CBCS SCHEME

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15EE32

Third Semester B.E. Degree Examination, July/August 2021
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions.***

1 a. Define Ideal and practical voltage and current sources with the help of neat circuit diagram and characteristic curves. **(04 Marks)**

b. Find the equivalent Resistance between terminals A and B using Y-Δ transformation in the network shown in Fig Q1(b).

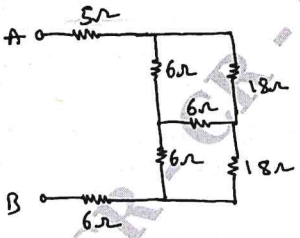

Fig Q1(b) **(06 Marks)**

c. Using mesh current analysis find the value of V_2 such that current through 4Ω resistance in zero.

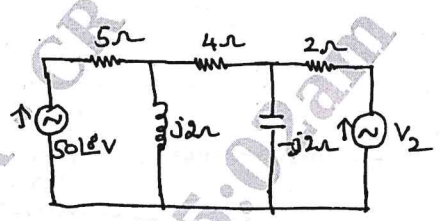

Fig Q1(c) **(06 Marks)**

2 a. For the Network shown in Fig Q2(a) find node voltage V_d and V_c

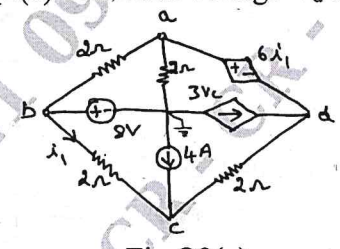

Fig Q2(a) **(08 Marks)**

b. With respect to series Resonant circuit define i) Resonant frequency (f_r) ii) Half power frequencies. **(04 Marks)**

c. For the network shown in Fig Q2(c) draw the dual circuit. Also write nodal equations for the dual network.

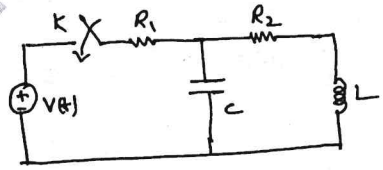

Fig Q2(c) **(04 Marks)**

3 a. State and explain Thevenin's theorem. **(05 Marks)**

b. Using Millman's Theorem find the current through $R_L = 10\Omega$ in the circuit shown in Fig Q3(b)

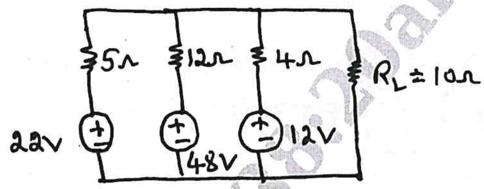

Fig Q3(b) **(05 Marks)**

c. Verify Reciprocity theorem for the circuit shown in Fig Q3(c).

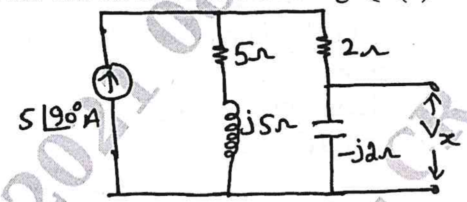

Fig Q3(c) **(06 Marks)**

4 a. State and Prove maximum power Transfer theorem for D.C circuits. **(05 Marks)**

b. In the circuit shown in Fig Q4(b). Find the value the current 667Ω resistor using Norton's theorem.

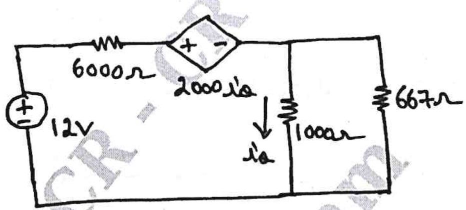

Fig Q4(b) **(06 Marks)**

c. Using super Position Theorem find the current through 2Ω resistor in Fig Q4(c).

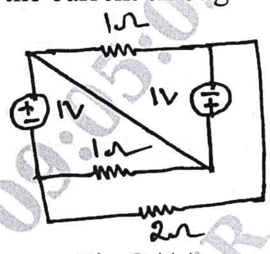

Fig Q4(c) **(05 Marks)**

5 a. Using classical method find and sketch i(t) for t > 0 in the circuit shown in Fig 5(a)

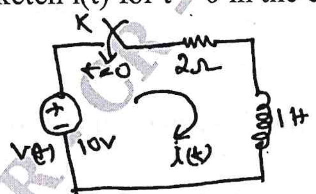

Fig Q5(a) **(08 Marks)**

b. In the network shown in Fig Q5(b) V = 10V, R = 10Ω, L = 1H, C = 10μF and $V_c(0) = 0$.

