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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022
ELECTRONICS AND COMMUNICATION ENGINEERING
(2020 SCHEME)

Course Code : **20ECT205**

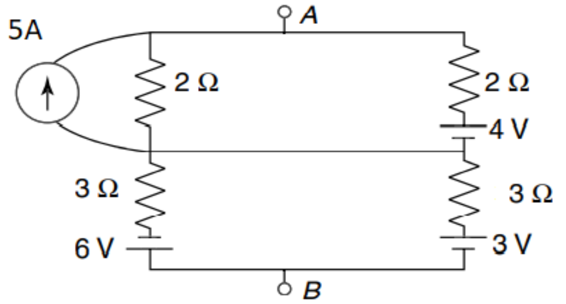
Course Name: **Network Theory**

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

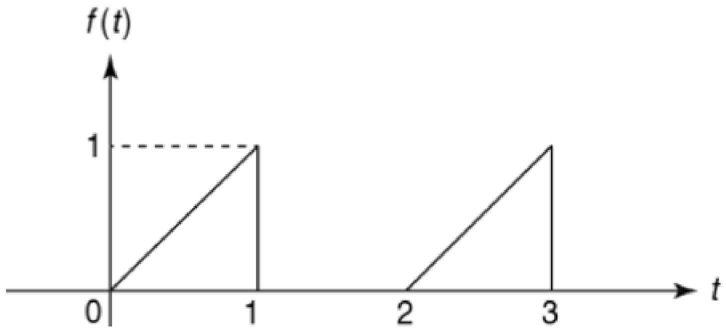
PART A

(Answer all questions. Each question carries 3 marks)

1. Reduce the network given into a single source and a single resistor between terminals A and B.



2. State Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL).
3. State and prove maximum power transfer theorem.
4. What are the steps to be followed in applying Thevenin's theorem to analyze a network containing dependent source?
5. Verify initial and final value theorem for $F(s)= (2s + 1) / (s^3 + 6s^2+ 11s +6)$.
6. Find the Laplace transform of the waveform given.



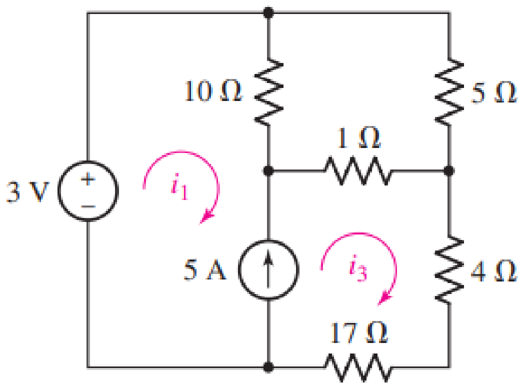
7. Write down the properties of poles and zero locations for driving point functions.
8. Define transfer functions of a two-port network.
9. Illustrate series connection of two port networks with necessary diagrams.
10. Show that $Z_{12} = Z_{21}$ for a two-port network to be reciprocal.

PART B

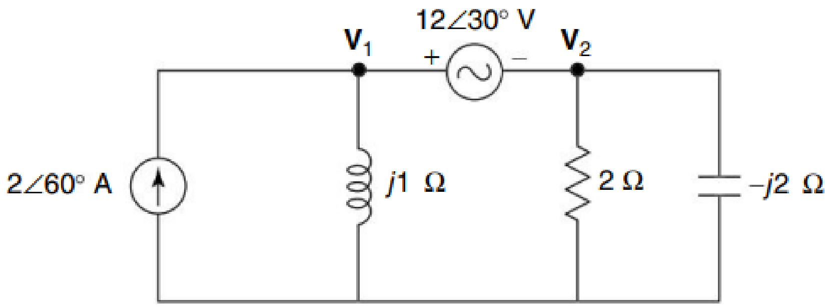
(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Through appropriate application of the super mesh technique, obtain a numerical value for the mesh current i_1 and i_3 in the circuit given, and calculate the power dissipated by the 1Ω resistor. (7)

