CBCS SCHEME

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

17EC35

Third Semester B.E. Degree Examination, July/August 2022
Network Analysis

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Using Source transformation find 'V' for circuit shown in Fig. Q1 (a). **(10 Marks)**

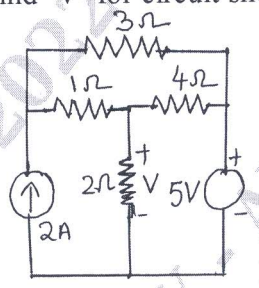

Fig. Q1 (a)

b. Using star-delta transformation find equivalent resistance across terminals a and b for circuit shown in Fig. Q1 (b). **(10 Marks)**

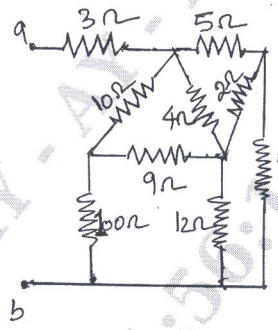

Fig. Q1 (b)

OR

2 a. Find magnitude of voltage source 'V_1' which results in effective voltage of 20 volts across 5 Ω resistor in the circuit, shown in Fig. Q2 (a). Also find power dissipated by inductance of reactance 2Ω. **(10 Marks)**

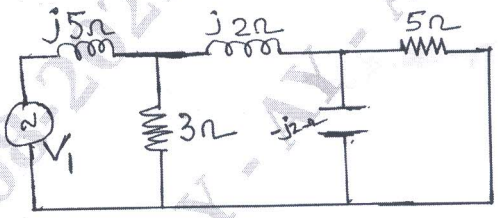

Fig. Q2 (a)

b. Find power delivered by each source for circuit shown in Fig. Q2 (b) using nodal analysis. **(10 Marks)**

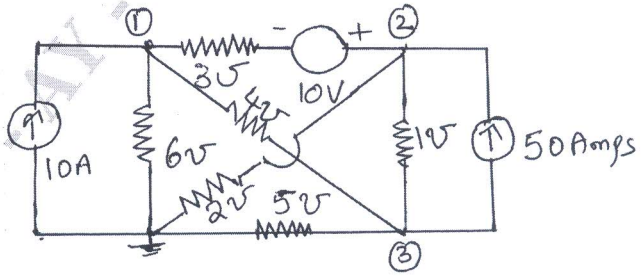

Fig. Q2 (b)

Module-2

3 a. Find current through 2 Ω resistor using superposition theorem for circuit shown in Fig. Q3 (a). Also state Millman's thorem and write expression for equivalent voltage and impedance. . **(10 Marks)**

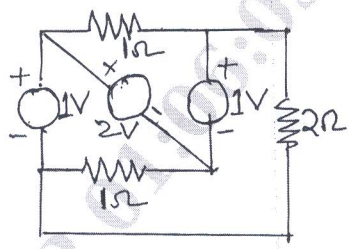

Fig. Q3 (a)

b. Verify Reciprocity theorem for circuit shown in Fig. Q3 (b). **(10 Marks)**

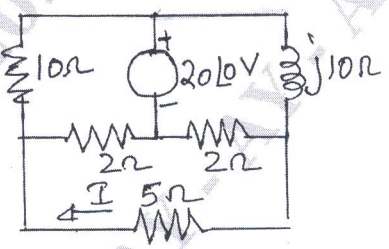

Fig. Q3 (b)

OR

4 a. Find current through galvanometer of resistance 50 Ω using Thevinin's Theorem for circuit shown in Fig. Q4 (a). **(10 Marks)**

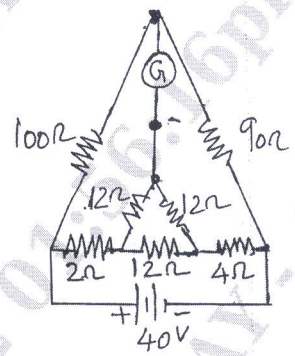

Fig. Q4 (a)

b. Write the conditions for maximum power for A.C. circuit when load is,
(i) Pure resistance (ii) Variable impedance
Find maximum power transferred to load of variable resistance connected across terminals ab for circuit shown in Fig. Q4 (b). **(10 Marks)**

