GIET MAIN CAMPUS AUTONOMOUS,
GUNUPUR - 765022

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

Total Number of Pages :3

B.TECH. DEGREE EXAMINATION-Nov-Dec.2018
End Semester Examination-III Semester
BEEPC3020/BELPC3020- Network Theory
(Regulations 2018)(Common to AEIE, ECE, EE and EEE Branches)

Time : 3 Hours Maximum : 100 Marks Question Code:31312

Answer ALL Questions

PART-A (10 X 2=20 Marks)

1 . a. Which among the following represents the precise condition of reciprocity for transmission parameters? [CO1][PO1]
i. AB - CD = 1 ii AD – BC = 1 iii. AC – BD = 1 iv. None of the above

b. If the value of resonant frequency is 50 kHz in a series RLC circuit along with the bandwidth of about 1 kHz, then what would be the value of quality factor? [CO1][PO2]
i .5 ii. 50 iii. 100 iv. 500

c. Which among the following is also regarded as 'Dual of Thevenin's Theorem'? [CO2][PO1]
i Norton's Theorem ii Superposition Theorem iii Miliman's Theorem iv Maximum power transfer Theorem

d. When a network function is expressed as a ratio of Laplace transforms of output to input variables of a system, then it is regarded as _____ [CO2][PO1]
i.System function, ii. Transfer function, iii. Both (i) and (ii), iv. None of the above

e. Transfer admittance function is the ratio of Laplace transforms of _____ [CO2][PO1]
i. Current at one port to voltage at other port ii. Voltage at one port to current at other port iii. Current at one port to current at other port iv.Voltage at one point to voltage at other port

f. Which is the correct condition of symmetry observed in z-parameters? [CO3][PO1]
i.$z_{11} = z_{22}$ ii. $z_{11} = z_{12}$ iii $z_{12} = z_{22}$ iv $z_{12} = z_{21}$

g. Which among the following condition is true at the resonance? [CO3][PO1]
i. $X_C > X_L$ ii. $X_C = X_L$ iii. $X_C < X_L$ iv. None of the above

h. Which elements behave as an open circuit especially under the consideration of d.c. quantities? [CO4][PO1]
i. Inductors ii. Resistors iii. Capacitors iv. All of the above

i. How does the 'σ' of complex frequency variable appear in time domain? [CO4][PO1]
i. As a linear power ii. As a reactive power iii As an exponential power iv.As an iterative power

j. Which law plays a significant role in the loop analysis of the network? [CO1][PO1]
i. KCL ii. KVL iii. Laws of superposition Theorem iv.None of the above

PART-B (10 X 2=20 Marks)

2. a. State Compensation theorem. [CO1][PO1]

b. Test the function F(S)= $\frac{s+4}{s^2+2s+5}$ for positive realness. [CO1][PO2]

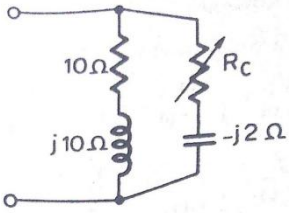
c. Define coefficient of coupling? What are their possible maximum & minimum values? [CO2][PO1]

d. Find the average power in a resistance R=5 Ω if the current is i=20sinωt+10sin3ωt+5sin5ωt amperes. [CO2][PO2]

e. What do you mean by the term "s" used in Laplace transform? [CO2][PO1]

f. For a low-pass L-C filter, if the value of L is doubled, the characteristic impedance and the cut-off frequency will be changed to------- and ---------times the original value respectively. [CO3][PO1]

g. Calculate the value of R_C in the circuit shown in figure to yield resonance. [CO3][PO2]



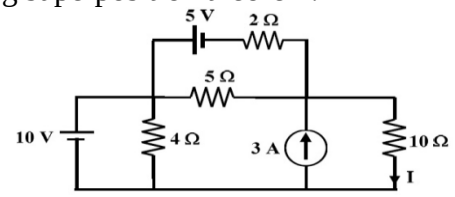
h. Find the Fourier transform of the signal f(t)=sin (ω_0t).

i. Find the initial and final value of the function f(t) whose Laplace transform is given by F(S) = (3S+2) / (S^4+6S^3+10S^2+S). [CO4][PO2] [CO4][PO2]

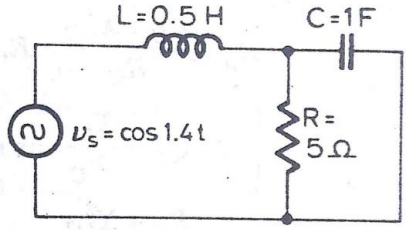
j. Define twigs, links and chords. How they are related? Explain with examples. [CO4][PO1]

PART-C (4 X 15=60 Marks)

