GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

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Registration No: | | | | | | | | | | |

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

3rd Semester (BACK PAPER) Examination-2019

BELPC3020 NETWORK THEORY

Common to AEIE/ECE

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 19.1 dB. 7

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

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 characteristic impedance of 900Ω. 8

Q.6

a s+2)(s2 + 4s+ 6)(s2+ 3s+ 2) is Hurwitz or not. 7

b Find the canonical forms (Foster - I and Foster - II) of the following transfer function. 8

$$z(s) = \frac{(s+3)(s+6)}{(s+1)(s+5)}$$

OR

c Synthesize the function Z(s) using the Cauer Form I of realization

$$z(s) = \frac{4(s+1)(s+3)}{s(s+2)}$$ 9

d What are the properties of LC impedance or admittance function? 6

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