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

Total Number of Pages: 03 **B.Tech.**
PEE3I101

3rd Semester Regular / Back Examination 2017-18
NETWORK THEORY
BRANCH: ELECTRICAL
Time: 3 Hours
Max Marks: 100
Q.CODE: B871

Answer Question No.1 and 2 which are compulsory and any four from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions: *multiple type or dash fill up type*** **(2 x 10)**

a) A practical current source can also be represented as
a) a resistance in parallel with an ideal voltage source
b) a resistance in parallel with an ideal current source
c) a resistance in series with an ideal current source
d) none of the mentioned

b) 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

c) If a resistor R_x is connected between nodes X and Y, R_y between X and Y, R_z between Y and Z to form a delta connection, then after transformation to star, the resistor at node X is?
a) $R_xR_y/(R_x+R_y+R_z)$
b) $R_xR_z/(R_x+R_y+R_z)$
c) $R_zR_y/(R_x+R_y+R_z)$
d) $(R_x+R_y)/(R_x+R_y+R_z)$

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

e) Reciprocity Theorem is used to find the change in _____ when the resistance is changed in the circuit.
a) Voltage
b) Voltage or current
c) Current
d) Power

f) The expression of power (P_1) at lower half power frequency is?
a) $(I^2_{max}R)/8$
b) $(I^2_{max}R)/4$
c) $(I^2_{max}R)/2$
d) $I^2_{max}R$

g) The real part of the complex frequency is called?
a) radian frequency
b) neper frequency
c) sampling frequency
d) angular frequency

h) The transform admittance of the inductor is?
a) 1/sL
b) sL
c) 1/L
d) L

i) The denominator polynomial in a transfer function may not have any missing

terms between the highest and the lowest degree, unless?
a) all odd terms are missing
b) all even terms are missing
c) all even or odd terms are missing
d) all even and odd terms are missing

j) The real parts of the driving point function Z (s) and Y (s) are?
a) positive and zero
b) positive
c) zero
d) positive or zero

Q2 **Answer the following questions: *Short answer type*** **(2 x 10)**

a) A parallel RLC circuit has R=20KΩ, L=10mH and C=1μF. Compute its resonant frequency and *Q*.

b) Give a general schematic of a ladder network. Why it is called so?

c) Express the output impedance of a two port network in terms of ABCD parameter.

d) The impulse response of a circuit is $h(t)=\frac{3}{L}e^{-\frac{R}{L}t}u(t)$. Find its step response.

e) Derive the Q factor of anti-resonant circuit.

f) If $Z(s)=0$ for $\sigma=0$ .condition satisfies for Foster second form of RL network. Then L_0 is present or absent? Explain.

g) What is the Laplace Transform of a unit step function occurring at *t = a?*

h) Describe the condition for reciprocity and symmetry of *h*- parameter

i) Describe the steps of Norton's Theorem? With neat diagram

j) Find the magnitude of the frequency when the drop across the capacitor in series RLC circuit is maximum.

Q3 **a)** Define node and junction of an electric circuit.Using Nodal method analysis, find the current flowing in each branch of the following network as shown in Fig. 1. All resistances are in ohms. **(10)**

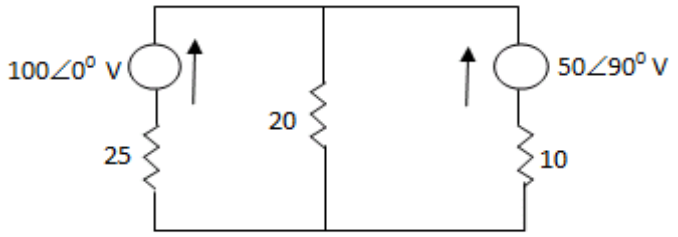

Fig. 1

b) Show the relationship between Bandwidth, Quality Factor and resonance frequency. **(5)**

Q4 **a)** Obtain Y- and h- parameter, if the other parameters are given below **(10)**
A=2, B= -1, C=3, and D= -2.

b) Obtain Transmission Line parameter for the network as shown in Fig. 2. **(5)**

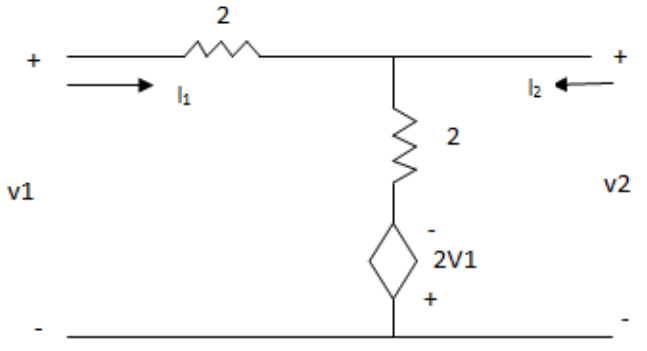

Fig. 2

Q5 **a)** What do you mean by Fourier Transform and Fourierseries? Determine the Fourier Series for the SAW-TOOTH function. As shown in Fig 3. **(10)**

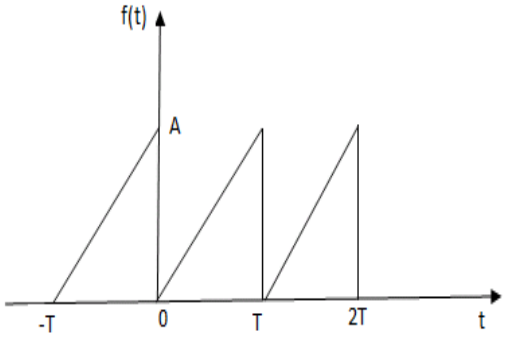

Fig 3

b) A network function I(s) = $\frac{2s}{(s+1)(s+2)}$ is given. Obtain the time-domain response from the pole- zero plot. **(5)**

Q6 **a)** What do you mean by dynamic impedance of a parallel resonance circuit? Calculate the value of R_C in the circuit as shown in Fig 4. to yield resonance. **(10)**

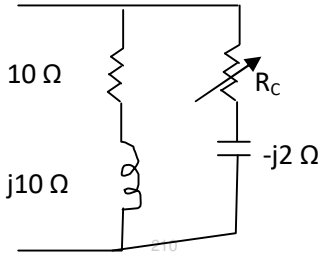

Fig 4

b) $(s+2)(s^2+4s+6)(s^2+3s+2)$ is Hurwitz or not. **(5)**

Q7 **a)** Find the all canonical forms of the following transfer function. **(10)**

$$z(s) = \frac{s^2+5s+4}{s^2+2s}$$

b) Find the canonical forms (Foster - I and Foster - II) of the following transfer function. **(5)**

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

Q8 **a)** Check whether $F(s) = \frac{2s^2+2s+1}{s^3+2s^2+s+2}$ the polynomial is Positive Real. **(10)**

b) Describe T and π Network with proper example. **(5)**

Q9 **a)** A series RLC circuit consists of R=20KΩ, L=10mH and C= 1 μF. **(10)**
Calculate frequency of resonance.
A variable frequency sinusoidal voltage of constant RMS value of 50V is applied to the circuit. Find the frequency at which the voltage across L and C is maximum.
Calculate the voltage across L and C is maximum.
Also calculate the voltage across L and C at frequency of Resonance.
Find maximum current in the circuit.

b) Describe the Time domain behavior from Pole-Zero **(5)**