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18EC32

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

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Briefly explain the classification of electrical networks. **(10 Marks)**

b. Three resistance are connected in delta obtain the star equivalent of the network. **(05 Marks)**

c. Find the equivalent resistance between any 2 corners. (Ref. Fig Q1(c))

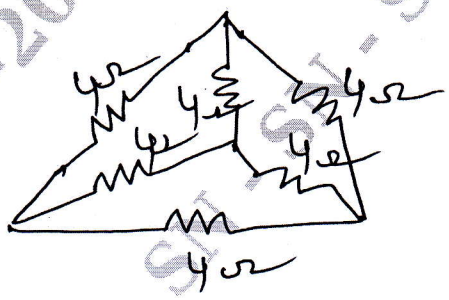

Fig Q1(c) **(05 Marks)**

OR

2 a. Using Mesh current analysis, find the currents in various branches in the circuit. (Ref. Fig Q2(a))

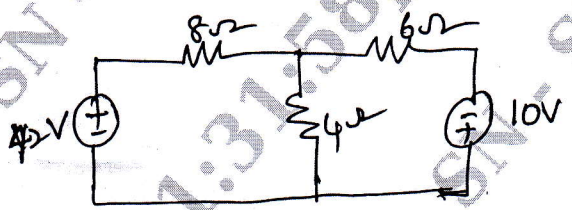

Fig Q2(a) **(10 Marks)**

b. Find the current through the braches using Nodal analysis. (Ref. Fig Q2(b)).

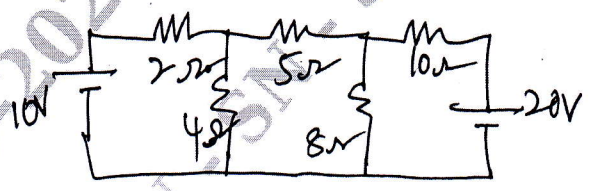

Fig Q2(b) **(10 Marks)**

Module-2

3 a. State and explain Thevenin's theorem. **(10 Marks)**

b. Find the Norton's equivalent for the given Fig Q3(b).

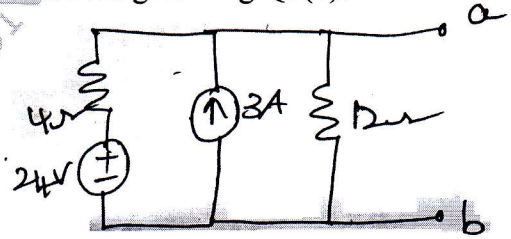

Fig Q3(b) **(10 Marks)**

OR

4 a. State and explain maximum power transfer when load impedance consisting of variable resistance and variable reactant. **(10 Marks)**

b. Using Millman's theorem, find the current flowing through (4+j3) Ω of the circuit as in Fig Q4(a).

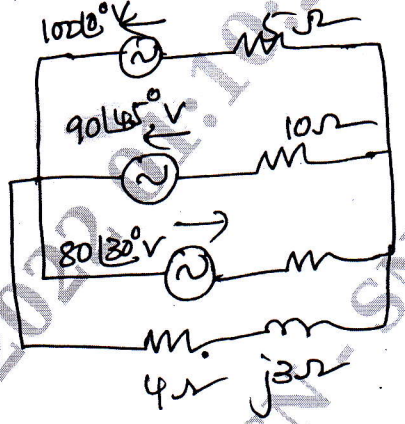

Fig Q4(a) **(10 Marks)**

Module-3

5 a. Discuss the initials and final conditions in inductor, capacitor and resistor. **(10 Marks)**

b. Find $V_c(0^+)$. Assume that the switch was in closed state for a long time. (Ref. Fig Q5(b))

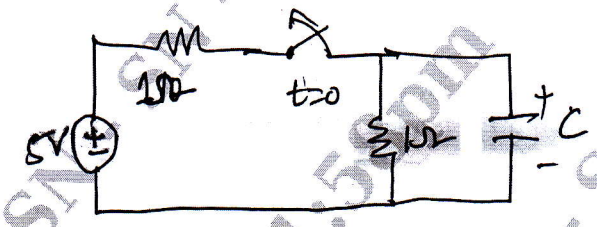

Fig Q5(b) **(10 Marks)**

OR

6 a. In the given network, K is closed at t = 0 with zero current in the inductor. Find the values of i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$, if R = 8Ω and L = 0.2H. (Ref. Fig Q6(a))

