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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019
Course Code: EE201
Course Name: CIRCUITS AND NETWORKS

Max. Marks: 100   Duration: 3 Hours
PART A
Answer all questions, each carries 5 marks.   Marks

1   Find the current flowing through the 5Ω resistor shown in figure 1 if all active   (5) elements are ideal.
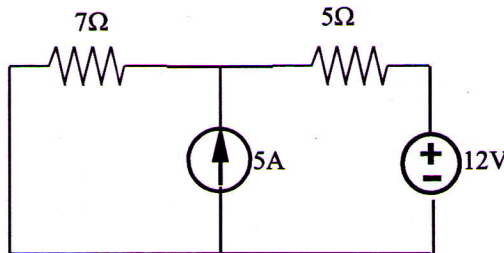

Fig. 1

2   Sketch the network graph if the incidence matrix is as represented below: (5)

Nodes	Branches				
	1	2	3	4	5
1	1	0	0	0	1
2	-1	1	0	1	0
3	0	-1	1	0	0
4	0	0	-1	-1	-1

3   A resistance R and $5\mu F$ capacitor are connected in series across a 100V dc   (5) supply. Calculate the value of R such that the voltage across the capacitor becomes 50V in 5s after the circuit is switched on.

4   In an RL series circuit, R=5 Ω, L=2.5mH and $i(0^-)$=2A. If a source of 50V is   (5) applied at t=0, find i(t) for t>0, using Laplace transformation.

5   For the network shown in figure 2, determine the transfer function $Z_{21}(s)$ and the   (5) driving point admittance function $Y_{11}(s)$.
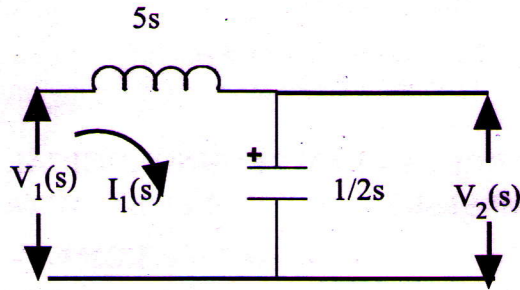
Fig. 2

6	Derive the expression of z- parameters in terms of y- parameters.	(5)
7	Explain the differences between Cauer form and Foster form.	(5)
8	Check whether the polynomial $s^4 + 6s^3 + 2s^2 + s + 1$ is Hurwitz or not.	(5)

PART B
Answer any two full questions, each carries 10 marks.

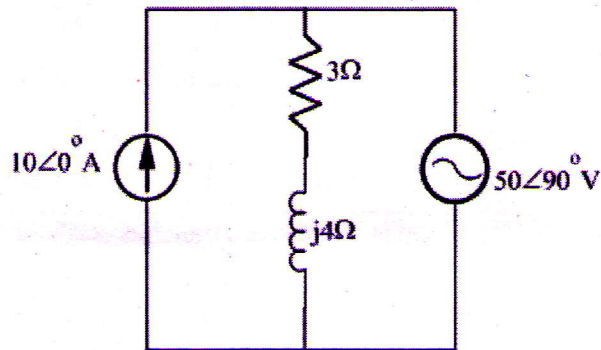9   Use superposition theorem to find the current, I in the circuit shown in fig. 3   (10)

Fig. 3

10   For the network shown in figure 4, draw the network graph. Select 2, 4, 5 as tree   (10)
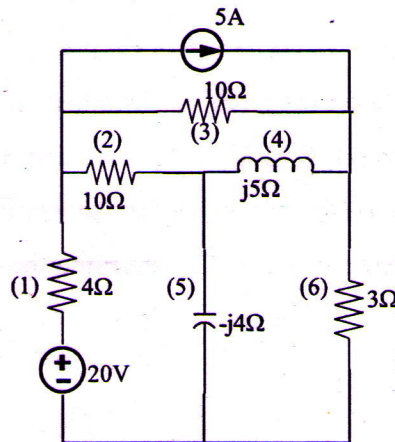branches. Obtain tie-set matrix and hence find the loop currents.

