CBCS SCHEME

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

17EE32

Third Semester B.E. Degree Examination, June/July 2023
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. Define the following :
i) Active and passive circuit
ii) Unilateral and Bilateral circuit
iii) Lumped and distributed circuit **(06 Marks)**

b. Find the current I_1, using source transformation method

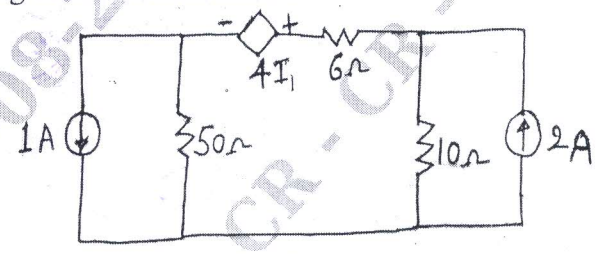

Fig Q1(b) **(06 Marks)**

c. Find the branch current in the given circuit using Star – Delta transformation.

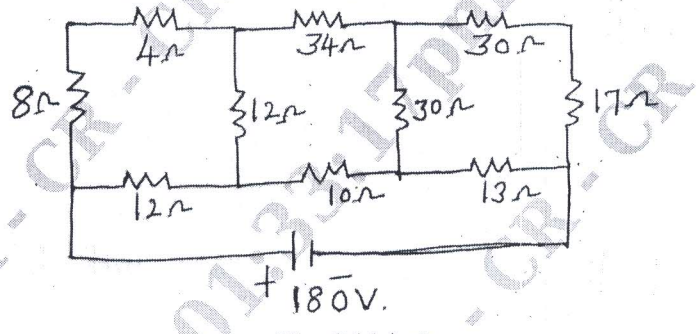

Fig Q1(c) **(08 Marks)**

OR

2 a. Give the differences between :
i) Active and passive elements ii) Ideal and practical sources **(06 Marks)**

b. Find the current I_x in the circuit using mesh analysis technique

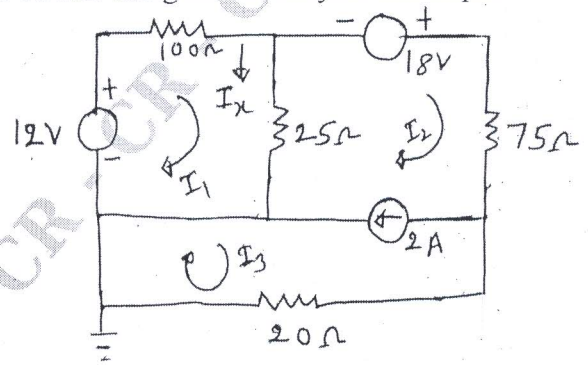

Fig Q2(b) **(07 Marks)**

c. Find node voltages and branch currents for the given circuit.

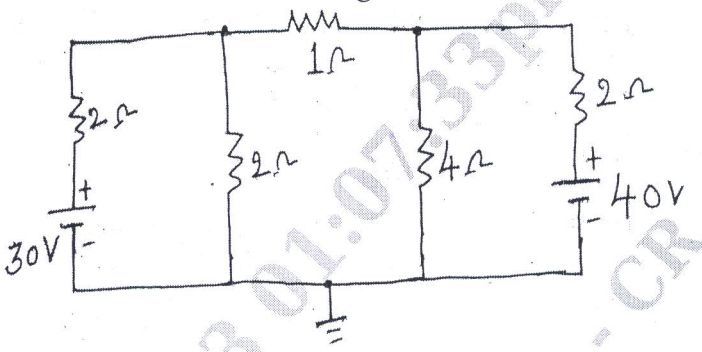

Fig Q2(c) **(07 Marks)**

Module-2

3 a. State and prove Reciprocity theorem. **(06 Marks)**

b. Find the current through load resistance 2Ω, using Millman's theorem.

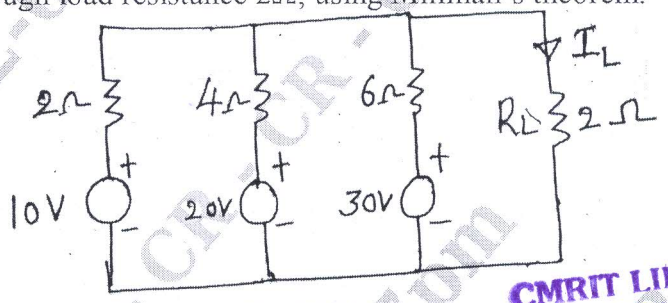

Fig Q3(b) **(07 Marks)**

c. Find the voltage across $-j3\Omega$ and verify Reciprocity theorem.

