JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- MAY-2023

COURSE CODE(CREDITS): 18B11EC211 (4) MAX. MARKS: 25

COURSE NAME: Electrical Science

COURSE INSTRUCTORS: EMP, SRU, PRG, SWT MAX. TIME: 1 Hour 30 Minutes

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. (a) Define mesh, loop and path in electrical circuit analysis. Are the branches shown with heavy lines in **Fig.1** below making a mesh, loop or path? Provide explanation for your answer. [CO2, 2M]

(b) What is supermesh concept and procedure to solve a supermesh circuit? For the given supermesh circuit in **Fig.2** below, determine three mesh currents $\mathbf{i}_1$, $\mathbf{i}_2$, and $\mathbf{i}_3$. [CO2, 4M]

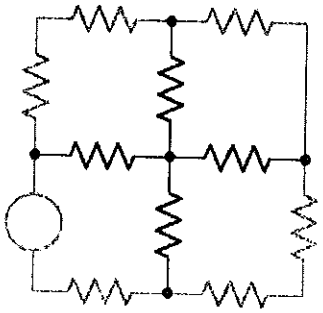


Fig. 1

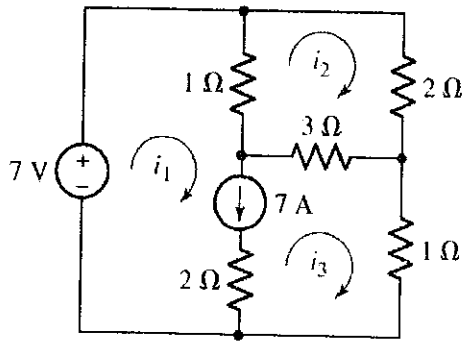


Fig. 2

Q2.(a) Define superposition theorem. Give two examples each of linear elements and nonlinear elements. [CO3, 2M]

(b) Find v in **Fig.3** below using superposition theorem. [CO3, 4M]

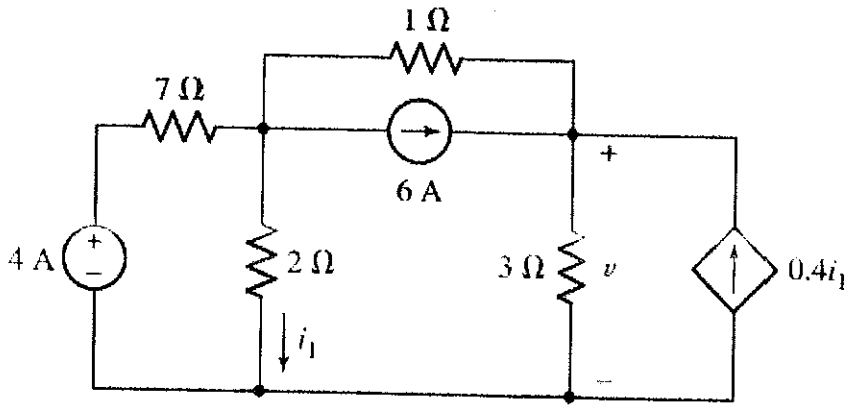
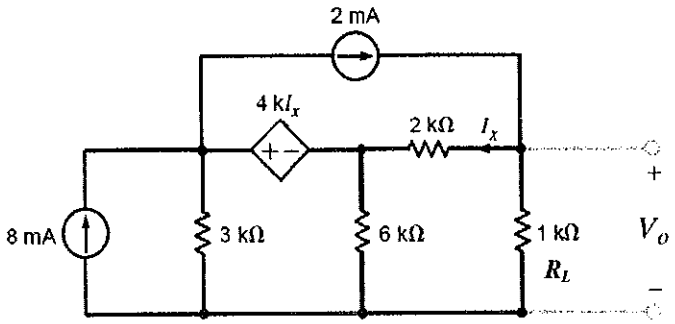


Fig. 3

P.T.O

Q3.(a) In **Fig.4**, Consider 1KΩ as the load resistance i.e., R_L =1 kΩ. Then Find V_o, the voltage drop across 1kΩ resistor by first finding the Thevenin equivalent circuit. [CO3, 4M]

(b) In **Fig.5**, Find R_L for maximum power transfer and the maximum power transferred to R_L in the circuit given below. [CO3, 3M]



.Fig. 4

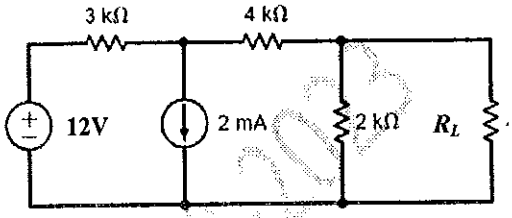


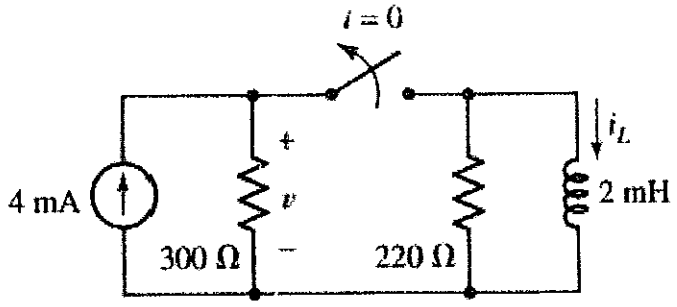
Fig. 5

Q4.(a) Prove that energy stored in the inductor is. [CO3, 2M]

$$w_L(t) = \tfrac{1}{2}.\, L.i^2$$

(b) With the assumption that the switch in the given circuit has been closed a long, long, long time, calculate $i_L(t)$ at (i) the instant just before the switch opens; (ii) **t=78.8 µs.** [CO3, 2M]

Fig. 6



(c) The voltage across the capacitor of **12µF** is shown in the given figure. Draw the wave form for the current in the capacitor. [CO3, 2M]

Fig. 7