

R18

Code No: 153AP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, December - 2019

ELECTRICAL CIRCUIT ANALYSIS  
(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 as sub questions.

PART - A

(25 Marks)

- 1.a) Give the statement of Thevenin's theorem. [2]
- b) What is forced response? [2]
- c) What is the admittance of parallel RC circuit? [2]
- d) What is a magnitude plot? [2]
- e) What are the admittance parameters? [2]
- f) What are the dual elements for R, L and C? [3]
- g) What are the reasons for transient response in a system? [3]
- h) Define RMS value. What is its significance? [3]
- i) What is convolution integral? What is its significance? [3]
- j) What is a symmetrical network? What is the condition? [3]

PART - B

(50 Marks)

- 2.a) With an example, Explain superposition theorem in detail.
- b) Using Nodal analysis, find V and I in the circuit shown in figure 1.

[5+5]

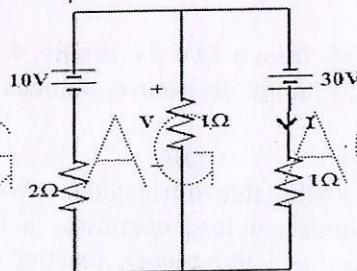


Figure: 1  
OR

- 3.a) With an example, Explain reciprocity theorem in detail.
- b) The thevenin equivalent of the network shown in Figure 2 is 10V in series with a resistance of 2 Ω. If now, resistance of 5 Ω is connected across AB, find the thevenin equivalent of the modified network across AB.

[5+5]

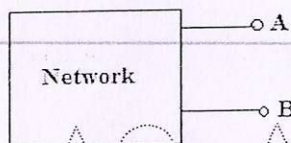


Figure: 2



- 4.a) Derive the expression for the complete response for the voltage across resistor in series RC circuit excited by DC supply.
- b) Consider the circuit shown in figure 3, the switch moves from position a to b at  $t=0$ . Determine the expression for  $i(t)$ ,  $t > 0$ . [5+5]

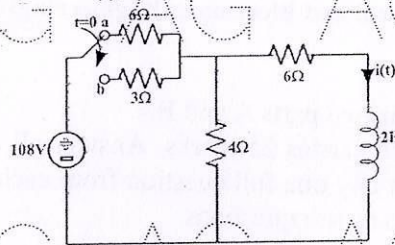


Figure:3  
OR

- 5.a) Derive the expression for the complete response for the voltage across inductor in series RL circuit excited by sinusoidal supply
- b) In the circuit shown in figure 4, the switch S is opened at  $t=0$ . Prior to that, switch was closed. Derive the current  $i(t)$  for  $t > 0$  [5+5]

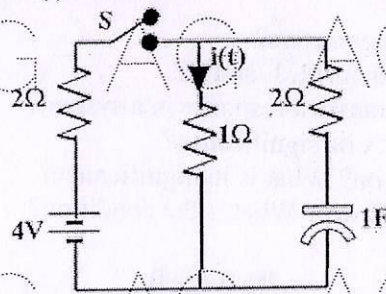


Figure:4

- 6.a) Derive the relationship between phase and line voltages in three phase star connected balanced system.
- b) A coil takes a current of 3A from a 12V d.c supply, when connected to a 240V, 50Hz supply the current is 20A. Find the resistance, inductance and impedance of the coil at 50 Hz. [5+5]
- OR
- 7.a) Derive the expression for RMS value of triangular waveform whose peak value is 'A'.
- b) Each phase of a delta-connected load comprises a resistance of  $30\Omega$  and a  $30\mu\text{F}$  capacitor in series. Determine active power, reactive power and apparent power that will be consumed by the load when connected across a 415V, 50Hz, 3 phase supply. [5+5]



- 8.a) Explain the properties of Laplace transforms in detail.  
 b) Find the resonant frequency for the circuit shown in figure 5 and also find the current at that frequency. [5+5]

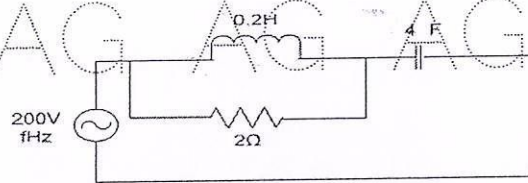


Figure: 5

OR

- 9.a) Draw the circuit diagram of series RLC circuit. Derive the condition for resonance.  
 b) Consider the circuit shown in figure 6, if  $i(0) = 2A$  then find the expression for  $v_0(t)$  for  $t > 0$  using laplace transforms. [5+5]

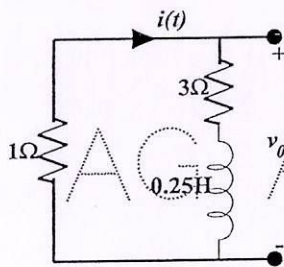


Figure: 6

- 10.a) Explain the procedure of finding impedance parameters of a two port network with an example.  
 b) Two identical circuits of the form shown in figure 7 are cascaded. Determine the transmission parameters of the combination. [5+5]

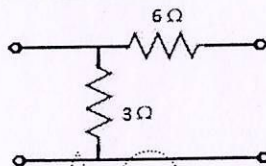


Figure: 7

OR

- 11.a) Explain the procedure of finding hybrid parameters of a two port network with an example.  
 b) For the circuit shown in figure 8, find the admittance parameters. [5+5]

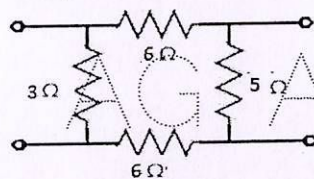


Figure: 8