CBCS SCHEME

USN | | | | | | | | | | |

17EE32

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing one full question from each module.***

Module-1

1 a. Find an equivalent resistance between A and B for the network given in Fig. Q1 (a) using star-delta transformation. **(06 Marks)**

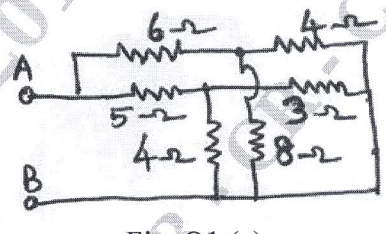

Fig. Q1 (a)

b. Find the currents i_1, i_2 and i_3 in the network given in Fig.Q1 (b) using mesh analysis. **(06 Marks)**

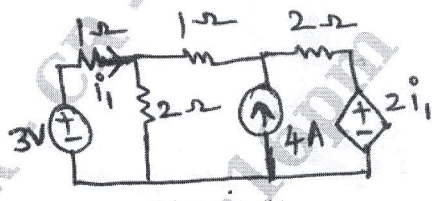

Fig. Q1 (b)

c. Find the power dissipated in 10 Ω resistor by nodal analysis in Fig. Q1 (c). **(08 Marks)**

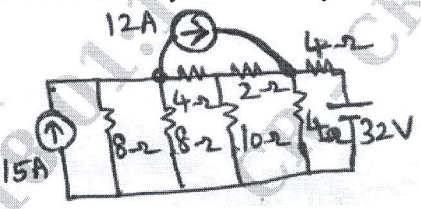

Fig. Q1 (c)

OR

2 a. Distinguish between (i) Active and Passive elements (ii) Ideal and practical sources. **(04 Marks)**

b. Find the node voltage V_1, V_2 and V_3 in the circuit diagram shown in Fig. Q2 (b) using nodal analysis. **(08 Marks)**

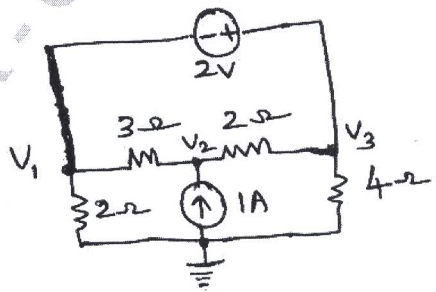

Fig. Q2 (b)

c. Find the current i_a in the circuit given in Fig. Q2 (c) using mesh analysis. **(08 Marks)**

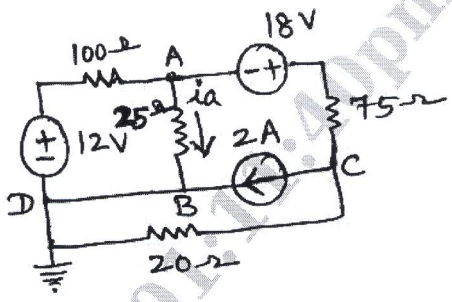

Fig. Q2 (c)

Module-2

3 a. State and explain super position theorem. **(06 Marks)**

b. Find the Thevenin's voltage, short circuit current and determine the actual current flowing through the 6 Ω resistor in the network given in Fig. Q3 (b). **(07 Marks)**

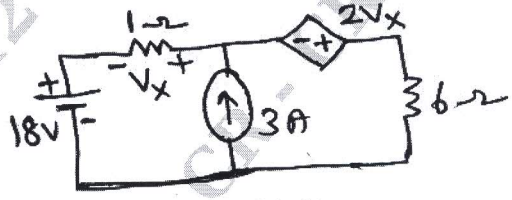

Fig. Q3 (b)

c. Find the current through 16 Ω resistor in the network given in Fig. Q3 (c) using Norton's theorem. **(07 Marks)**

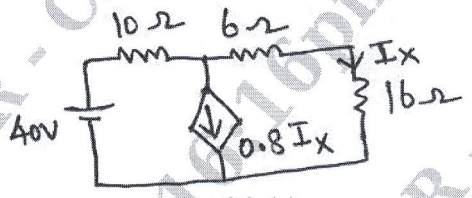

Fig. Q3 (c)

OR

4 a. Verify the reciprocity theorem for the voltage V and current I in the network given in Fig. Q4 (a). **(08 Marks)**

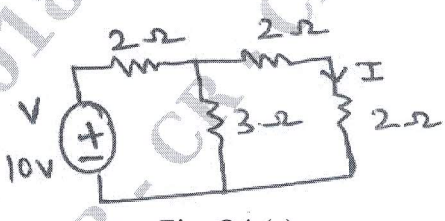

Fig. Q4 (a)

b. Find the value of load resistance R_L when maximum power is transferred across it in the network shown in Fig. Q4 (b). **(04 Marks)**

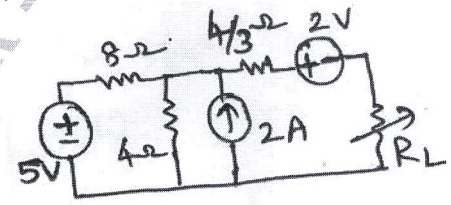

Fig. Q4 (b)

c. Find the current through R_L using Thevenin's theorem for the network in the Fig. Q4 (c). **(08 Marks)**

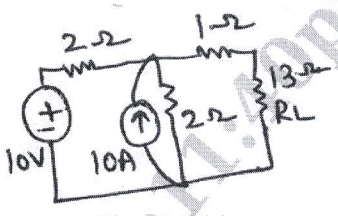

Fig. Q4 (c)

