CBCS SCHEME

USN

15EE32

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. For the network K shown in Fig Q1(a) find potential between M and N using source transformation. **(04 Marks)**

b. Using Mesh current Analysis determine V_x and power supplied by 10 volt source of the network shown in Fig Q1(b). **(06 Marks)**

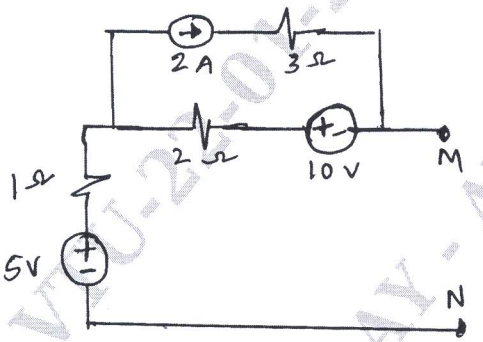

Fig Q1(a)

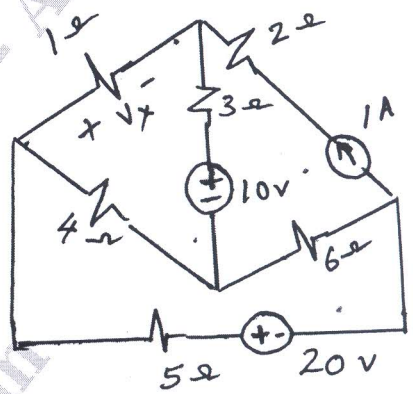

Fig Q1(b)

c. What is Resonance? Show that the resonant frequency in geometric mean of cut off frequencies. **(06 Marks)**

OR

2 a. For the circuit shown in Fig Q2(a), final the resistance between M and N using Star/Delta transformation. **(05 Marks)**

b. Using Node voltage analysis, find V_x and I_x. of the circuit shown in Fig Q2(b) **(06 Marks)**

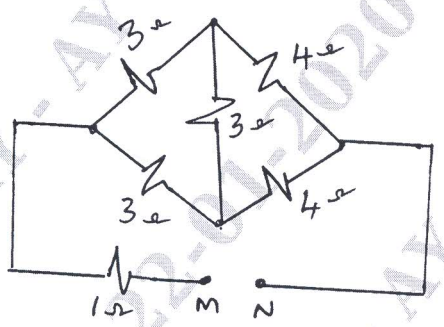

Fig Q2(a)

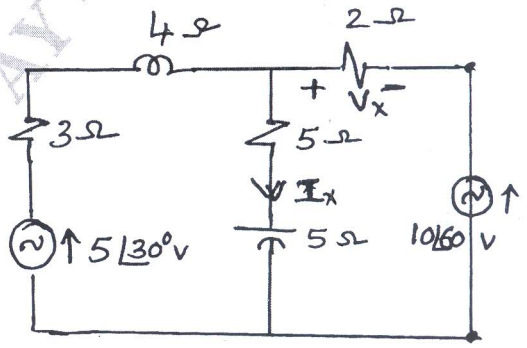

Fig Q2(b)

c. A coil of 20Ω resistance was in inductance of 0.2 henery and is connected in parallel with capacitance of 100μF. Find the resonant frequency at which circuit will act as non inductive resistance, Also find the dynamic resistance. **(05 Marks)**

Module-2

3 a. State and prove Reciprocity theorem. **(05 Marks)**

b. For the network shown in Fig Q3(b), find current I using Milliman's theorem. **(05 Marks)**

c. For the network shown in Fig Q3(c), find current I using Norton's theorem. **(06 Marks)**

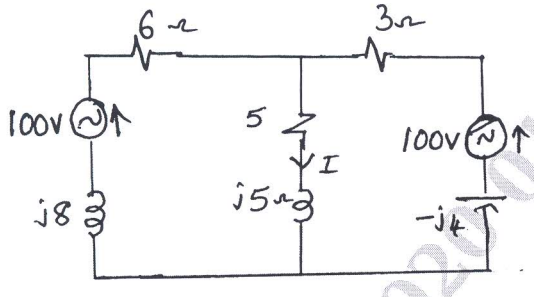

Fig Q3(b)

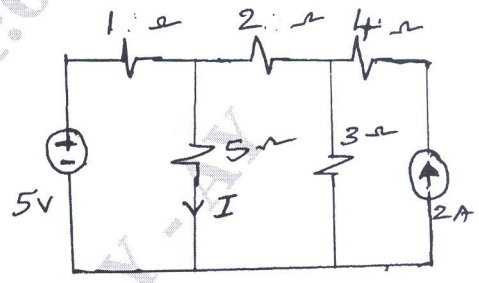

Fig Q3(c)

OR

4 a. Draw the Thevenin's equivalent circuit of Fig shown in Fig Q4(a). **(05 Marks)**

b. For the network shown in Fig Q4(b), find the current 'I_x' using superposition theorem. **(05 Marks)**

