

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))

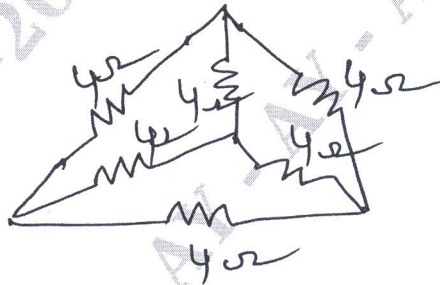


Fig Q1(c)

(05 Marks)

OR

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

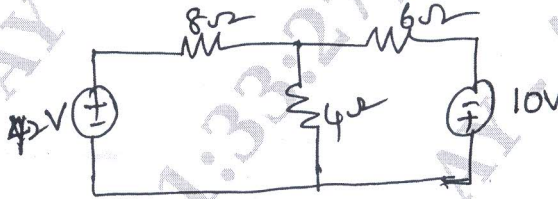


Fig Q2(a)

(10 Marks)

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

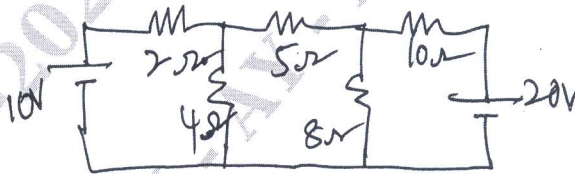


Fig Q2(b)

(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).

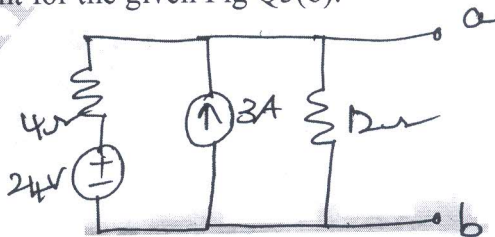


Fig Q3(b)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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 $(4+j3) \Omega$ of the circuit as in Fig Q4(a).

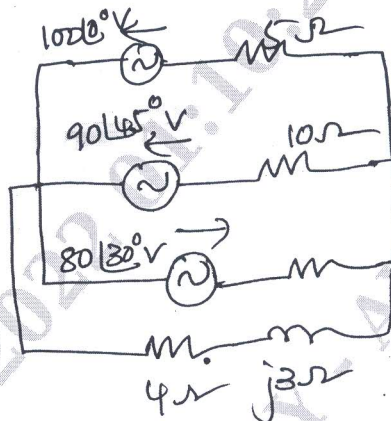


Fig Q4(a)

(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))

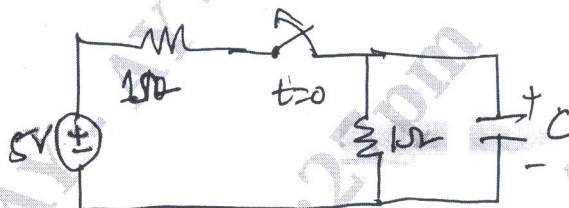


Fig Q5(b)

(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 $R = 8\Omega$ and $L = 0.2H$. (Ref. Fig Q6(a))

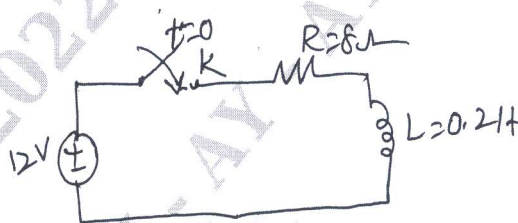


Fig Q6(a)

(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 $t = 0^+$.

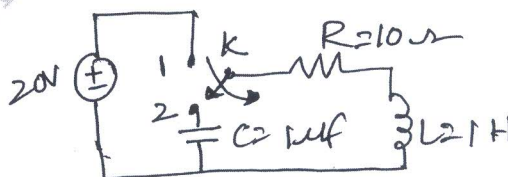


Fig Q6(b)

2 of 3

(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).

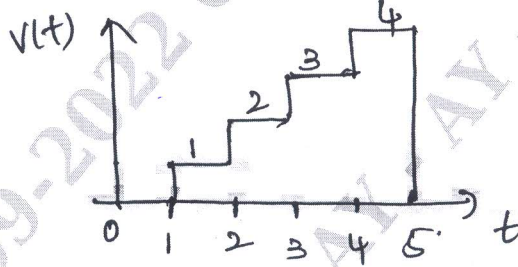


Fig Q8(a)

(10 Marks)

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

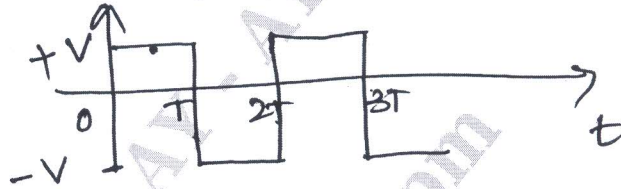


Fig Q8(b)

(10 Marks)

Module-5

- 9 a. What is resonance? Derive an 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.

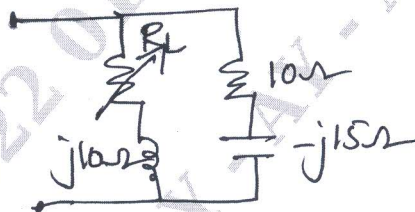


Fig Q9(b)

(10 Marks)

OR

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

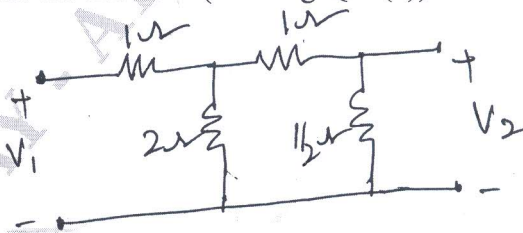


Fig Q10(a)

(10 Marks)

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