CLASS: BTECH   SEMESTER : III
BRANCH: EEE/ECE   SESSION : MO/19

SUBJECT: EE205 CIRCUIT THEORY

TIME: 3.00Hrs.   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   i. Define 1) i-shift 2) f-loop 3) branch incidence 4) twigs   [2+3]
         ii. In the graph shown in figure below solid lines are twigs and dotted lines are links. Construct the fundamental cut set matrix.

Q.1(b)   Draw the graph of the network shown in figure formulate the cutest matrix, write the equilibrium   [5]
         equation in matrix form on node basis when branch 2and 4 are tree branches.
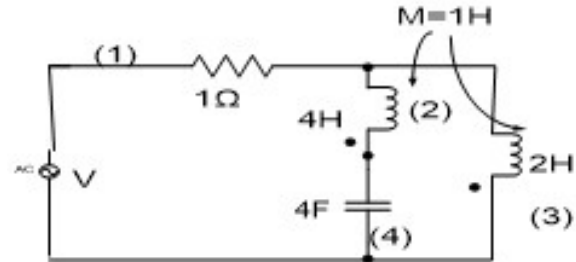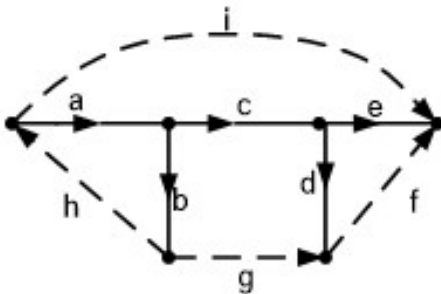
Q.2(a)   i. State and explain Reciprocity theorem.   [2+3]
         ii In the network of figure, verify the substitution theorem by replacing the 6Ω register by a voltage source.
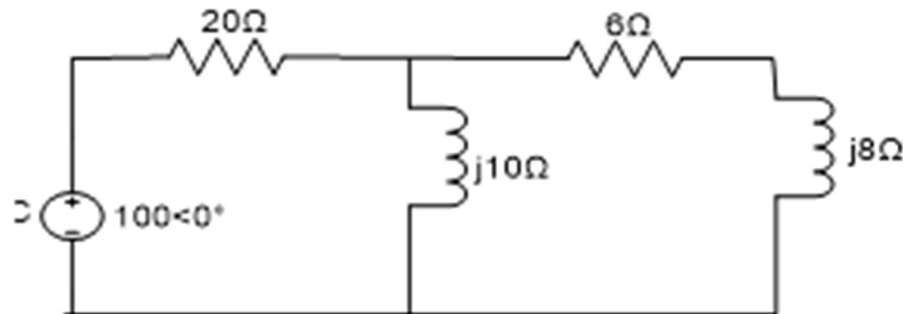
Q.2(b)   i. what is the significance of state space.   [2+3]
   ii. the state variable model for SISO system is given below:

$$\begin{bmatrix} \dot{X_1} \\ \dot{X_2} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -5 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U(t)$$

$$Y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Determine the transfer function of this system.

Q.3(a)   Interrelate the H-type hybride paremeter with ABCD parameter and open crcuit parameter.   [5]

Q.3(b)   Evaluate the open circuit and short circuit parameters of the circuit shown.   [5]
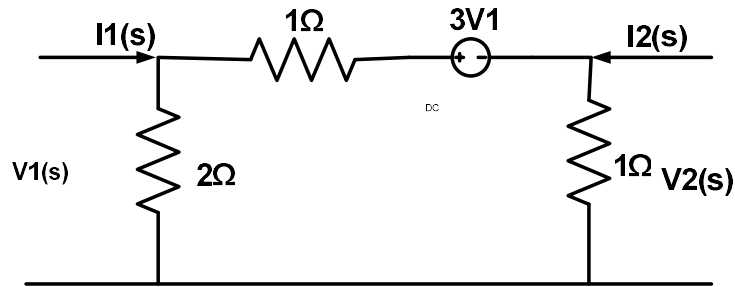
Q.4(a)   What are the properties of R-L impedance function?   [2+3]
          Check whether the given polynomial is Hurwitz or not.

$$P(s) = s^4 + s^3 + 5s^2 + 3s + 4$$

Q.4(b)   Synthesize the network of the given function in the two foster forms of realization: [5]

$$F(s) = \frac{(s+1)(s+5)}{(s+3)(s+7)}$$

Q.5(a)   i. What is maximally flat magnitude function?   [2+3]
          ii. Explain the significance of Butterworth circle for design of Butterworth polynomial.
Q.5(b)   What is Butterworth circle? Design the Butterworth polynomials for the specification for LP filter are: [5]

$$\alpha_p \leq 0.5dB \text{ for } \omega \leq 3MHz$$

$$\alpha_s \geq 30dB \text{ for } \omega \geq 4MHz \ .$$

:::::06/12/2019 M::::