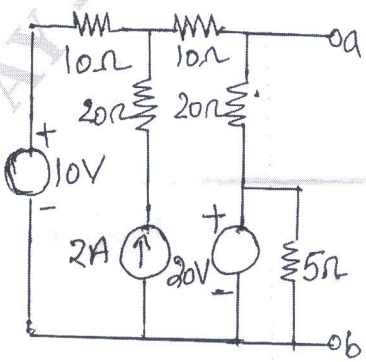

Fig. Q4 (b)

Module-3

5 a. Write equivalent form of initial and final conditions of elements resistance, inductance and capacitance. **(07 Marks)**

b. The network shown in Fig. Q5 (b), is in steady state with switch 'K' closed. At t = 0 switch is opened. Determine voltage across the switch, V_K and $\frac{dV_K}{dt}$ at $t = 0^+$ **(07 Marks)**

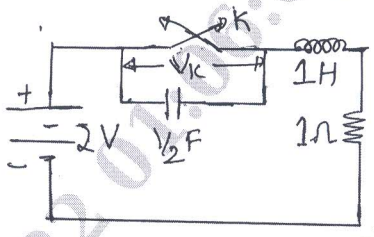

Fig. Q5 (b)

c. The network shown in Fig. Q5 (c) has switch 'K' opened at t = 0. Solve for V, $\frac{dV}{dt}$ and $\frac{d^2V}{dt^2}$ at $t = 0^+$ if I = 1 amp, R = 100 Ω and L = 1 Henry. Refer Fig. Q5 (c). **(06 Marks)**

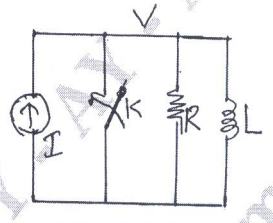

Fig. Q5 (c)

OR

6 a. Derive the expression for finding Laplace Transform of a periodic waveform of time period 'T' seconds. Also find the Laplace transform of the wave form shown in Fig. Q6 (a). **(10 Marks)**

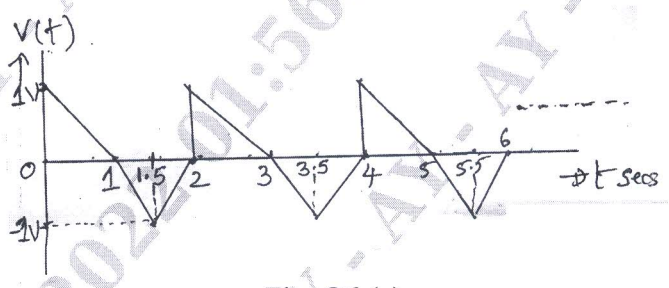

Fig. Q6 (a)

b. In given network shown in Fig. Q6 (b), find $i_2(t)$ if switch is closed at t = 0 using Laplace transform. **(10 Marks)**

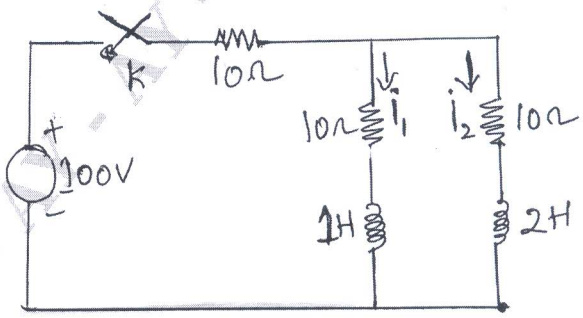

Fig. Q6 (b)