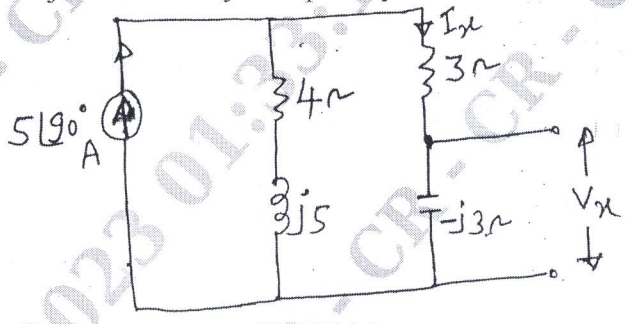

Fig Q3(c) **(07 Marks)**

OR

4 a. State maximum power transfer theorem. Show that complex conjugate of source impedance is equal to load impedance. **(07 Marks)**

b. Find the value of I_x using Thevenin's theorem.

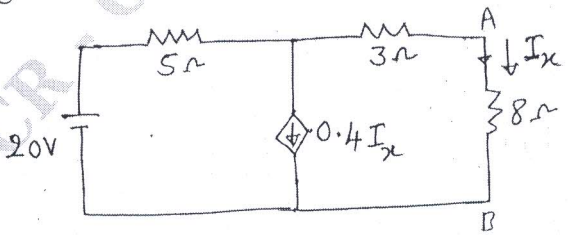

Fig Q4(b) **(06 Marks)**

c. Find the current I, through load resistance 10Ω using super position theorem.

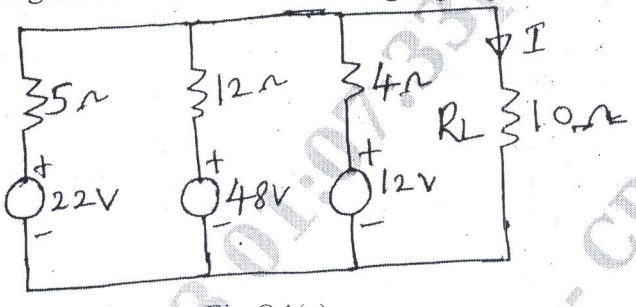

Fig Q4(c) **(07 Marks)**

Module-3

5 a. Define the following terms :
i) Resonance
ii) Q_0 – factor
iii) Band width
iv) Selectivity. **(06 Marks)**

b. Show that $\omega_0 = \sqrt{\omega_1 \omega_2}$ in RLC circuit. **(06 Marks)**

c. A coil of inductance 0.1H, resistance 10Ω connected in series with a capacitor 0.1μF, the applied voltage is 200V. Find:
i) Resonant frequency
ii) Q_0 – factor
iii) Bandwidth
iv) Current and power in the circuit. **(08 Marks)**

OR

6 a. Explain the behaviour of R ; L and C for initial conditions. **(06 Marks)**

b. In a parallel RLC circuit C = 50μF. Find Bandwidth, R and L values, for
i) $\omega_0 = 100$ $\omega_1 = 80$
ii) $\omega_0 = 100$ $\omega_2 = 120$ **(07 Marks)**

c. Find I, $\frac{dI}{dt}$, $\frac{d^2I}{dt^2}$ for $t = 0^+$ when the switch 'S' changed from position 1 to position 2. Using initial conditions?

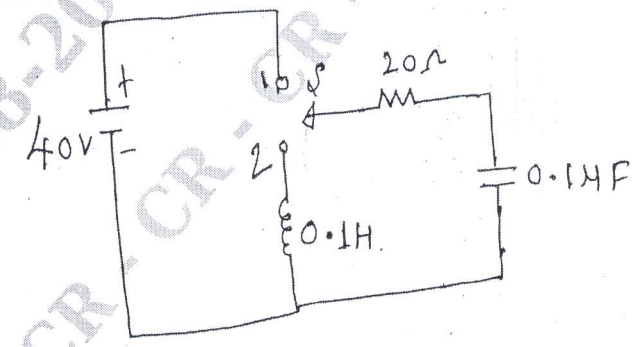

Fig Q6(c) **(07 Marks)**

Module-4

7 a. State and prove initial value and Final value theorem. **(07 Marks)**

b. Find I(t) for the given RC circuit rectangular pulse shown is input and assume the circuit is initially relaxed.

