Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (R,S), DECEMBER 2023
ELECTRONICS AND COMMUNICATION ENGINEERING
(2020 SCHEME)

Course Code : **20ECT205**

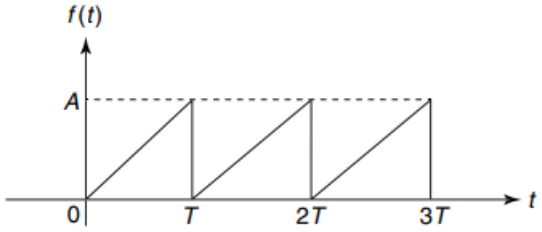
Course Name: **Network Theory**

Max. Marks : **100** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. State Kirchhoff's Laws with necessary diagrams.
2. Define Incidence matrix with example.
3. Explain superposition theorem with necessary diagrams.
4. State reciprocity theorem. List the steps to be followed in reciprocity theorem.
5. Find the Laplace transform of the waveform.



6. Verify the initial and final value theorems for $e^{-2t}(t+1)^2$.
7. Test whether the following represent driving-point functions.

(a) $\frac{5s^4+3s^2-2s+1}{s^3+6s+20}$ (b) $\frac{s^3+s^2+5s+2}{s^4+6s^3+9s^2}$

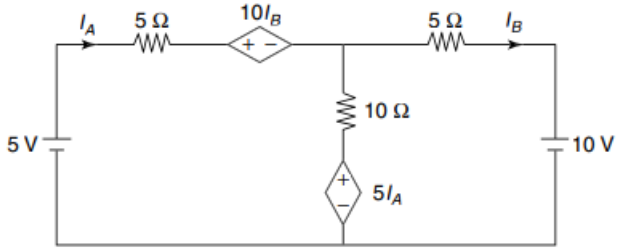
8. Illustrate series connection of two port networks with necessary diagrams.
9. Define characteristic impedance and Image impedance.
10. Prove that for a symmetrical network $Z_{11}=Z_{22}$.

PART B

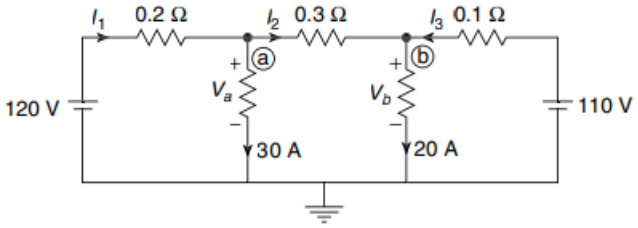
(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Obtain the branch currents in the network shown in figure by applying mesh analysis. (7)

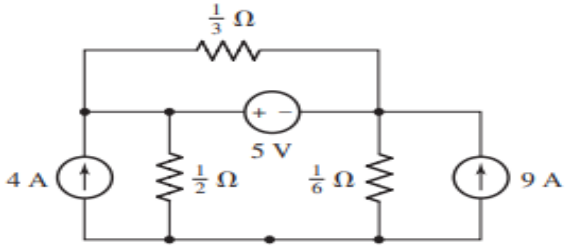


b) Find currents I_1, I_2 and I_3 and voltages V_a and V_b for the network shown in the figure using node analysis. (7)

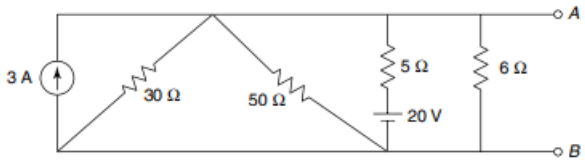


OR

12. a) By applying suitable method compute the voltage across each current source. (8)

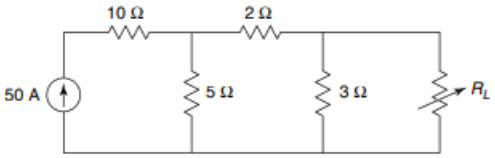


b) Replace the circuit between A and B in with a voltage source in series with a single resistor. (6)



MODULE II

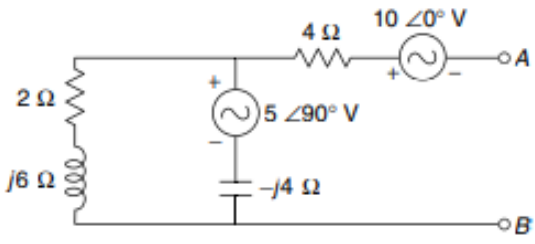
13. a) Find the value of the resistance R_L in figure for maximum power transfer and calculate the maximum power. (9)



b) State maximum power transfer theorem with its conditions and also derive equation for maximum power. (5)

OR

14. a) Obtain Thevenin's equivalent network. (10)



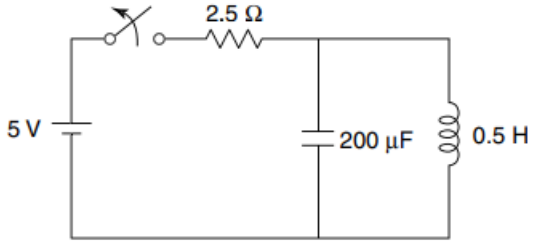
b) State and explain the steps to be followed in applying Norton's theorem to analyze a network containing independent source alone with necessary diagrams? (4)

MODULE III

15. Obtain the response of RL circuit to unit step signal, unit ramp signal, unit impulse signal. (14)

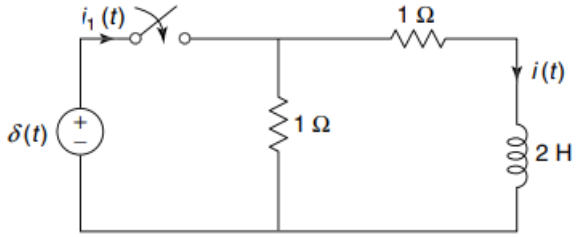
OR

16. a) In the network the switch is closed and steady-state is attained. At t = 0, switch is opened. Determine the current through the inductor.



(9)

b) Find impulse response of the current i(t) in the network shown in figure below.



(5)

MODULE IV

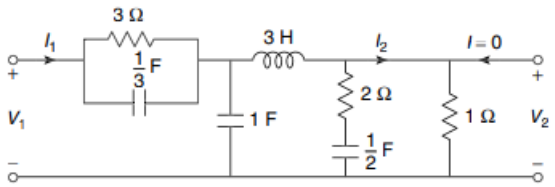
17. a) Obtain the pole-zero plot of the following functions.

(a) $F(s) = \frac{s(s+2)}{(s+1)(s+3)}$ (b) $F(s) = \frac{s(s+1)}{(s+2)^2(s+3)}$ (6)

b) What are the restrictions on pole and zero locations for driving-point functions and transfer functions. (8)

OR

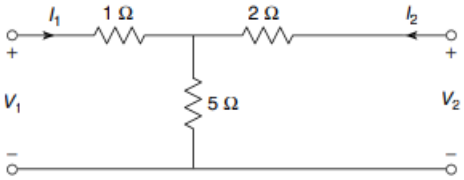
18. Determine the voltage ratio V_2/V_1, current ratio I_2/I_1, transfer impedance V_2/I_1 and driving- point impedance V_1/I_1 for the given network.



(14)

MODULE V

19. Find the transmission parameters for the network given.



(14)

OR

20. Deduce Z parameter in terms of Y-parameters and g parameters. (14)

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