Total number of printed pages:4

UG/3rd/UIE301

2021

NETWORK THEORY

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions*

1. a) Write the difference between the following: 2X5=10

   i) Electric Circuit and Electric Network

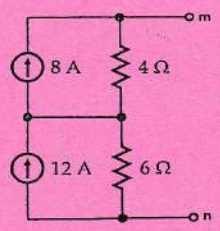
   ii) Active Element and Passive Element

   iii) Bilateral and Unilateral Element

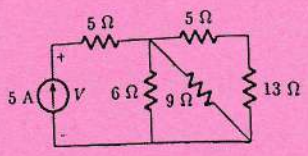
   iv) Lumped Network and Distributed Network

   v) Continuous System and Discrete System

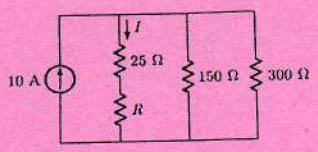
   b) Convert the following circuit into a single voltage source. 5



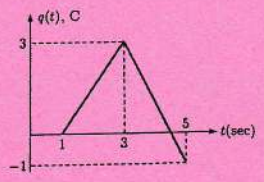
   c) Find the voltage V across the current source for the figure shown below 2



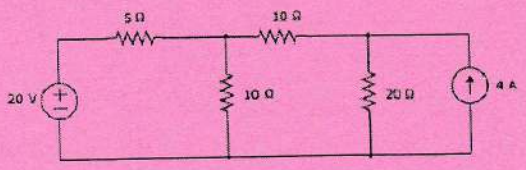
d) Find the value R for the given circuit for which I=5A 3



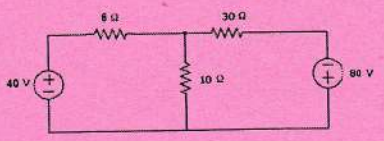
2. a) The charge flowing in a circuit element is plotted in the following figure. Find and plot the current i(t) 5



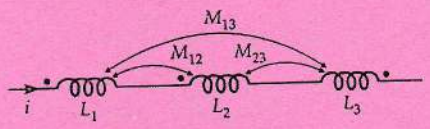
b) Using nodal analysis find the power dissipation at 20 Ω resistor of the following circuit 8



c) Find the voltage across 30 Ω resistor using mesh analysis 7



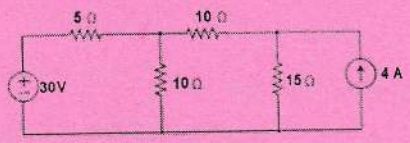
3. a) Find the total inductance of the three series connected coupled coils as shown in following figure. L1=1H,L2=2H,L3=5H,M12=0.5H,M13=1H and M23=1H 5



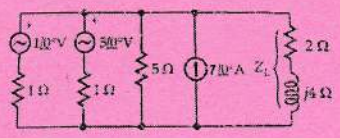
b) Derive the relation between coupling of coefficient (K) and mutual inductance (M) for magnetically coupled circuit. 5

c) Derive the expression for frequency at which the voltage across the capacitor is maximum in series resonant circuit. 10

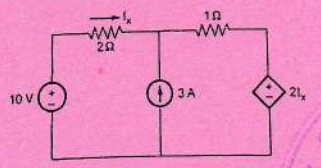
4. a) Explain superposition theorem. Find the current flowing through 15 Ω resistor of the following circuit using superposition theorem. 3+7=10



b) State Millman's theorem. Using Millman's theorem find the current in the load Z_L 3+7=10



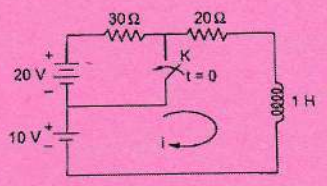
5. a) Find current Ix by Thevenin's theorem 10



b) State maximum power transfer theorem theorem for a passive network connected to an active network consisting of current and voltage sources and linear bilateral passive elements. Also find the efficiency of maximum power transfer. 10

6. a) Explain transient response of driven series R-L circuit. 10

b) The network shown in figure reaches a steady state with switch K closed. At t=0, the switch is opened find i(t) for t>0. 10



7. a) Write the procedures for drawing dual network. 5

b) Explain Series connection of two port network. 5

c) Give advantages of three phase system. 3

d) Establish a relationship between line and phase voltages and currents in a Star connection. 7