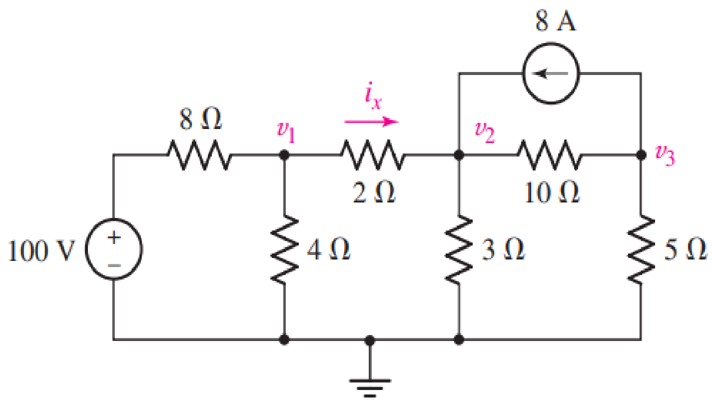


b) Determine the voltage across the capacitor. (7)

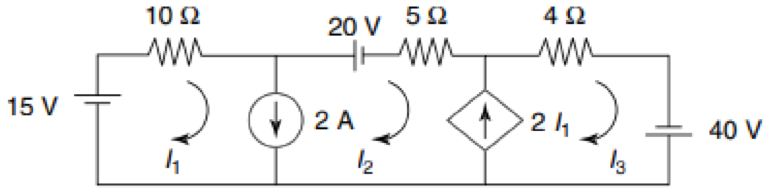


OR

12. a) Employing node analysis procedures, obtain a value for the current and voltage labeled in the given circuit. (6)

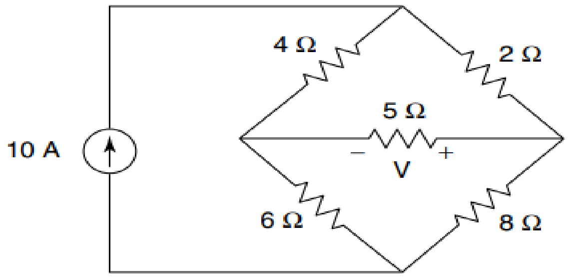


b) Explain about the steps required for computing the unknown currents in the circuit shown below and also solve for it. (8)

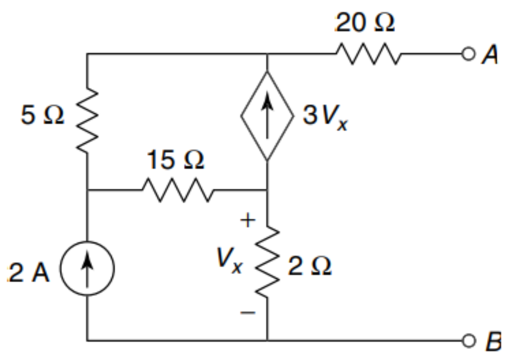


MODULE II

13. a) Suggest a suitable network theorem to check whether the Voltage V remains same when the position of excitation and response are interchanged. Also verify the same using mathematical computation. (7)

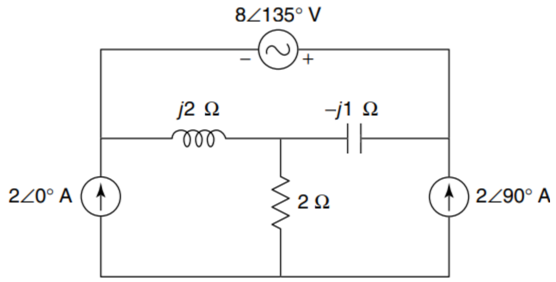


b) Sketch Norton's equivalent network for the network shown in the figure below. (7)



OR

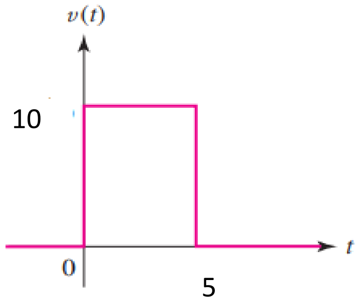
14. a) Find the value of current flowing through the inductor using superposition theorem. (10)

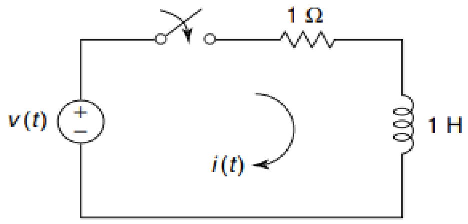


b) State superposition theorem and list the steps to be followed in analyzing the network. (4)

