

Code No: 153AP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, September - 2021

**ELECTRICAL CIRCUIT ANALYSIS**

(Electrical and Electronics Engineering)

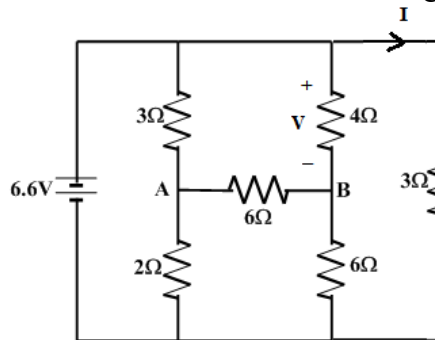
Time: 3 hours

Max. Marks: 75

**Answer any five questions**  
**All questions carry equal marks**

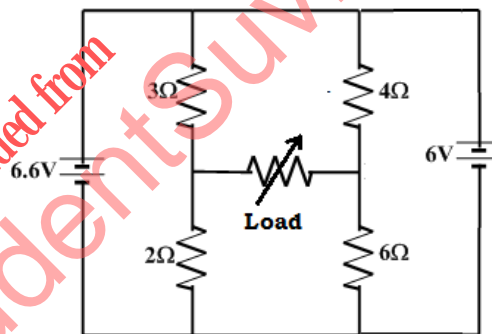
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- 1.a) State and explain reciprocity theorem in detail.  
 b) Using Mesh analysis, find V and I in the circuit below figure 1. [6+9]



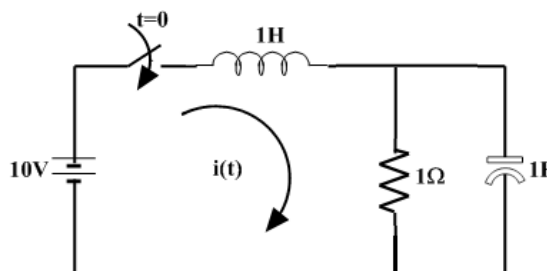
**Figure: 1**

- 2.a) State and Explain Thevenin's theorem in detail.  
 b) Find the maximum power transferred to load resistance  $R_L$  in the circuit below figure 2. [6+9]



**Figure: 2**

- 3.a) Derive the expression for the complete response for the voltage across resistor in parallel RL circuit excited by DC supply at  $t = 0$ .  
 b) In the circuit below figure 3, find  $i(0^+)$ ,  $\frac{d i(0^+)}{dt}$  and  $\frac{d^2(i(0^+))}{dt^2}$  [8+7]



**Figure: 3**

- 4.a) Derive the expression for the complete response for the current in a series RC circuit excited by sinusoidal supply by closing the switch at  $t = 0^+$ .
- b) For the circuit given below figure 4,  $V_0 = 10V$  and the inductor is initially relaxed. The switch S is closed at  $t=0$ . Derive the expression for 'i'. [7+8]

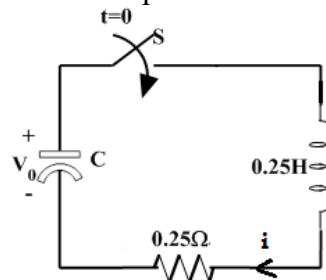


Figure: 4

- 5.a) Prove that the line current is  $\sqrt{3}$  times the phase current in three phase delta connected balanced system
- b) A resistance of  $10 \Omega$  is connected in parallel with a  $2 \mu F$  capacitor and the network is connected to a  $120V, 60Hz$  supply. Determine the current and power in resistor and capacitor. [8+7]
- 6.a) Derive the expression for average power in a linear circuit (R-L) excited by sinusoidal voltage source.
- b) Three  $10 \Omega$  resistors are connected in delta across a  $150V, 50Hz, 3-\phi$  supply. Find the line current. Determine the value of resistance that must be connected in star in order to take the same line current. [8+7]
- 7.a) Derive the expressions for current and impedance in series RLC circuit at resonance.
- b) What are the basic properties of Laplace transforms? Explain. [8+7]
- 8.a) Derive the relationship between hybrid and transmission parameters.
- b) For the circuit below figure 5, determine impedance parameters. [6+9]

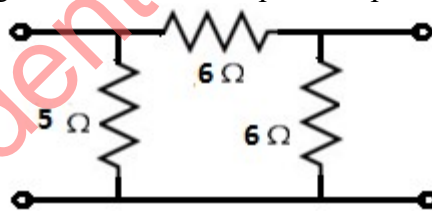


Figure: 5

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