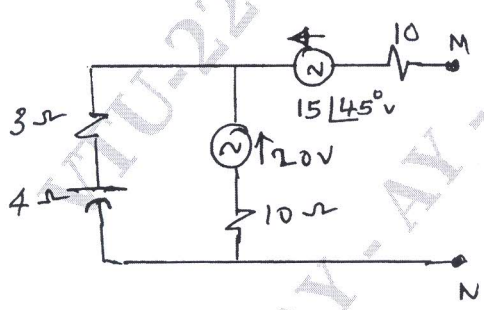

Fig Q4(a)

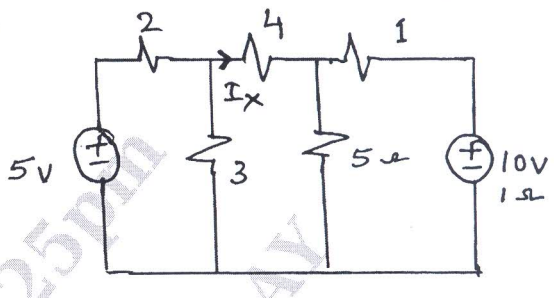

Fig Q4(b)

c. State and obtain the condition for maximum power transfer when load consisting of variable resistance and variable reactance. **(06 Marks)**

Module-3

5 a. Explain the behavior of Resistance, inductance and capacitance for initial condition. **(05 Marks)**

b. For the network shown in Fig Q5(b), switch is closed at t = 0. Write expression for current i(t) for t > 0. **(06 Marks)**

c. For the circuit shown in Fig Q5(c), switch is closed at t = 0. Obtain expression for current i(t) for t > 0. **(05 Marks)**

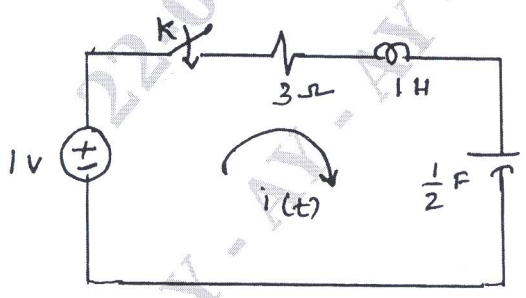

Fig Q5(b)

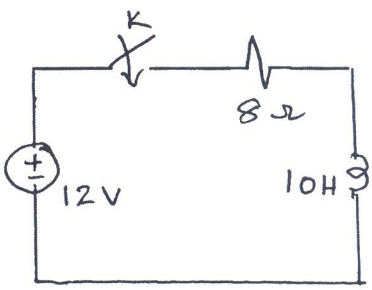

Fig Q5(c)

OR

6 a. Define initial condition and final condition and list merits of initial conditions. **(04 Marks)**

b. For the network shown in Fig Q6(b) switch is changed from M to N at t = 0 after reaching steady state condition. Find current i(t) and its derivatives at $t = 0^+$. **(06 Marks)**

c. For the network shown in Fig Q6(c) switch is opened at t = 0. Find voltage v(t) and its first and second derivatives at $t = 0^+$. **(06 Marks)**

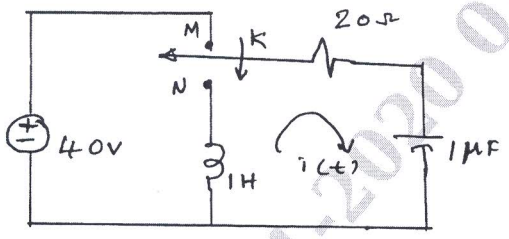

Fig Q6(b)

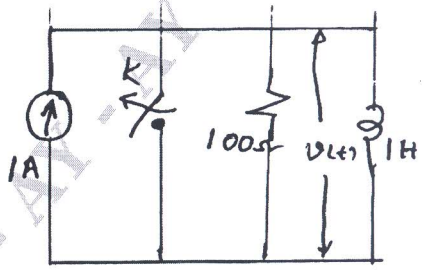

Fig Q6(c)

Module-4

7 a. State and explain Final value theorem. **(05 Marks)**

b. If the capacitors are uncharged and the inductor current is zero at $t = 0^-$, in the given network shown in Fig Q7(b). Show that the transform of the generator current is

$$\frac{10(s^2+s+1)}{(s^2+1)(s^2+2s+2)}$$

(05 Marks)

c. Synthesis the waveform shown in Fig Q7(c) and find the Laplace transform. **(06 Marks)**

