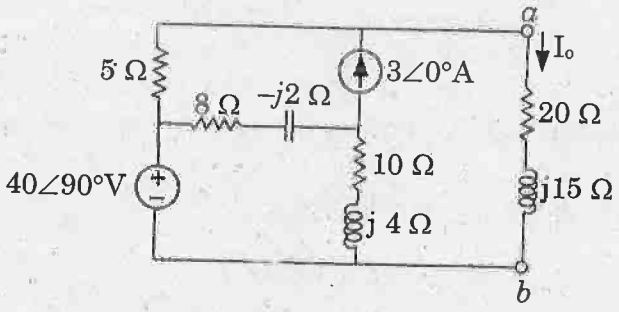


Fig. 12 (b)

13. (a) (i) Derive the expression for resonant frequency and bandwidth for a series RLC resonant circuit. (8)

(ii) In the parallel *RLC* circuit of Fig. 13 (a) (ii), let $R = 8k\Omega$, $L = 0.2, mH$ and $C = 8\,\mu F$. Calculate ω_0, Q, half power frequencies and BW. (8)

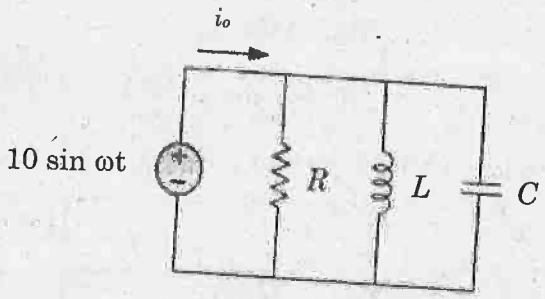


Fig. 13 (a) (ii)

Or

(b) (i) Find the voltage drop across 12Ω resistor for the given circuit in Fig. 13 (b) (i). Also, draw the conductively coupled equivalent circuit. (8)

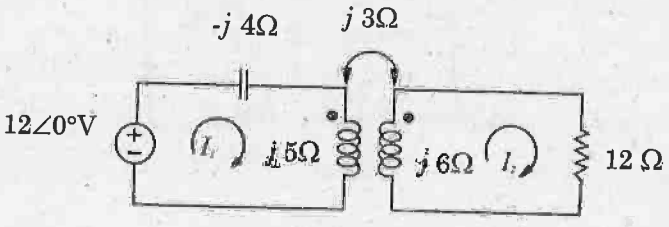


Fig. 13 (b) (i)

(ii) The number of turns in two Coupled coils are 500 turns and 1500 turns respectively When 5 A current flows in coil, the total flux in this coil is 0.6×10^{-3} wb and the flux linking in second coil is 0.3×10^{-3} wb. Determine L_1, L_2 M and K. (8)

14. (a) A series RL circuit with $R=10\,\Omega$ and L = 0.1 H is supplied by an input Voltage v(t) 10 sin 100t Volts applied at t = 0 as shown in fig. 14 (a). Determine the current i, voltage across inductor. Derive the necessary expression and plot the respective curves. (16)

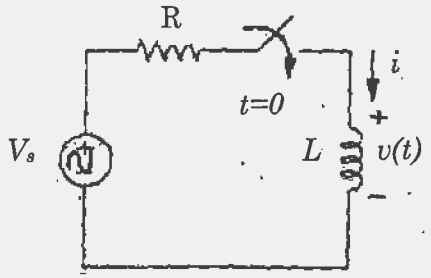


Fig. 14 (a)

Or

(b) Determine the impedance (Z) parameter and draw the T- equivalent circuit for the given two port network in Fig. 14 (b). Also, derive the transmission line (ABCD) parameters from Z parameter. (16)

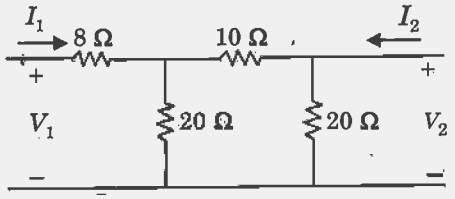


Fig. 14 (b)

15. (a) (i) A balanced Δ-connected load having an impedance $20-j15\Omega$ is connected to a Δ-connected, positive sequence supply $V_{ab}=330\angle0^\circ V$. Calculate the phase currents of the load and the line currents. (8)

(ii) The input power to a 3ϕ load is 10kw at 0.8 pf. Two wattmeters are connected to measure power, find the individual readings of the wattmeters. (8)

Or

(b) For the unbalanced circuit in Fig. 15 (b), determine the line currents and voltage across each load impedance Draw the phasor diagram. (16)

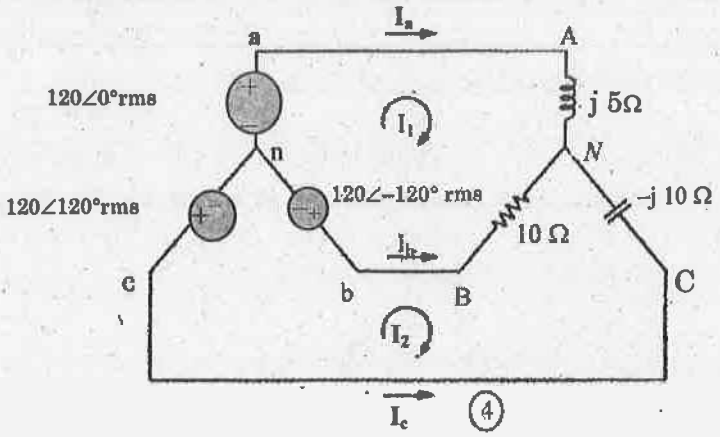


Fig. 15 (b)