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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S,FE)/S1 (PT)(S) June 2024 (2019 Scheme)/S3 (WP)(R) December 2023 Examination

Course Code: EET201

Course Name: CIRCUITS AND NETWORKS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1 Using superposition, find *Vo* in the circuit of Fig. 1 (3)

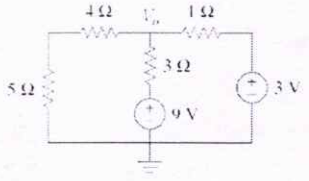

Fig.1

2 Find the Norton equivalent of the circuit in Fig.2 as seen by looking into terminals a and b. (3)

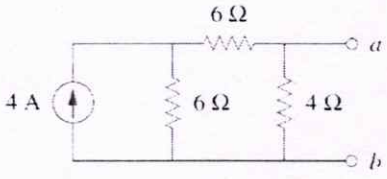

Fig.2

3 Obtain the expression for current in the circuit shown in fig.3 for t>0, assume no initial charge across capacitor. Use Laplace transform method. V_s is a constant DC voltage source (3)

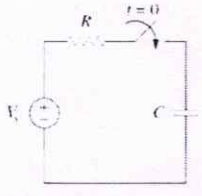

Fig.3

4 Explain how to obtain s-domine equivalent of Resistance, inductance and capacitance (3)

5 Explain the use of dot convention in the analysis of coupled circuits. (3)

6 Find v(t), for t>0 in the circuit of Fig.5 Vs = 20 V. (3)

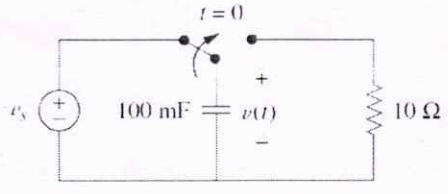

Fig.5

7 Derive the expression for resonance frequency in a series RLC circuit connected to a variable frequency AC source (3)

8 An unbalanced Y-load $Z_A = 15\ \Omega$, $Z_B = 10 + j5\ \Omega$, $Z_C = 6 - j8\ \Omega$. is connected to a 100 V, 3phase, 4wire, ACB sequence system. Calculate the line currents (3)

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and the neutral current.

9 Obtain T parameters in terms of Z parameters (3)

10 Show that the overall Y-parameter matrix of two parallel connected 2-port networks is the sum of the Y-parameter matrices of the individual networks. (3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

11(a) For the circuit shown in Fig.6, find the node voltages v_1 and v_2 (10)

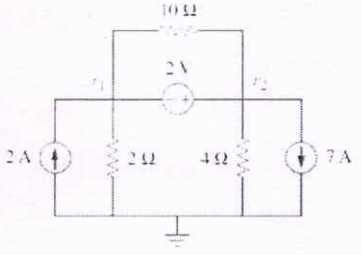

Fig.6

(b) Use source transformation to reduce the circuit in Fig.7 to a single voltage source in series with a single resistor. (4)

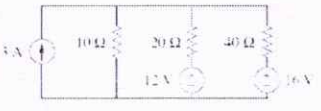

Fig.7

12 Use mesh analysis to evaluate I_o in the circuit in fig.8 (14)

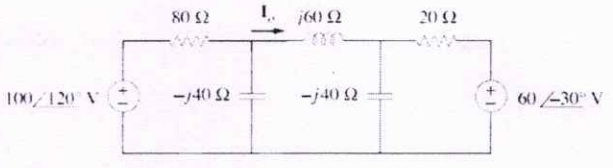

Fig.8

Module 2

13 In the circuit shown in Fig.9, the switch S has been in position 1 for a long period of time. Find the complete expression for the current after throwing the switch S to position 2 (14)

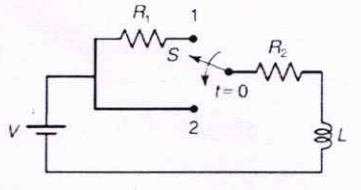

Fig.9

14 Find i(t) for t > 0 in the circuit of Fig.10 (14)

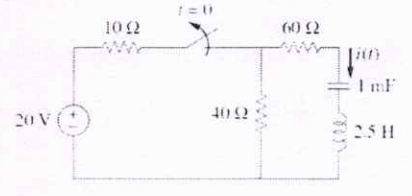

Fig.10

Module 3

15 Initially the circuit is in steady state and the switch is closed at time t=0.Find the output voltage $v_o(t)$ for t>0 in the circuit of fig.11 (14)

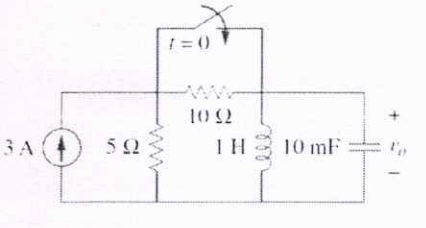

Fig.11

16 Calculate the phasor currents I_1 and I_2 in the circuit of Fig.12 (14)

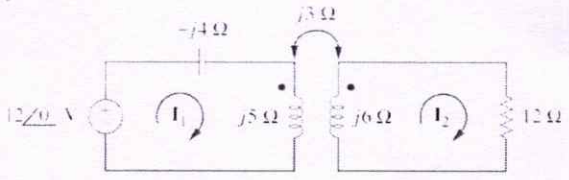

Fig.12

Module 4

17 A star connected load of $Z_a=80+j50\ \Omega$, $Z_b=20+j30\ \Omega$, $Z_c=60-j40\ \Omega$ is connected to a 110V, 3phase 3 wire system. Determine the line currents . (14)

18(a) Find the phase currents and line currents in the circuit in fig.14. $Z_1=8+j6\ \Omega$, $Z_2=4.2-j2.3\ \Omega$, $Z_3=10\ \Omega$ (9)

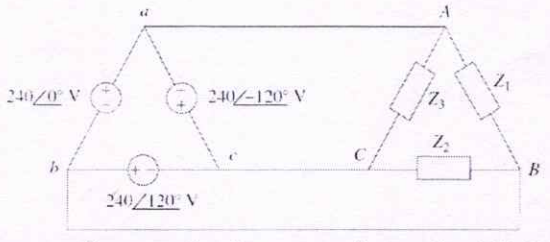

Fig.14

(b) Derive the expression for half power frequencies in case of a series RLC circuit (6)

Module 5

19(a) Calculate the Y parameters of the network in fig.15 considering as two networks connected in parallel (10)

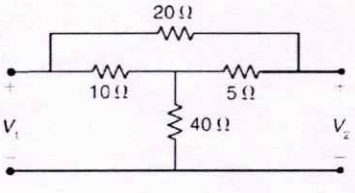

Fig.15

(b) Express T parameters in terms of Y parameters (4)

20(a) Calculate the T parameters of the network shown in fig.16 (8)

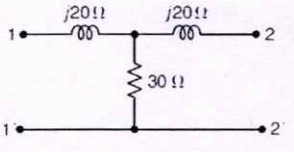

Fig.16

(b) Drive the condition for reciprocity and symmetry of two port network in terms of h parameters (6)