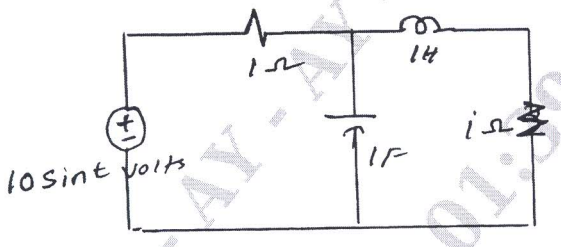

Fig Q7(b)

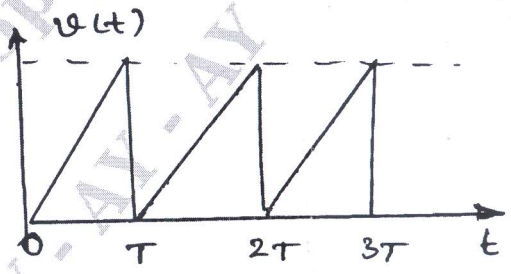

Fig Q7(c)

OR

8 a. Find the Laplace transform of following standard signal. i) Unit step ii) Ramp iii) Impulse **(05 Marks)**

b. Let $I(s) = \frac{2s+5}{(s+1)(s+2)}$. Find its initial value using initial value theorem. Verify the result. **(04 Marks)**

c. For the network shown in Fig Q8(c) at t = 0 switch is opened. Find node voltage $v_1(t)$ and $v_2(t)$. The network is under steady state condition when the switch is closed. **(07 Marks)**

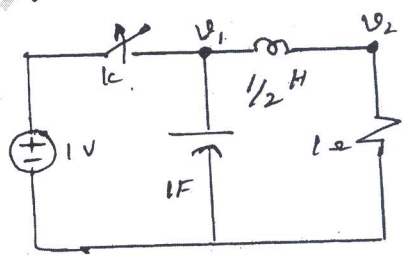

Fig Q8(c)

Module-5

9 a. Determine the line currents and total power supplied to a Delta connected load of $Z_{AB} = 10\angle 60$, $Z_{BC} = 20\angle 90$ and $Z_{CA} = 25\angle 30°\Omega$. Assume a 3 phase 400V and ABC sequence. **(06 Marks)**

b. For the network shown in Fig Q9(b), obtain the z - parameters. **(06 Marks)**

c. Obtain driving point impedance and driving point admittance of one port network shown in Fig Q9(c). **(04 Marks)**

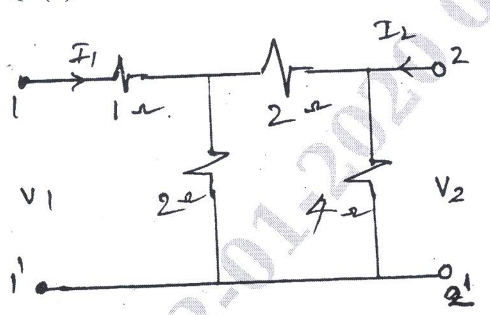

Fig Q9(b)

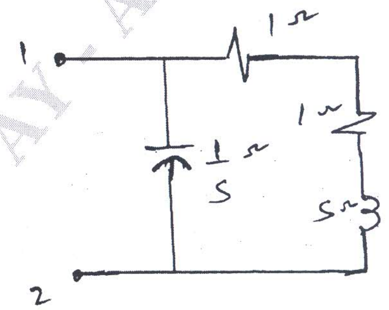

Fig Q9(c)

OR

10 a. Obtain y-parameters interms of z-parameters. **(06 Marks)**

b. A voltage pulse of 10V magnitude is applied to the network shown in Fig Q10(b). Find the current i(t). **(06 Marks)**

c. Determine the system function if the d.c gain of the system is 10 and pole zero plot is as shown in the Fig Q10(c). **(04 Marks)**

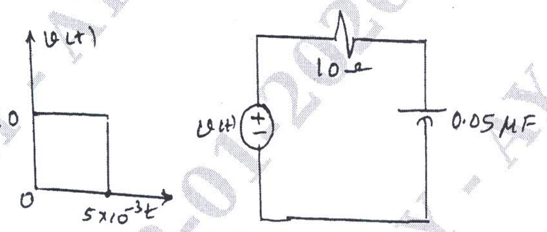

Fig Q10(b)

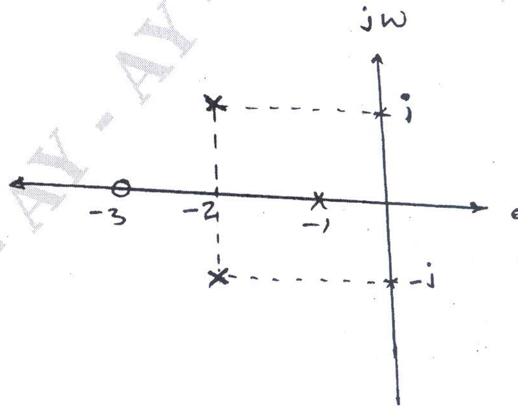

Fig Q10(c)

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