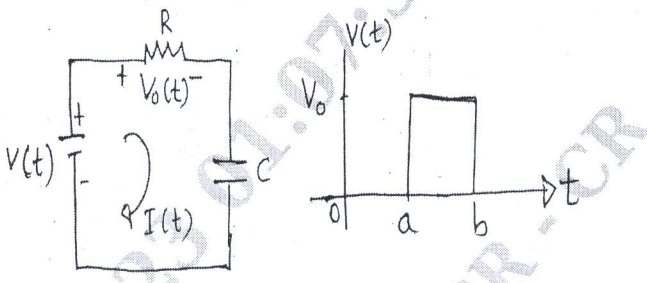

Fig Q7(b) **(06 Marks)**

c. Find the Inverse Laplace transform of

i) $F(s) = \dfrac{2s+4}{s^2+4s+3}$

ii) $F(s) = \dfrac{s^2+2s+5}{(s+3)(s+5)^2}$. **(07 Marks)**

OR

8 a. Find the Laplace Transformation for
i) Unit step function ii) Ramp function iii) Sin ωt iv) Cos ωt. **(10 Marks)**

b. Find Laplace transformation and synthesize give waveform

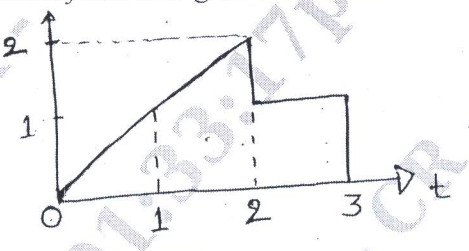

Fig Q8(b) **(05 Marks)**

c. Find initial and final value for the following S – domain equation

$I_1(s) = \dfrac{8.67[s+350]}{s[s+266.7]}$. **(05 Marks)**

Module-5

9 a. Define Z, Y and T parameters? **(06 Marks)**

b. Find Y-parameters for the given circuit?

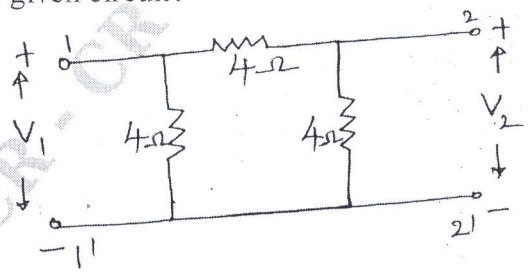

Fig Q9(b) **(06 Marks)**

c. A 3-phase, 400V, star connected load having $Z_A = 10 + j0$, $Z_B = 15 + j10$ and $Z_C = 0 + j5$. Find : i) Line currents ii) Real power iii) Reactive power. **(08 Marks)**

OR

10 a. Find Line currents, phase currents and Real power for the given 3-phase Delta connected unbalanced load?

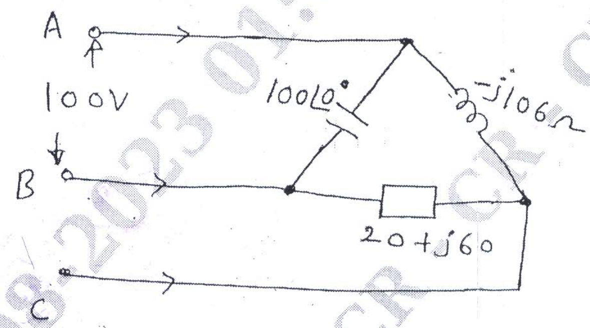

Fig Q10 (a) **(10 Marks)**

b. Show that Z-parameter interms of Y-parameters in two port networks? **(06 Marks)**

c. Find Z-parameter for the circuit?

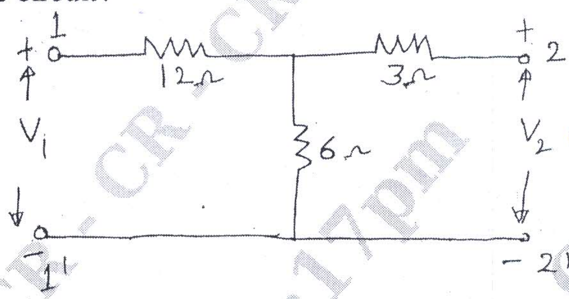

Fig Q10(c) **(04 Marks)**

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