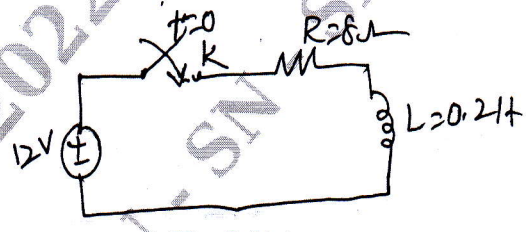

Fig Q6(a) **(10 Marks)**

b. In circuit shown in Fig Q6(b). The switch K is changed from position 1 to position 2 at t = 0. Steady state condition having been reached at position. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

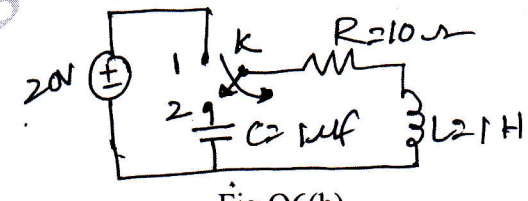

Fig Q6(b) **(10 Marks)**

Module-4

7 a. Obtain the Laplace transform of
i) Unit step function ii) Unit Ramp function iii) Unit impulse function. **(10 Marks)**

b. Find the Laplace transform of following :

(i) $x(t) = 2t\,u(t) - \frac{4d}{dt}\delta(t)$ ii) $x(t) = 5u\,(t/3)$ iii) $x(t) = 5e^{-t/2}u(t)$ **(10 Marks)**

OR

8 a. Find the Laplace transform for the given Figure Q8(a).

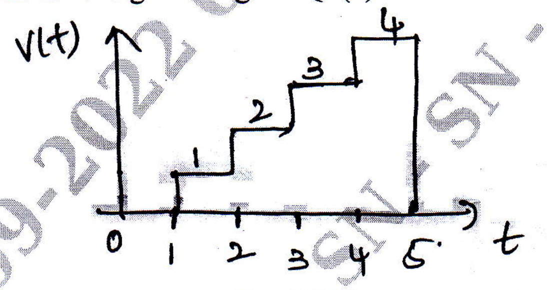

Fig Q8(a) **(10 Marks)**

b. Find the Laplace transform for the Fig Q8(b)

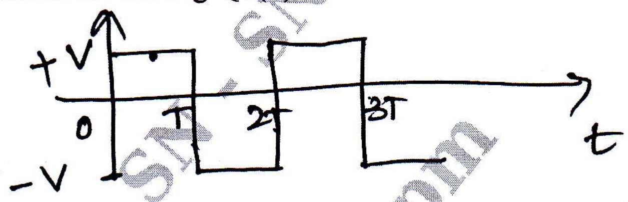

Fig Q8(b) **(10 Marks)**

Module-5

9 a. What is resonance? Derive as expression for half power frequencies in series RLC circuit. Define Q-factor, selectivity and Bandwidth. **(10 Marks)**

b. Find the value of R_L for which, circuit shown below in Fig Q9(b), is resonant.

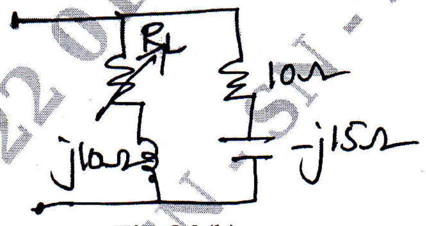

Fig Q9(b) **(10 Marks)**

OR

10 a. Find Y and Z parameters for the network (Ref. Fig Q10(a)).

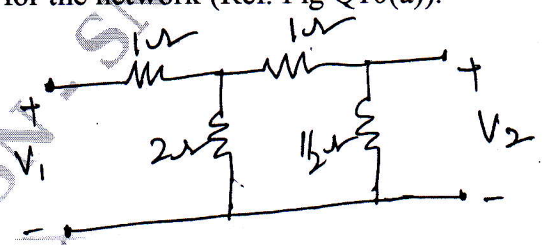

Fig Q10(a) **(10 Marks)**

b. Derive Y parameters in terms of ABCD parameters. **(10 Marks)**

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