

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.

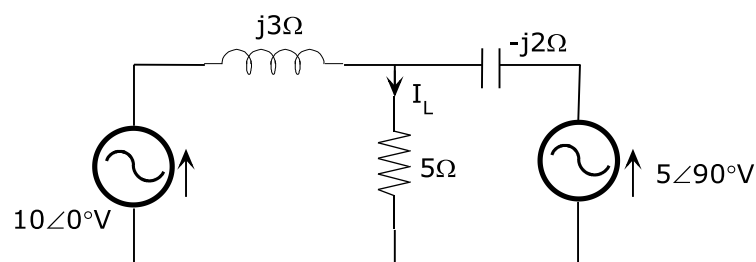
Marks

- | | | |
|---|--|-----|
| 1 | State and explain maximum power transfer theorem as applicable to AC networks with load $Z_L=R_L+jX_L$. | (5) |
| 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 parameters. | (5) |
| 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.

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|---|---|------|
| 9 | Determine the load current I_L by using Norton's theorem. | (10) |
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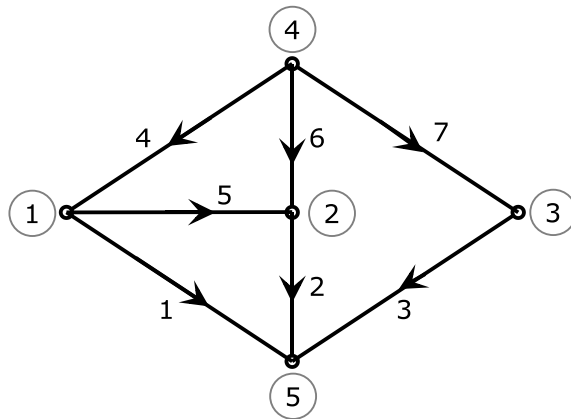


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|----|--|-----|
| 10 | a) State and explain superposition theorem. | (5) |
| | b) A reduced incidence matrix of a graph is given by | (5) |
| | Obtain number of possible trees. | |

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

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

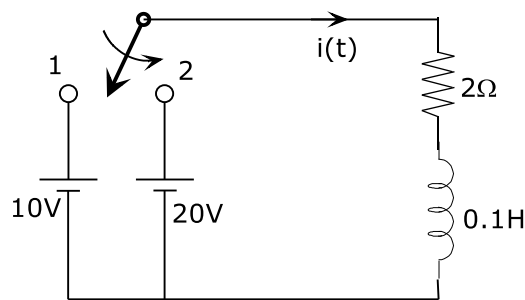
links. Obtain fundamental tie-set and cut-set matrices for the graph.



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 $t=0$. The switch has been in position 1 for a long time to get steady state values. (10)

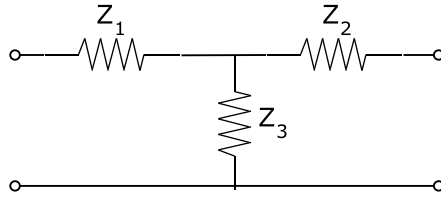


- 13 Derive expression for transient current in a RL series circuit excited with i) DC (10) voltage and ii) AC sinusoidal voltage by applying Laplace transform.
- 14 a) Two inductively coupled coils have self inductances $L_1 = 50 \text{ mH}$ and $L_2 = 200 \text{ mH}$. (5)
- i) Find the value of mutual 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

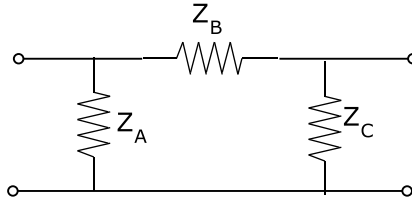
Answer any twofull questions, each carries 10 marks.

- 15 a) Find Z parameters of the given two port network. The impedances are $Z_1=5\text{k}\Omega$, (6) $Z_2=3\text{k}\Omega$, $Z_3=12\text{k}\Omega$.



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 $Z(s) = \frac{s(s^2+4)(s^2+6)}{(s^2+1)(s^2+5)}$ (10)

Obtain first form of Cauer Network.
