Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Third Semester B.Tech Degree (S,FE) Examination December 2020

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   State and explain maximum power transfer theorem as applicable to AC networks   (5)
     with load $Z_L = R_L + jX_L$.

2   List any three properties of incidence matrix associated with graph theory.   (5)

3   Define time constant and explain its significance.   (5)

4   Explain the terms magnetic coupling and dot convention.   (5)

5   Explain open circuit parameters of a 2 port network.   (5)

6   State the conditions a 2 port network to be reciprocal with respect to z, y, h, ABCD   (5)
     parameters.

7   State the conditions for a polynomial to be Hurwitz .   (5)

8   Write any five properties of impedance function of RL network.   (5)

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

9   Determine the load current I_L by using Norton's theorem.   (10)
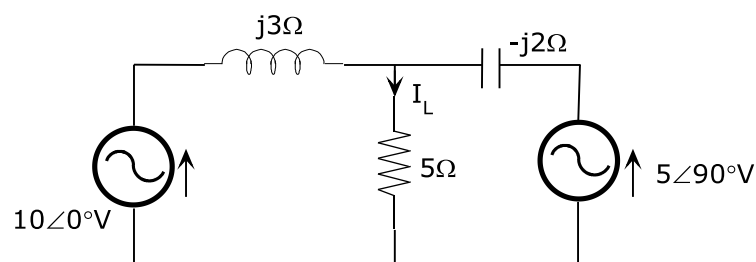
10   a)   State and explain superposition theorem.   (5)

     b)   A reduced incidence matrix of a graph is given by   (5)

          Obtain number of possible trees.

$$[A] = \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & -1 & 1 & -1 & 0 & 0 \\ -1 & 0 & -1 & 0 & -1 & 0 \end{bmatrix}$$

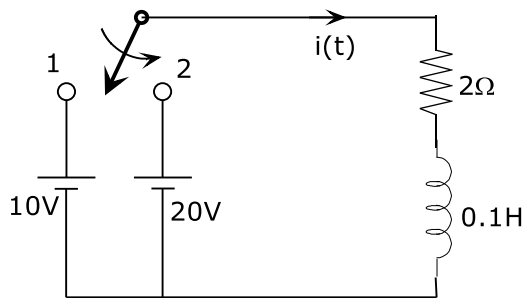11   For the graph shown below, select a tree with [1, 2, 3, 4] as twigs and [5, 6, 7] as   (10)

links. Obtain fundamental tie-set and cut-set matrices for the graph.
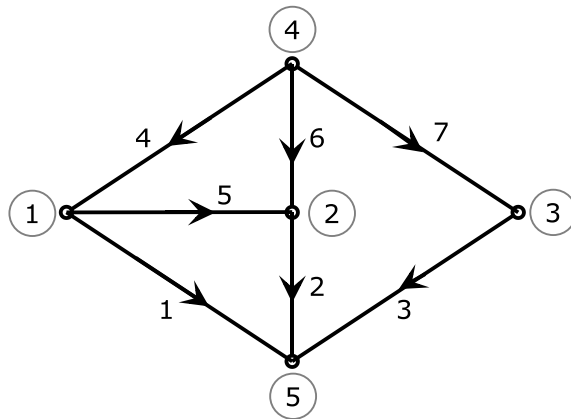
PART C
Answer any two full questions, each carries 10 marks.

12 Determine the current i(t) when the switch is moved from position 1 to position 2 at   (10)
t=0. The switch has been in position 1 for a long time to get steady state values.


13 Derive expression for transient current in a RL series circuit excited with i) DC   (10)
voltage and ii) AC sinusoidal voltage by applying Laplace transform.

14 a) Two inductively coupled coils have self inductances $L_1 = 50$ mH and $L_2 = 200$ mH.   (5)

    i) Find the value of mutual inductance between coils if the coefficient of coupling is 0.5.

    ii) What is the maximum possible mutual inductance?

  b) Plot the transient response of RLC series circuit for various damping conditions with   (5)
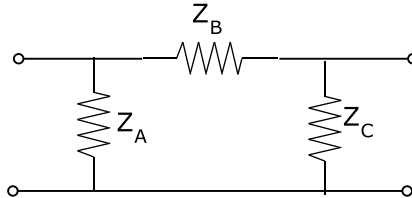DC excitation.

PART D
Answer any twofull questions, each carries 10 marks.

15 a) Find Z parameters of the given two port network. The impedances are $Z_1=5k\Omega$,   (6)
$Z_2=3k\Omega$, $Z_3=12k\Omega$.
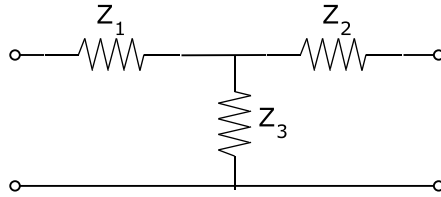
b) Given $Z_{11} = 6\Omega$, $Z_{22} = 4\Omega$, $Z_{12} = Z_{21} = 3\Omega$. Compute ABCD parameters. (4)

16 a) Determine hybrid parameters. Given , $Z_A = Z_B = Z_C = 1k\Omega$ (5)

b) Check whether the polynomial $P(S) = s^4 + s^3 + 2s^2 + 4s + 1$ is Hurwitz. (5)

17 Driving point impedance is given by $Z(s) = \dfrac{s(s^2+4)(s^2+6)}{(s^2+1)(s^2+5)}$ (10)

Obtain first form of Cauer Network.

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