Department Of Electrical Engineering
National Institute Of Technology Srinagar

Exam	Semester	Course Title	Subject Code	Max Marks	Time	Date
Major	B.Tech (3rd)	Basic Electrical Engineering	ELE-307	60	3 hours	24-11-18

Course Objectives:

CO1 : To analyse and evaluate the electrical circuits, apply basic laws in circuit theory and to determine electric circuit parameters.

CO2 : Power and energy relations, analysis of series parallel D.C. Circuits and network theorem along with applications.

CO3 : Analysis of A.C circuits, network theorems in A.C circuits and understanding the concept of active and reactive power, resonance.

CO4 : To study the characteristics of 3 phase systems, Current and voltage relations in star/delta configuration's, Balanced / un-balanced systems.

CO5 : To study the basic operation of transformer and laws of electromagnetic induction

Note: Attempt any 4 questions

Q1: a) Find the current 'i' in Fig 1 **(CO1) (7)**

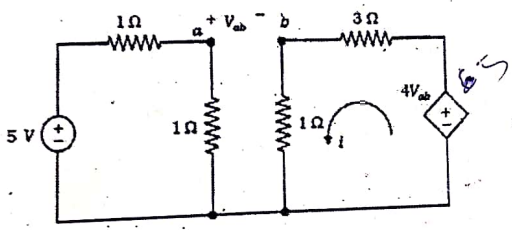

Fig 1

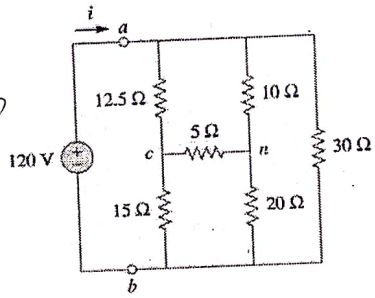

Fig 2

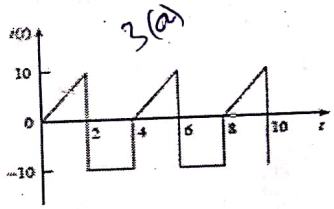

Fig 3

b) Obtain the equivalent resistance R_{ab} for the circuit in Fig 2 and use it to find the current i. **(CO2) (8)**

Q2: a) In Fig 4, Find the Thevenin's equivalent Circuit with respect to terminals a and b. **(CO2) (8)**

b) Find the value of maximum power that can be transferred across R_L using Maximum Power Transfer Theorem for Fig 5 **(CO3) (7)**

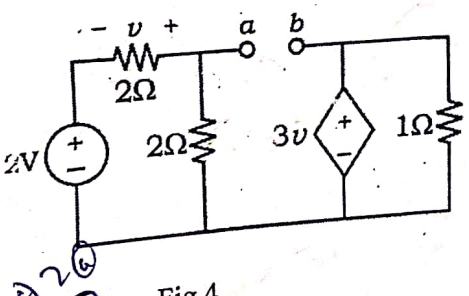

Fig 4

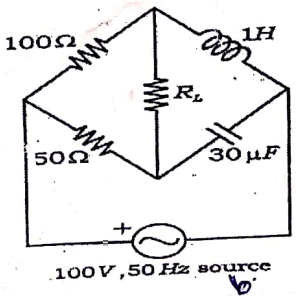

Fig 5

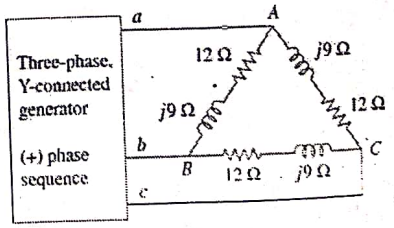

Fig 6

Q3: a) Find the average and effective values of the current waveform of Figure 3. If the current is passed through a 2-Ω resistor, find the power absorbed by the resistor **(CO2) (7)**

b) Calculate all the phase and line currents in the Fig 6, if Van = 220 Cos (wt + 60) **(CO4) (8)**

Q4: a) If a series RLC circuit is excited by a voltage source of 10 Sinωt, given R = 8KΩ, L = 0.2mH, C = 8μF, find

(1) Resonant frequency (ω_r),
(2) Quality factor (Q),
(3) Bandwidth (B.W) **(CO3) (6)**

b) For a series RLC circuit excited by an ac voltage source, draw the following characteristics showing inductive and capacitive regions. **(CO3) (9)**

(1) Z vs w (2) I vs w (3) power factor angle vs w (4) X vs w

(CO5) (9)

Q5: a) Explain (briefly) following with respect to Magnetic Circuits

1) Self Inductance
2) Mutual Inductance
3) Coefficient of mutual coupling **(CO5) (6)**

b) Explain the basic principle of operation of a transformer.