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

Total Number of Pages : 03 **B.Tech**
PET3I102

3rd Semester Regular / Back Examination 2018-19
NETWORK THEORY
BRANCH : ECE, ETC
Time : 3 Hours
Max Marks : 100
Q.CODE : E730

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

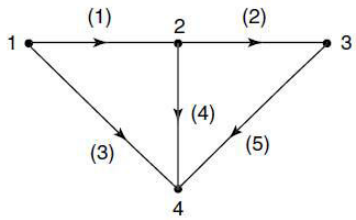
Q1 **Short Answer Type Questions (Answer All-10)** **(2 x 10)**

a) What is the difference between series and parallel resonance?

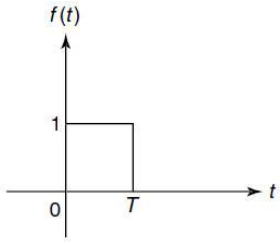
b) State the Dot convention in coupled circuit? Give an example.

c) What are the Dirichlet's conditions.

d) Figure shows a graph of the network. Show all the trees of this graph.



e) Find the Laplace transform of a rectangular pulse shown in Figure.



f) State and explain Tellegen's theorem.

g) A coil is at resonance at 10kHz with a capacitor. If the resistance of the coil are 200 Ω and 5 H, find the Q factor of the coil.

h) Why source transformation is required in network analysis ?

i) What do you understand by steadt state and transient response of the system?

j) A complex wave of 240 V rms value has 20% third harmonic content, 5% fifth harmonic content and 2% seventh harmonic content. Find the rms value of the fundamental and each harmonic.

Part- II

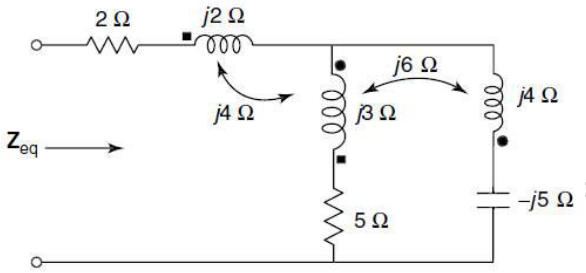
Q2 **Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Using the pole-zero plot, find magnitude and phase of the function at $s = j4$

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

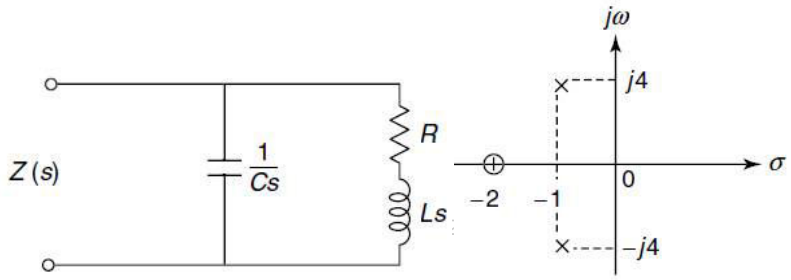
b) The selectivity is inversely proportional to its bandwidth of RLC series circuit. Prove it.

c) Find equivalent impedance of the network shown in Figure.



d) Write down the properties and necessary and sufficient conditions of positive real function.

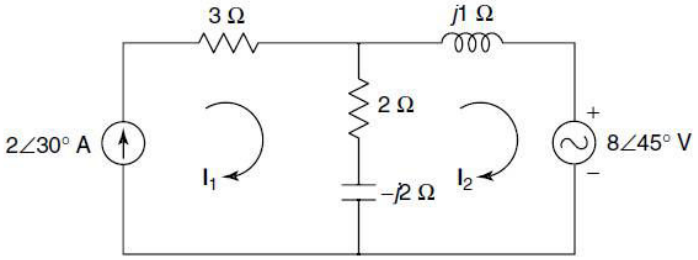
e) The pole-zero diagram of the driving-point impedance function of the network of figure is shown below. At dc, the input impedance is resistive and equal to 2 ohm. Determine the values of R, L and C.



f) When two coils are connected in series, the total inductance is measured to be 18mH. When the connections to one coil are reversed, the total series inductance is 28mH.Find the mutual inductance.

g) Define the singular functions. Why the singular function is so important in system?

h) Find the voltage across the 2 ohm resistor in the network using superposition theorem.



i) Design a m-derived T and π-section low pass filters for nominal characteristics impedance R_0 =600 ohm, cut-off frequency=1800 Hz and infinity attenuation frequency f_∞=2KHz.

j) Check whether the given polynomial P(s) is Hurwitz or not.

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

k) What are the conditions for reciprocity and symmetry for h and Y parameter?

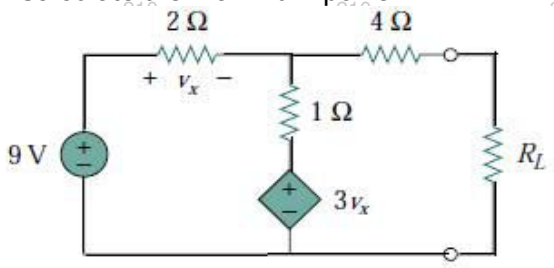
l) Find the resonant frequency for parallel R,L,C circuit and show the condition on which a resonant parallel frequency will be the series resonant frequency.

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

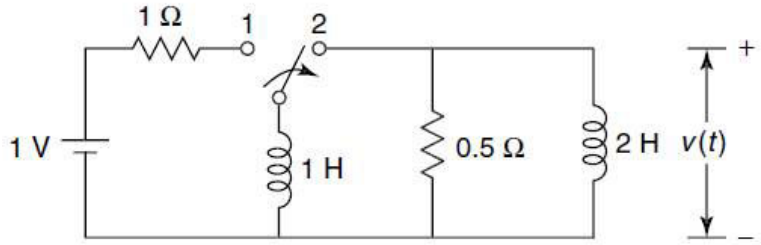
Q3 State and explain the maximum power transfer theorem. **(16)**

Determine the value of R_L that will draw the maximum power from the rest of the circuit in the following figure. Calculate the maximum power.

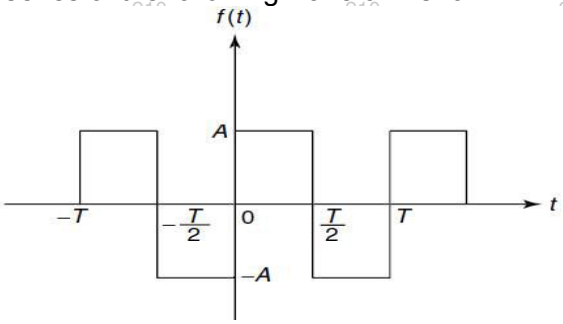


Q4 What are the initial and final value theorems? Is the initial value theorem applicable everywhere? Define convolution integral. What is application of convolution integral? **(16)**

In the network shown in Figure, the switch is in the position 1 for a long time and at t = 0, the switch is moved to the position 2. Find v (t) for t > 0.



Q5 Define the Signum function. Draw the magnitude and phase spectrum of it. Find the trigonometric Fourier series of the following waveform shown in Figure. **(16)**



Q6 What do understand by network sysnthesis? Realize the Foster I and Cauer II forms of the following impedance function **(16)**

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