Fig. 4

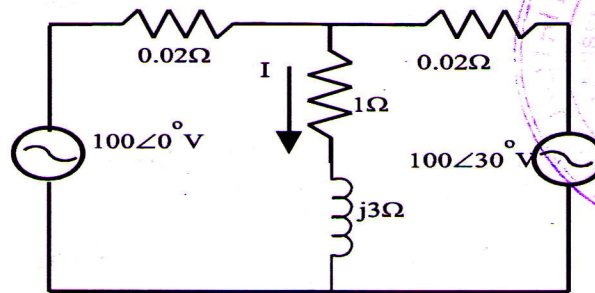11   Solve for the current I in the figure 5 using Norton's Theorem.   (10)

Fig. 5

PART C
Answer any two full questions, each carries10 marks.

12 a) A series RC circuit with R=10Ω and C=4μF has an initial charge Q_0=800μC on (10) the capacitor. At t=0, the switch is closed to apply a constant dc voltage source of 100V. Sketch the transformed circuit. Find the resulting current transient if the charge on the capacitor has the same polarity as deposited by the source.

13 a) In the network shown in figure 6, the switch is opened at t= 0. Find out the (10) current through the 1Ω resistor after opening the switch.
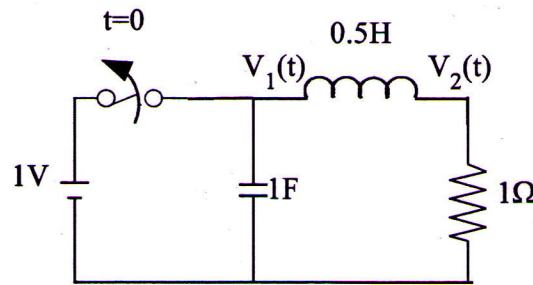

Fig. 6

14 a) In the RL circuit shown in figure 7, the switch is in position 1 long enough to (10) establish steady state conditions and at t=0, it is switched to position 2. Find the resulting current.
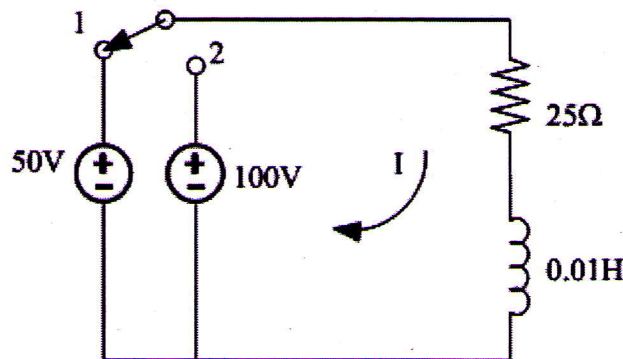

Fig. 7

PART D

Answer any two full questions, each carries 10 marks.

15   a)   Find the Z and Y parameters of the given π- network.   (10)
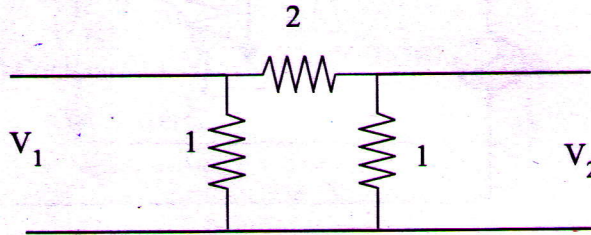

Fig. 8

16   Find the first and second order Cauer forms of the function, $z(s) = \dfrac{2s^2 + 8s + 6}{s^2 + 2s}$ (10)

17   Find the two canonical Foster networks with elements for the impedance (10) function, Z(s) given by $Z(s) = \dfrac{(s+1)(s+3)}{s(s+2)}$

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