3a (i) Find the current I using superposition theorem. [8][CO1][PO2]



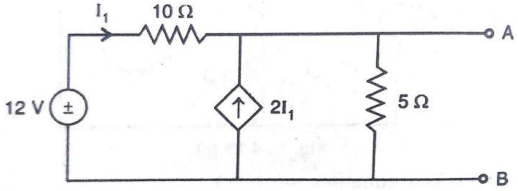
(ii)Show that the given circuit is resonant at supply frequency. [7][CO1][PO2]



(or)

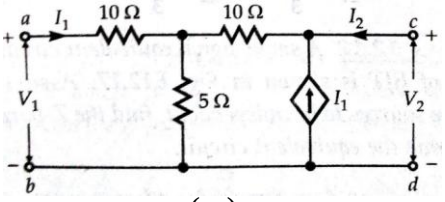
b.(i)State & explain Reciprocity theorem with examples. What are the limitations of this theorem? [8][CO1][PO1]

(ii)Obtain Norton's equivalent circuit across A-B for the circuit as shown in figure. [7][CO1][PO3]



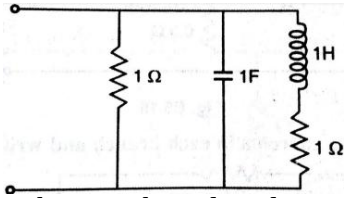
4 a (i)Define symmetry and reciprocity in two port network. Find the condition of symmetry and reciprocity in terms of ABCD parameters. [8][CO2][PO1]

(ii)Find the Z parameters for the circuit shown in figure. [7][CO2][PO2]



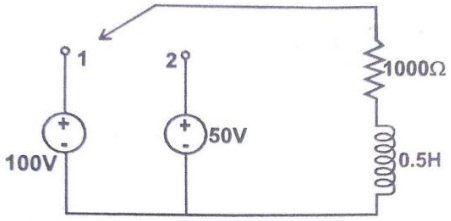
(or)

b.(i)Determine the driving point impedance of the network shown in figure. Plot pole-zero diagram of driving point admittance. [7][CO2][PO2]



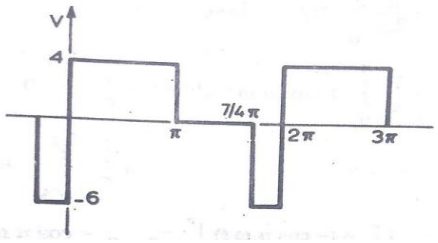
(ii)In the circuit shown in figure the switch is closed on position 1 at t=0 and then t=t$'$=50 [8][CO2][PO2]

msec is moved to position 2. Find the transient current for $0<t<t'$ and $t>t'$.



5.a.(i) A high pass filter section is constructed from two capacitors 1μF each and a 15mH inductance. Find (a) cut off frequency, (b) infinite frequency characteristic impedance, (c) characteristic impedance at 200Hz, (d) attenuation at 200Hz and 2000 Hz, and (e) Phase shift constant at 200Hz and 2000 Hz. [8][CO3][PO1]

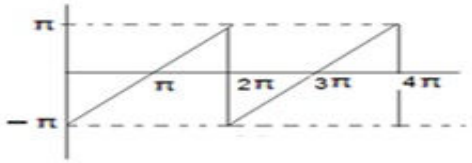
(ii)Determine the Fourier series of the wave shown in figure. [7][CO3][PO2]



(or)

b. (i)Design a prototype band stop filter section having cut-off frequencies of 2000 Hz and 5000Hz and design resistance of 600 Ω. [7][CO3][PO2]

(ii)Find the trigonometric Fourier series representation of the wave shown below. [8][CO3][PO2]

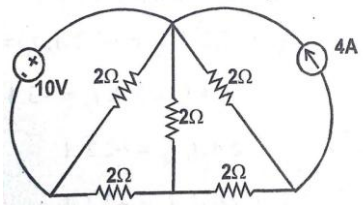


6. a.(i)Realize the function [7][CO4][PO2]

$$Z(s) = \frac{s(s^2+4)}{2(s^2+1)(s^2+9)}$$

In both the cauer forms.

(ii)Draw the graph of the network, find the tie-set schedule and determine loop currents. [8][CO4][PO3]



(or)

b. (i)Which of the following function is R-L driving point impedance? Why? Synthesize the realizable impedance in Foster's-1 form. [8][CO4][PO2]

(i) $F_1(s) = \dfrac{(s+1)(s+8)}{(s+2)(s+4)}$ (ii) $F_2(s) = \dfrac{(s+2)(s+4)}{(s+3)(s+5)}$

(ii)Find the range of K such that the polynomial $P(s)$ given below is Hurwitz. [7][CO4][PO2]

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

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