CBCS SCHEME

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17EE32

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. Explain independent and dependent sources. **(04 Marks)**

b. Determine the potential difference between M and N of the network shown in Fig Q1(b)

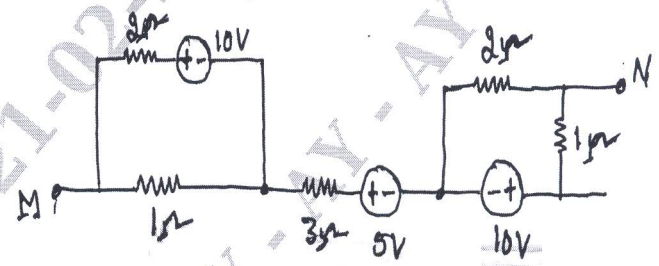

Fig Q1(b) **(08 Marks)**

c. Obtain star connected impedances to replace a set of Δ - connected impedance. **(08 Marks)**

OR

2 a. Find equivalent resistance across x and y of the circuit shown in Fig Q2(a)

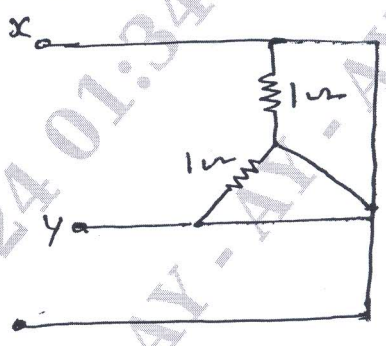

Fig Q2(a) **(06 Marks)**

b. Determine the node voltages of the circuit shown in Fig Q2(b)

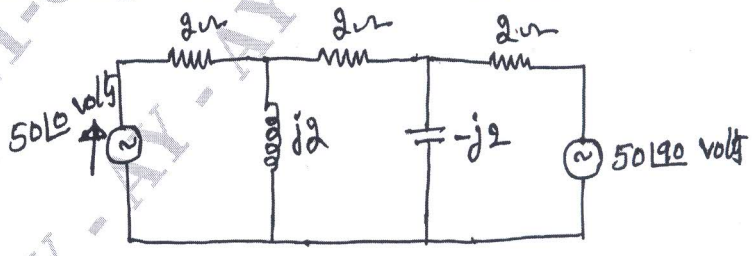

Fig Q2(b) **(06 Marks)**

c. Find I_x, I_y and V_x of the circuit shown in Fig Q2(c), using mesh current analysis

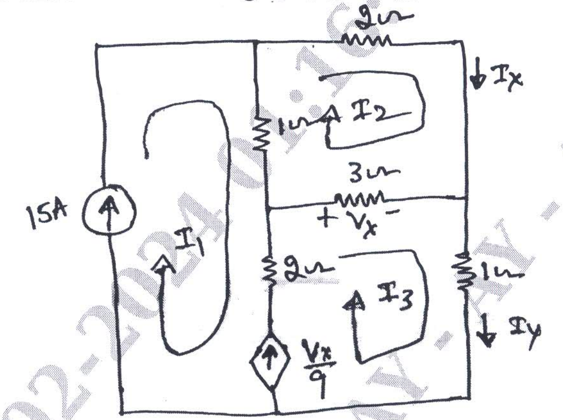

Fig Q2(c) (08 Marks)

Module-2

3 a. Find current I_x in the network shown in Fig Q3(a) using superposition theorem.

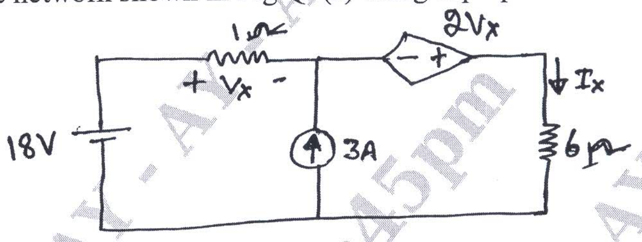

Fig Q3(a) (10 Marks)

b. Obtain Thevenin's equivalent circuit of the network shown in Fig Q3(b)

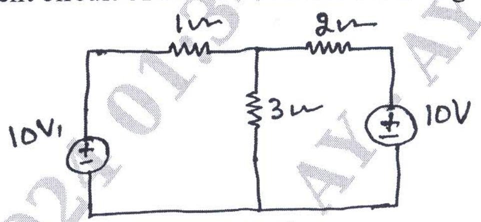

Fig Q3(b) (10 Marks)

OR

4 a. State and explain nortons theorem. (08 Marks)

b. Determine I_x of the circuit shown in Fig Q4(b)

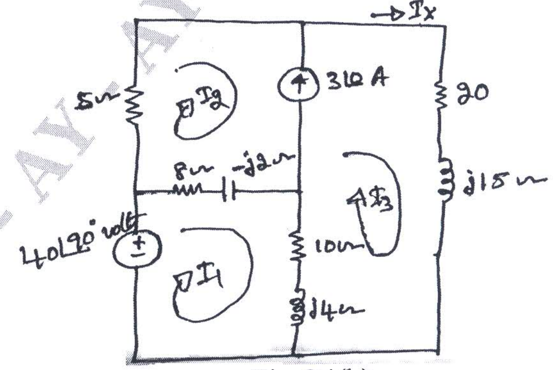

Fig Q4(b) (12 Marks)

Module-3

5 a. Show that resonant frequency of series resonant circuit is equal to geometric mean of two half power frequencies. **(08 Marks)**

b. Determine R, L and C of parallel circuit whose response curve shown in Fig Q5(b), what are the new value of w_0 and bandwidth increased four times.

