Code No: 114AC **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, May - 2016
NETWORK THEORY
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) What is the significance of phase sequence? [2]
b) What is balanced supply and balanced load? [3]
c) Define time constant of R-L circuit excited d.c source. [2]
d) Explain the behavior of a capacitor for sudden changes in voltages. [3]
e) Define transform impedance. [2]
f) What are the functions of one port networks? [3]
g) Define short circuit reverse transfer admittance. [2]
h) What is meant by transformed variable? Give an example. [3]
i) What are the properties of line spectra? [2]
j) What are the properties of Fourier transforms? [3]

PART - B

(50 Marks)

2.a) What is the relationship between phase and neutral line currents in a three phase unbalanced system.
b) Explain how to measure reactive power in a three phase balanced system.
c) A three phase three wire system has a balanced star connected load with a 60Ω resistance in each phase. The circuit is supplied with a balanced supply of 150V, 50 Hz. Determine the line current. [3+3+4]

OR

3.a) Explain the measurement of power in a 3-phase circuit using two wattmeter method.
b) A delta connected load with phase impedances $(2j),(-6j)$ *and* (2) are fed by a three phase star connected supply 120 V. Determine the line current. [5+5]

4.a) Draw the time response of inductor current in a series RL circuit excited by DC supply.

b) What is the condition for the response of a series RLC circuit excited by DC supply to have critically damped response?

c) Derive the expression for the current in a series RL circuit (R = 10Ω, L = 10 mH) excited by a sinusoidal voltage of 100V, 50 Hz if the supply is connected at t = 0. Assume zero initial conditions. [2+3+5]

OR

5.a) What is damping ratio?

b) Derive the time constant for a parallel RC circuit excited by DC supply.

c) Derive the expression for the voltage across the capacitor in a series RLC circuit (R = 5Ω, L = 5 mH, C = 5μF) excited by a sinusoidal voltage of 100V, 50 Hz if the supply is connected at t = 0. Assume zero initial conditions. [3+2+5]

6.a) What is a two port network?

b) Comment on the time domain response of a second order system if the poles are complex conjugate having positive real parts.

c) What are the necessary conditions for driving point functions? Explain. [2+3+5]

OR

7.a) Define driving point impedance.

b) Comment on the time domain response of a second order system if the poles are equal negative real values.

c) What are the properties of transfer function? Explain. [2+3+5]

8.a) Define open circuit reverse voltage gain.

b) Derive the condition for a two port network to be symmetrical in terms of ABCD parameters.

c) For the network shown in the figure 1, determine hybrid parameters and using these parameters calculate admittance parameters. [2+3+5]

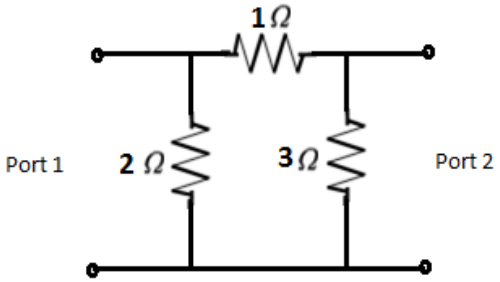

Figure: 1

OR

9.a) Define short circuit input impedance.

b) Derive the condition for a two port network to be reciprocal in terms of admittance parameters.

c) For the network shown in the figure 2, determine ABCD parameters and using these parameters calculate impedance parameters. [2+3+5]

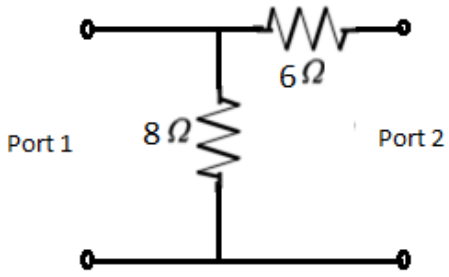

Figure: 2

10.a) What is the main property of low pass filter?

b) Find F(jω) for the following function $f(t) = e^{-9(t-4)}$.

c) Calculate the coefficients in the Fourier series expansion of the following function

$f(t) = 10\cos(5t + 30^0) + 5\sin(10t + 60^0)$. [2+3+5]

OR

11.a) What is the function of a band elimination filter?

b) Calculate the coefficients in the Fourier series expansion of the following function $f(t) = 10\cos(5t + 30^0)$.

c) Find f(t) at t = 10 if $F(j\omega) = 3u(\omega + 3) - 3u(\omega - 3)$. [2+3+5]

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