TEE 301

Roll No.

ODD SEMESTER EXAMINATION 2019-20

B. TECH III SEM ECE/EEE (Old Syllabus)

NETWORK ANALYSIS AND SYNTHESIS

Time: 3 HOURS **Total Marks: 100**

Total no. of printed pages: 3

Attempt all the questions. All questions carry equal marks

Q1. Attempt any four parts of the following: **(5*4)**

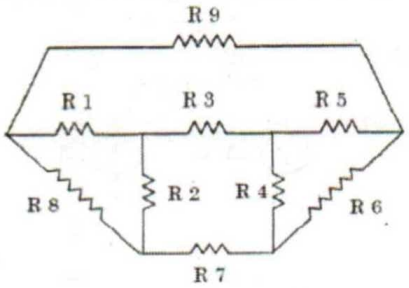
(a) Define the following terms
(i) Branch (ii) Sub graph (iii) Node (iii) Tree

(b) Draw the oriented graph of a network with fundamental cut-set matrix given as below:

Twigs(1,2,3,4) Links(5,6,7)

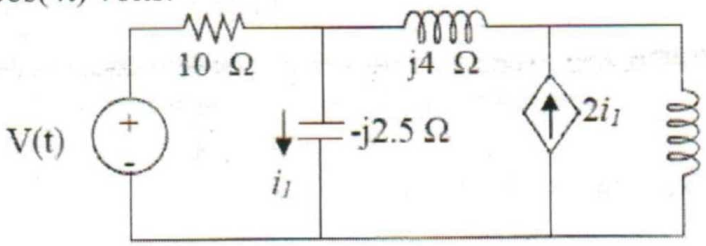
1	2	3	4	5	6	7
1	0	0	0	-1	0	0
0	1	0	0	1	0	1
0	0	1	0	0	1	1
0	0	0	1	0	1	0

(c) For the resistive network shown in Figure, draw a graph, select a tree and obtain tie-set matrix. Write down the KVL equations from the tie-set matrix



(d) Derive the relation between branch voltage matrix, twig voltage matrix and node voltage matrix of a network.

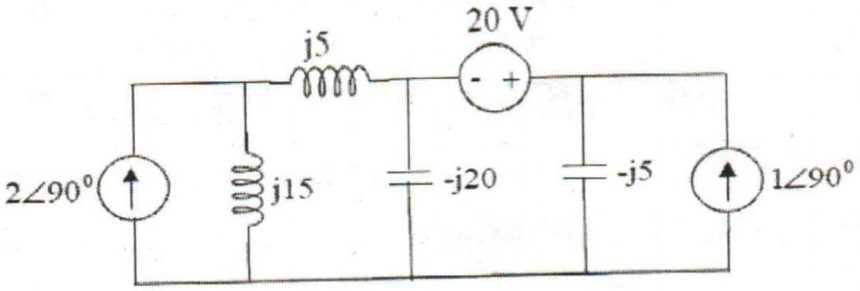
(e) Find i_1 in the circuit shown in the figure, using nodal analysis. Assume the supply voltage V(t)=20 cos(4t) volts.



P.T.O

Q2. Attempt any four parts of the following: **(5*4)**

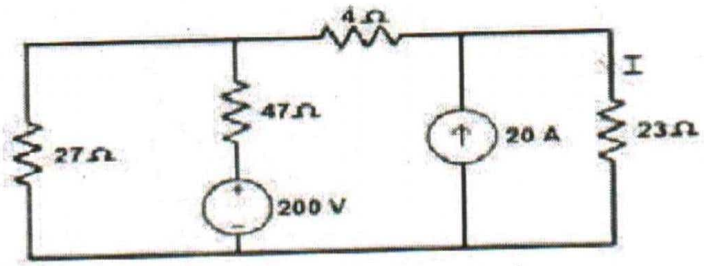
(a) Find the voltage across -j20 Ωcapacitor using superposition theorem in below Figure.



All impedance values are in ohms.

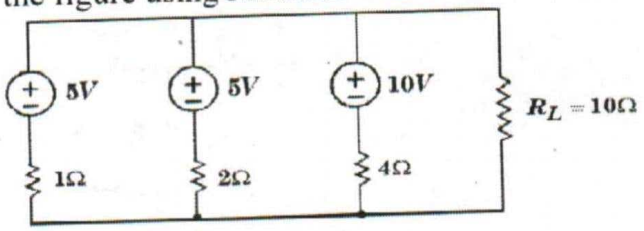
(b) Prove that the power transfer to the load becomes maximum when the load impedance isequal to the complex conjugate of the Thevenin's impedance.

(c) Compute the current in 23 Ωresistor using superposition theorem forthecircuit shown



(d) State and explain Thevenin's theorem with an example.

(e) State and prove Millman's theorem.Also, find the current through RL in the network shown in the figure using Millman's theorem.



Q3. Attempt any two parts of the following: **(10*2)**

(a) Draw the pole-zero diagram for the given network function and hence obtain v(t).

$$V(s) = \frac{4\,(s+2)s}{(s+1)(s+3)}$$

(b) Enlist the properties of driving point function.Also, check the stability criteria of the polynomial by applying the Routh-Hurwitz criterion in

$$P(s) = s^6 + s^5 + 3s^4 + 3s^3 + 3s^2 + 2s + 1$$

(c) Draw the Bode plot for

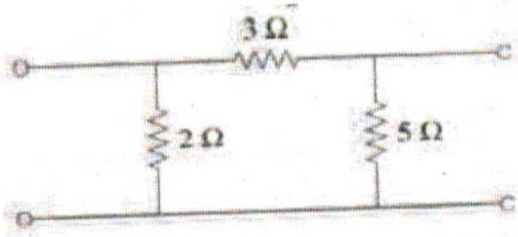
$$G(s) = \frac{20}{s\,(s+2)(s+10)}$$

From the Bode plot also determine i) Phase crossover frequency ii)Gain crossover frequency iii) Gain margin iv) Phase margin v) Stability

P.T.O

Q4. Attempt any two parts of the following: **(10*2)**

(a) Find the Z- parameters for the following circuit. Express ABCD parameters in terms of h parameters.



(b) Find input impedance, output impedance, open-circuit impedance and short circuit impedance in terms of h-parameters and T-parameters.

(c) Explain the property of reciprocity of two-port networks. State the condition of reciprocity in terms of Z,Y and T parameters.

Q5. Attempt any two parts of the following: **(10*2)**

(a) An impedance is given by

$$z(s) = \frac{8(s^2+1)(s^2+3)}{s((s^2+2)(s^2+4))}$$

Realise the network in Foster I, II and Cauer I, II forms.

(b) A function is given by $z(s) = \frac{s^3+5s^2+9s+3)}{s^3+4s^2+7s+9}$

Find the positive realness of the function.

(c) Obtain the expression for resonant frequency, bandwidth and Q-factor for parallel R-L-Ccircuit.