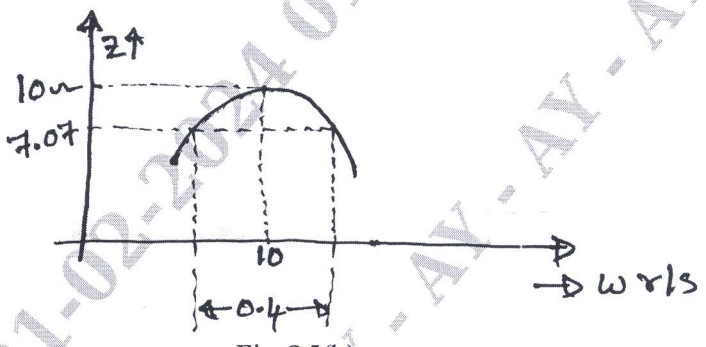

Fig Q5(b) **(12 Marks)**

OR

6 a. Show that : i) The voltage of a capacitor cannot change instantaneously ii) The current in inductor cannot change instantaneously. **(10 Marks)**

b. A series RC branch with R = 20Ω and C = 1μF is shunted by an inductor o resistance 20Ω and inductance 1H. This is supplied by a DC source of 100 volts through series resistance of 10Ω. There is a switch across 10Ω resistance which is closed at t = 0. Solve for the currents in L and C and their derivatives at $t = 0^+$. **(10 Marks)**

Module-4

7 a. State and prove: i) Initial value theorem ii) Final value theorem. **(10 Marks)**

b. Use initial value and final value theorem where they apply to find f(0) and f(∞) for

$$F(s) = \frac{s^3 + 3s^2 + 5}{s(s^3 + 3s^2 + 4s + 2)}.$$ **(10 Marks)**

OR

8 a. Find Laplace transform of the function

f(t) = t for 0 < t < 1

= 0 for t < 1 **(06 Marks)**

b. Obtain Laplace transform of impulse function. **(08 Marks)**

c. Obtain Laplace transform of the function f(t) of periodic signal show in Fig Q8(c)

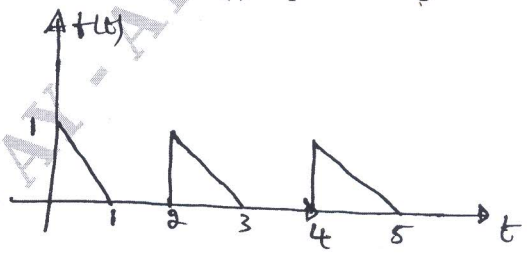

Fig Q8(c) **(06 Marks)**

Module-5

9 a. A symmetrical star connected system is shown in Fig Q9(a). Calculate the three phase time voltage and power given $V_{RN} = 230\angle 0$ Volts assume phase sequence is RYB.

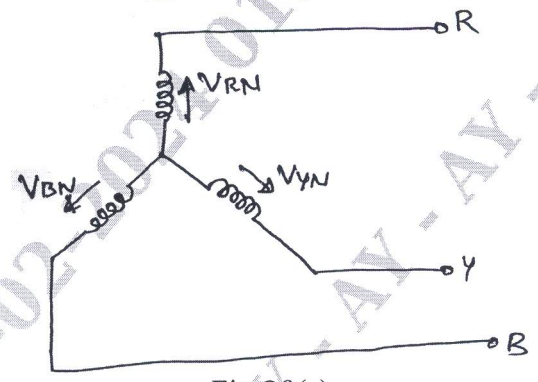

Fig Q9(a) **(10 Marks)**

b. Define Z-parameter and draw its equivalent circuit. **(10 Marks)**

OR

10 a. Determine Y-parameter of two part network shown in Fig Q10(a)

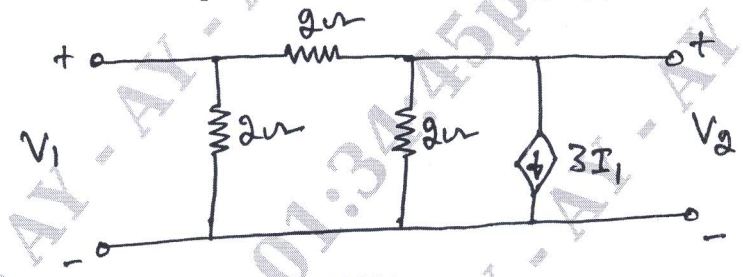

Fig Q10(a) **(10 Marks)**

b. Find the transmission parameter for the network shown in Fig Q10(b)

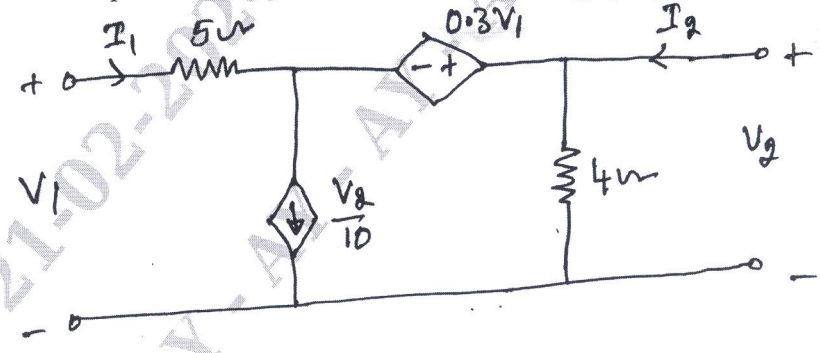

Fig Q10(b) **(10 Marks)**

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