Find $i(0^+)$, $\frac{di(0^+)}{dt}$ and $\frac{d^2i(0^+)}{dt^2}$, if switches is closed at t = 0

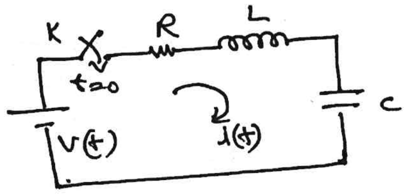

Fig Q5(b) **(08 Marks)**

6 a. In the circuit shown in Fig Q6(a) the switch 'S' is moved from 'a' to 'b' at t = 0. Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. If R = 1Ω, L = H, C = 0.1μF and V = 100V, Assuming steady state has been achieved with switch 'S' at 'a'.

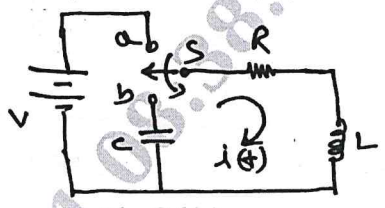

Fig Q6(a) **(08 Marks)**

b. Find and sketch voltage across capacitor $V_c(t)$ for $t \geq 0$ in the circuit shown in Fig Q6(b)

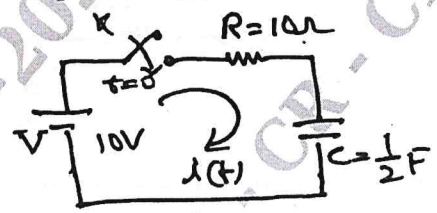

Fig Q6(b) **(08 Marks)**

7 a. Using convolution Integrals find the inverse Laplace transform of the following functions

i) $F(s) = \frac{1}{s(s+1)}$ ii) $F(s) = \frac{1}{(s-a)^2}$. **(08 Marks)**

b. Using Laplace transformation method find the expression for current i(t) when switch 'K' is closed at t = 0 in the network in Fig Q7(b).

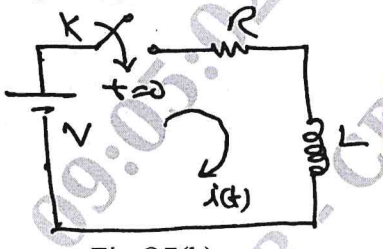

Fig Q7(b) **(08 Marks)**

8 a. State and prove Initial value theorem and find value theorem. **(08 Marks)**

b. Find the Laplace transform of i) δ(t) ii) e^{-at}. **(04 Marks)**

c. Find the Laplace Transform of saw tooth waveform shown in Fig Q8(c)

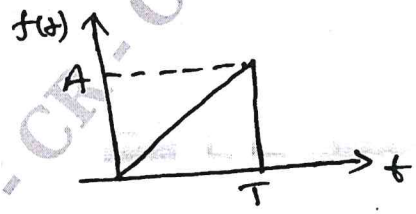

Fig Q8(c) **(04 Marks)**

9 a. A delta connected three phase load with the impedances of (28 + j0)Ω, (25 + J45)Ω and (0 – J65)Ω are connected across a 3 phase 230V, 50Hz symmetrical RYB supply. Find the line and phase currents in magnitude and phase. Draw the necessary circuit diagram. **(08 Marks)**

b. Define Poles and Zeros of network functions. **(04 Marks)**

c. Determine Z-parameters for the circuit shown in Fig Q9(c)

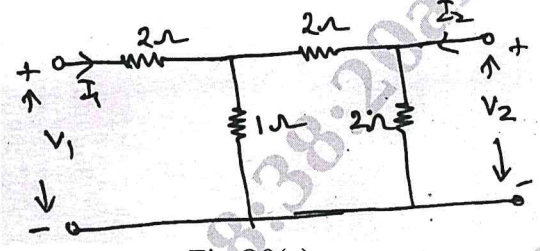

Fig Q9(c) **(04 Marks)**

10 a. Find out transmission parameters for the network shown in Fig Q10(a).

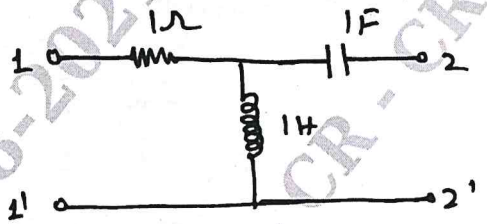

Fig Q10(a) **(08 Marks)**

b. For the network shown in Fig Q10(b) find the driving point function Z(s) and plot the poles and zeros on s-plane.

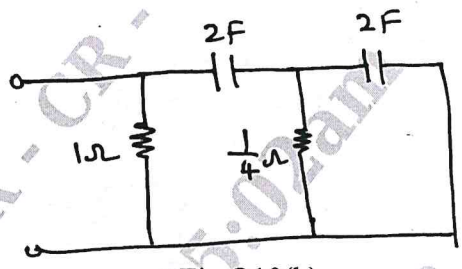

Fig Q10(b) **(08 Marks)**

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