Module-4

7 a. Show that resonant frequency is the geometric mean of half power frequencies. **(06 Marks)**

b. Show that in a R-L-C series circuit with frequency 'W' of supply being varied at constant voltage the voltage across the capacitor becomes maximum at a frequency,

$$\omega_C = \left[\frac{1}{LC} - \frac{R^2}{2L^2}\right]^{\frac{1}{2}}.$$ **(06 Marks)**

c. A coil having a resistance of 5 Ω and an inductance of 100 mH is connected in series with a 50 μF capacitor across 200 V, variable supply frequency. Find voltage across coil and capacitor when the power factor of the circuit becomes unity. Also find power dissipated at resonance. **(08 Marks)**

OR

8 a. Define selectivity and Q-factor of a resonant circuit. Also discuss the frequency response curves for parallel resonance. **(09 Marks)**

b. Find the value of 'L' for which the circuit shown is resonant at a frequency ω = 5000 rad/sec. Refer Fig. Q8 (b). **(07 Marks)**

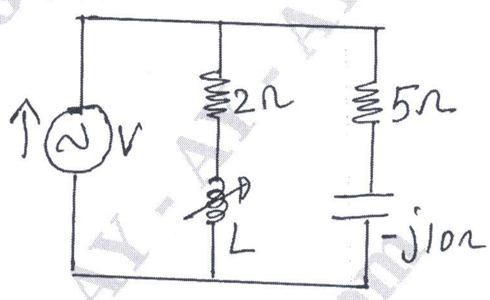

Fig. Q8 (b)

c. Determine the values of R_L and R_C which cause the circuit shown in Fig. Q8 (c) is resonant at all frequencies.

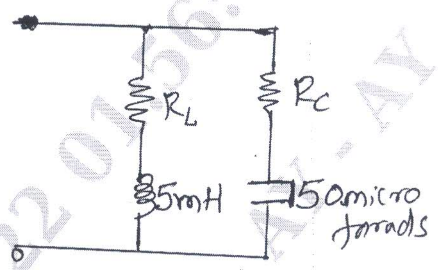

Fig. Q8 (c) **(04 Marks)**

Module-5

9 a. Define Y-parameters and express ABCD parameters in term of h-parameters. **(08 Marks)**

b. Find Y and h parameters for the network shown in Fig. Q9 (b). **(12 Marks)**

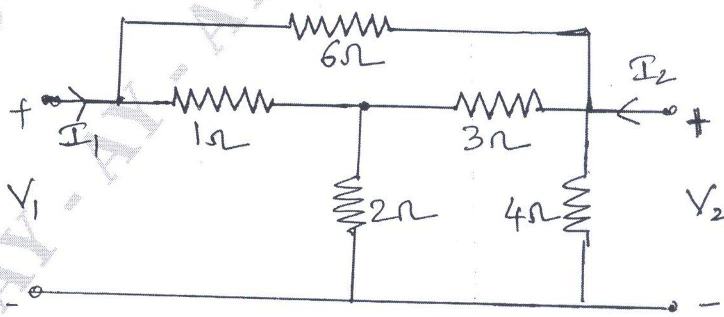

Fig. Q9 (b)

OR

10 a. Write the conditions for reciprocity and symmetry of Z, Y, T and h-parameters. **(08 Marks)**

b. For the network shown in Fig. Q10 (b), find Z and ABCD parameters and check for reciprocity. **(12 Marks)**

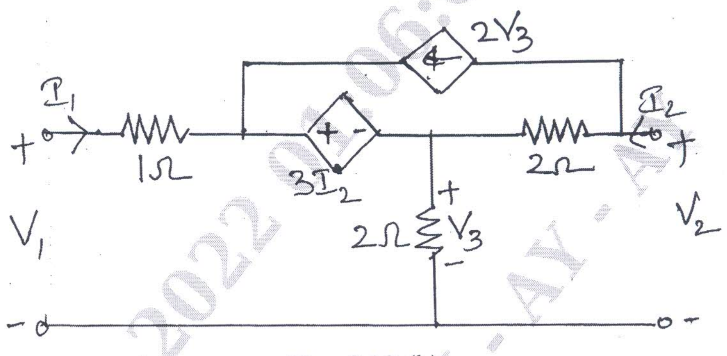

Fig. Q10 (b)

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