Module-3

5 a. Derive expression for resonant frequency in series RLC circuit. **(06 Marks)**

b. A series RLC circuit has R = 4 Ω, L = 1 mH and C = 10 μF. Calculate Q factor, bandwidth, resonant frequency and half power frequencies. **(08 Marks)**

c. Find the equation of current if the switch is closed at t = 0. Find also the voltage across L and R, the current at t = 0.1 sec and the time at which the voltage across L and R are equal in the Fig. Q5 (c). **(06 Marks)**

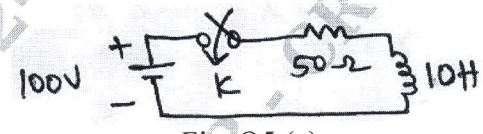

Fig. Q5 (c)

OR

6 a. Find I_o, I_C, I_L, Q factor, resonant frequency and parallel resonance for the parallel resonant circuit shown in Fig. Q6 (a). **(08 Marks)**

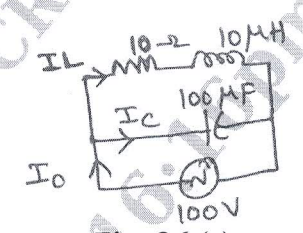

Fig. Q6 (a)

b. In the Fig. Q6 (b), the switch S is closed at t = 0, find the time when the current from the battery reaches to 500 mA. **(08 Marks)**

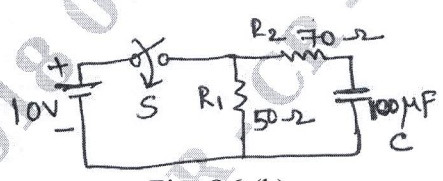

Fig. Q6 (b)

c. What are the initial conditions and their use in network analysis? **(04 Marks)**

Module-4

7 a. State and prove initial value theorem and final value theorem. **(08 Marks)**

b. Find the Laplace transform of the, (i) $f(t) = 5 + 4e^{-2t}$ (ii) $e^{-at} \sin \omega t$ **(04 Marks)**

c. Obtain the Laplace transform of the function shown in Fig.Q 7(c). **(08 Marks)**

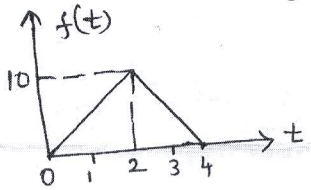

Fig. Q7 (c)

OR

8 a. Find the inverse Laplace transform,

(i) $\frac{s^2+5}{s(s^2+4s+4)}$ (ii) $\frac{2s+6}{s^2+6s+25}$ **(06 Marks)**

b. Obtain Laplace transform of,

(i) $f(t) = 5(t-2)u(t-1)$

(ii) $f(t) = 4e^{-3t}[u(t+2) - u(t-2)]$

(iii) $\delta(t)$

(iv) $u(t)$ **(08 Marks)**

c. Sketch the waveforms,

(i) $tu(t-T)$ (ii) $(t-T)u(t-T)$ (iii) $u(-t)$ (iv) $tu(t+T)$ **(06 Marks)**

Module-5

9 a. Determine the line currents and total power supplied to a delta connected load of $Z_{ab} = 10\angle 60^\circ\Omega$, $Z_{bc} = 20\angle 90^\circ\Omega$ and $Z_{ca} = 25\angle 30^\circ\Omega$. Assume a 3 phase, 400 V, ABC system. **(08 Marks)**

b. Define Z and Y parameters. **(04 Marks)**

c. Find the Z parameters of the network shown in Fig. Q9 (c). **(08 Marks)**

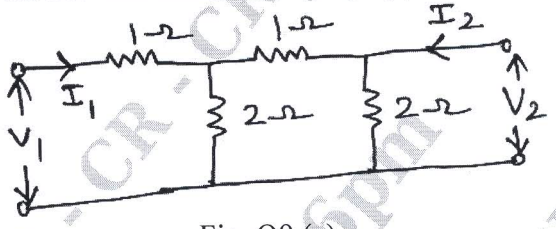

Fig. Q9 (c)

OR

10 a. Determine the line currents in an unbalanced star connected load supplied from a symmetrical 3 phase, 440 V system. The branch impedances are $Z_R = 4\angle 30^0\Omega$, $Z_Y = 10\angle 45^0\Omega$ and $Z_B = 10\angle 60^0\Omega$. The phase sequence is RYB. **(08 Marks)**

b. Find Y-parameters for the network shown in Fig. Q10 (b) **(08 Marks)**

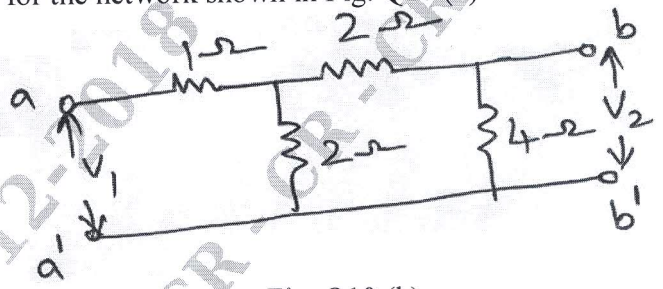

Fig. Q10 (b)

c. Write the conditions for symmetry and reciprocity of Z and Y parameters of a two port network. **(04 Marks)**

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