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Code No: 114AC

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 ($R = 10\Omega$, $L = 10$ 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 ($R = 5\Omega$, $L = 5$ mH, $C = 5\mu\text{F}$) 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]

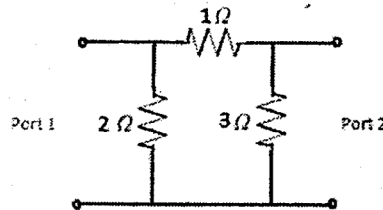


Figure: 1

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]

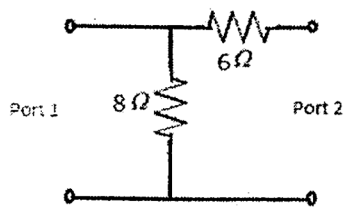


Figure: 2

- 10.a) What is the main property of low pass filter?
 b) Find $F(j\omega)$ for the following function $f(t) = e^{9(t-4)}$.
 c) Calculate the coefficients in the Fourier series expansion of the following function

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

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 $f(t) = 10\cos(5t + 30^\circ)$.
 c) Find $f(t)$ at $t = 10$ if $F(j\omega) = 3u(\omega + 3) - 3u(\omega - 3)$. [2+3+5]

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