Registration No:

Total Number of Pages : 2        AR-17        B.TECH

3rd Semester (BACK PAPER) Examination-2019
**BEEPC3020 NETWORK THEORY**
EE/EEE

Time : 3 Hours        Maximum : 100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

**PART – A: (Multiple Choice Questions) 10 x 2=20 Mark**

Q.1. Answer *All* Questions

a     In Superposition theorem, while considering a source, all other voltage sources are?
     a) open circuit      b)short circuited      c) change its position      d) removed from the circuit

b     Superposition theorem states that the response in any element is the _____ of the responses that can be expected to flow if each source acts independently of other sources.
     a) algebraic sum      b)vector sum      c) multiplication      d)subtraction

c     If z-parameters are $z_{11} = 40$, $z_{22} = 50$ and $z_{12} = z_{21} = 20$, what would be the value of $y_{22}$
     a. 4 / 160      b. 5 / 160      c. 10 / 160      d. 15 / 150

d     Which is the correct condition of symmetry observed in z-parameters?
     a. $z_{11} = z_{22}$      b. $z_{11} = z_{12}$      c. $z_{12} = z_{22}$      d. $z_{12} = z_{21}$

e     An open circuit reverse voltage gain in h-parameters is a unit less quantity and generally equivalent to _____
     a. $V_1 / I_1$ (keeping $V_2 = 0$)      b. $I_2 / I_1$ (keeping $V_2 = 0$)
     c. $V_1 / V_2$ (keeping $I_1 = 0$)      d. $I_2 / V_2$ (keeping $I_1 = 0$)

f     In a certain parallel resonant band-pass filter, the resonant frequency is 14 kHz. If the bandwidth is 4 kHz, the lower frequency is
     a)7 kHz      b) 10 kHz      c)12 kHz      d) cannot be determined

g     In a series resonant band-pass filter, a lower value of *Q* results in
     a) a hgher resonant frequency      b) a smaller bandwidth
     c) a higher impedance      d) a larger bandwidth

h     If there are 5 branches and 4 nodes in graph, then the number of mesh equations that can be formed are?
     a) 2      b) 4      c) 6      d) 8

i     The dual pair of capacitance is?
     a) capacitance      b) resistance
     c) current source      d) inductance

j     How many fundamental cutsets will be generated for a graph with 'n' number of nodes?
     a. n+1      b. n-1      c. $n^2(n-1)$      d. n/ n-1

**PART – B: (Short Answer Questions) 10X2=20 Marks**

**Q.2. Answer *ALL* questions**

a     Which theorem obeys laws of conservation of energy?

b     Under what condition Norton theorem is applicable.

c     State and explain Thevenin's theorem.

d     Distinguish between steady state and transient response.

e     What is the significance of time constant of R-L circuit?

f     A system has input unit step and transfer function $T(s) = \frac{1}{s^2+3s+5}$. Find output of the system at steady state

g     What are critical frequencies ? Why they are so called ?

h     In a given RL type high pass filter R = 3 KΩ and fc= 2000 KHz. Find out the value of L.

i     Mention the properties of RC driving point impedance.

j     List three properties of positive real function

**PART – C: (Long Answer Questions) 4X15=60 Marks**

**Answer _ALL_ questions**

**Q.3**

a    Write short note any Compensation theorem.                                                                    7
b    Write short note any Tellegen's theorem.                                                                     8

OR

c    State & explain Superposition Theorem.                                                                       7
d    Define Thevenin's theorem with example.                                                                      8

**Q.4**

a    A network function is given as

$$I(s) = \frac{2s}{(s+1)(s+2)}$$

   7

   Obtain the time-domain response from the pole- zero plot.

b    Describe the Time domain behavior from Pole-Zero                                                              8

OR

c    What information do poles and zeros provide in respect of network to which they relate?                       7
d    Explain different restriction on location of poles and zeros for a driving point function.                   8

**Q.5**

a    Design a low pass filter as π- and T-networks having a cutoff frequency fc =1000Hz to operate with a
     terminated load resistance of 200Ω. Also find the frequency at which this filter offers attenuation of       7
     19.1 dB.

b    Design a constant K-type HPF filter (both T & π) having nominal impedance of 700Ω and cut-off               8
     frequency of 6000Hz. Also determine the characteristic impedance, attenuation constant and Phase
     shift at 4000Hz & 10000Hz.

OR

c    Design a constant K band pass filter with cutoff frequencies 3kHz and 7.5kHz and nominal
     characteristic impedance of 900Ω.                                                                            7

d    Design a constant K band stop filter with cutoff frequencies 3kHz and 7.5kHz and nominal                     8
     characteristic impedance of 900Ω.

**Q.6**

a    For the network shown in fig., determine incidence matrix. Also find number of
     trees possible for the network.



   7
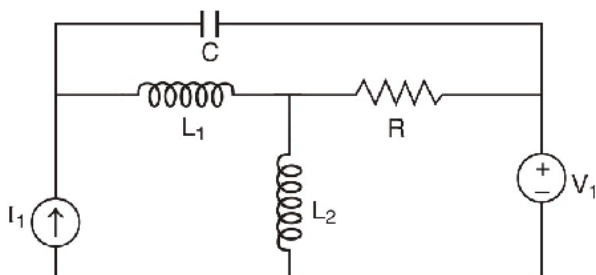
b    Write short answer on Cut set and Tie Set Matrix.                                                            8

OR

c    Check whether the polynomial is Positive Real

$$F(s) = \frac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$$

   7

d    Using Foster Form II, synthesis the function.                                                                8

$$Y(s) = \frac{(s^2 + 5)(s^2 + 13)}{s(s^2 + 9)}$$

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