MODULE III

15. a) Find the current response in a simple series RL circuit when the forcing function of rectangular voltage pulse of amplitude 10 and duration 5 is applied at t=0. (7)



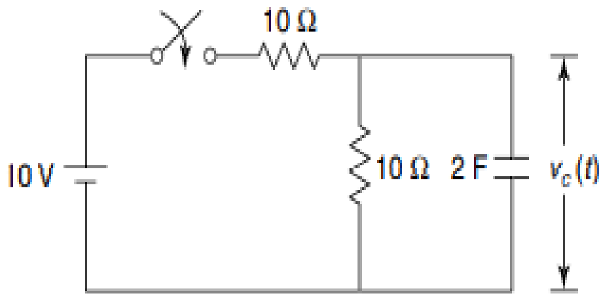


b) Obtain the expression for response of series resistor capacitor circuit when a ramp signal, r(t) is applied. (7)

OR

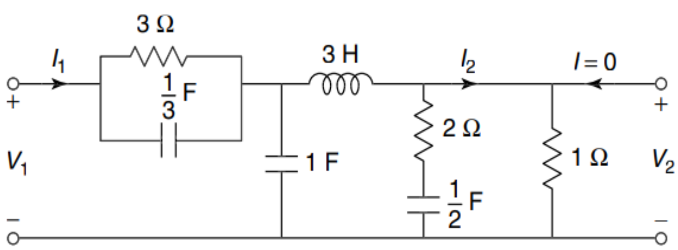
16. a) Derive the expression for the response of a series RLC circuit. (8)

b) The switch is closed at t=0. Determine the voltage across the capacitor. (6)



MODULE IV

17. a) Determine the voltage ratio (V_2 /V_1), current ratio (I_2 /I_1), transfer impedance ratio (V_2 / I_1) and driving point impedance ratio (V1 /I_1) for the given network. (12)

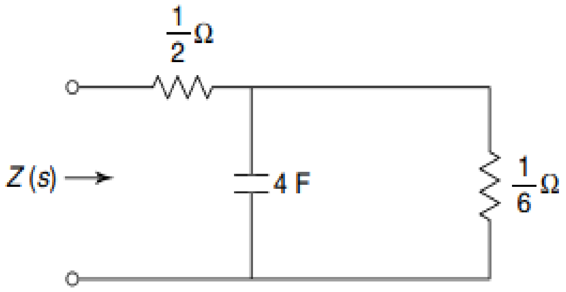


b) Define two port network with a neat diagram. (2)

OR

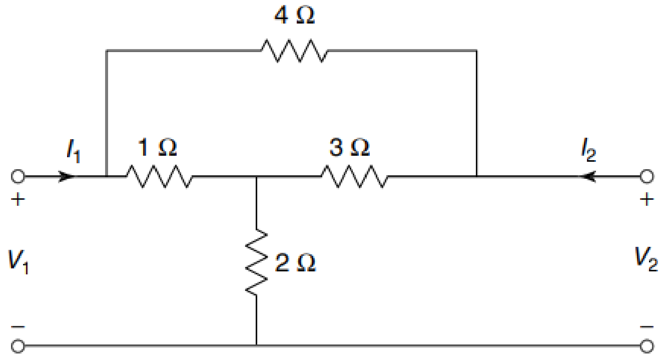
18. a) Plot the amplitude and phase response of F(s) = (s+ 20)/(s -20). (6)

b) Determine the poles and zeros of the impedance function Z(s) in the network. Also sketch the pole zero plot. (8)



MODULE V

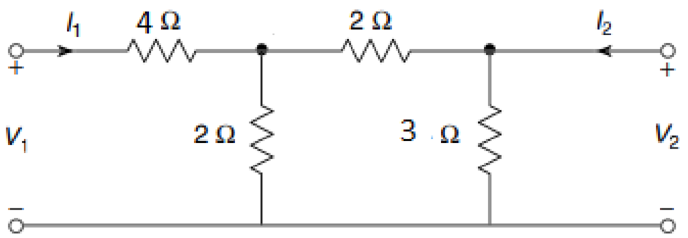
19. a) Find the open-circuit impedance parameters for the network shown below. Also check for symmetricity and reciprocity. (9)



b) Derive the expression for z parameters of a two port network. (5)

OR

20. a) Compute the transmission parameters for the network shown in the figure below. (10)



b) Define characteristic impedance and image impedance. (4)

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