JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION - 2023

B.Tech-II Semester (CSE/IT/ECE/CE)

COURSE CODE(CREDITS): 18B11EC211 (4) MAX. MARKS: 35

COURSE NAME: Electrical Sciences

COURSE INSTRUCTORS: EMP, SRU, NTJ, SWT, ALK MAX. TIME: 2 Hours

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Note: ***(a)****All questions are compulsory.*

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

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Q1. (a) Determine $\mathbf{i_1}$ in the circuit of **Fig.1**, if the controlling quantity is equal to $\mathbf{2i_2}$. **[CO1, 2M]**

(b) Select a value for $\mathbf{R_L}$ in **Fig. 2** such that it is ensured to absorb maximum power from the circuit. **[CO1, 4M]**

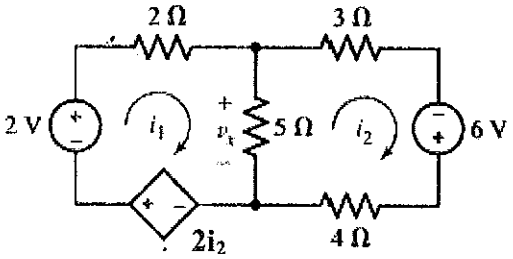

Fig. 1

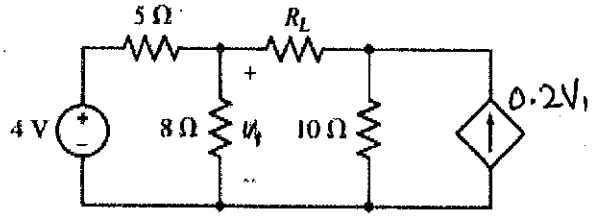

Fig. 2

Q2. (a) For the circuit in **Fig.3**, find the values of $\mathbf{v_c(0^-)}$, $\mathbf{v_c(0^+)}$, $\mathbf{i_L(0^-)}$ and $\mathbf{i_L(0^+)}$. **[CO2, 2M]**

(b) Determine **i(t)** for all values of time in the circuit of **Fig.4.** **[CO2, 4M]**

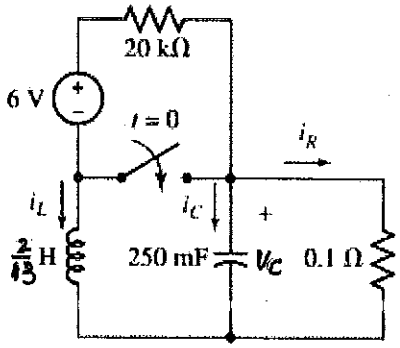

Fig. 3

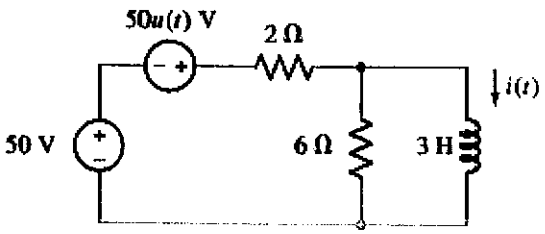

Fig. 4

[P. T. O]

Q3. (a) Find the average power supplied by each source in **Fig.5**. **[CO3, 3M]**

(b) In **Fig.6**, draw the phasor diagram showing $\mathbf{V_1}$ and $\mathbf{V_2}$, if $\mathbf{V_S} = 1\ \angle 0°$ **[CO3, 3M]**

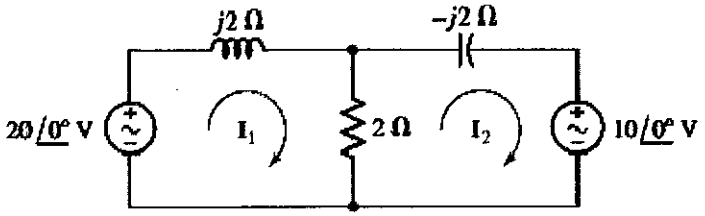

Fig. 5

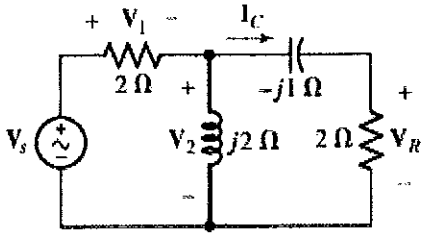

Fig. 6

Q4. (a) Determine average and rms value of the waveform depicted in **Fig. 7.** **[CO4, 3M]**

(b) Find the complex power delivered by the source of circuit in **Fig. 8.** **[CO4, 3M]**

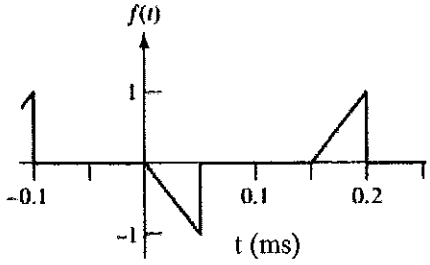

Fig. 7

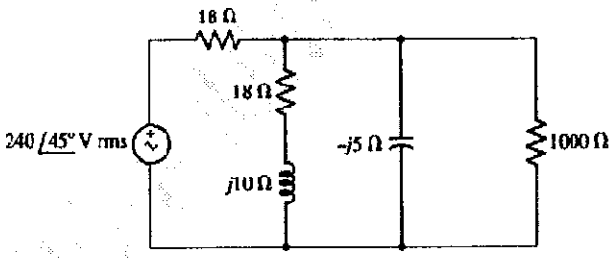

Fig. 8

Q5. (a) Write loop equations for $\mathbf{I_1}$ and $\mathbf{I_2}$. Given mutual reactance M = j750Ω, self reactances, L_1= j2kΩ, L_2 = j1.8kΩ as shown in the **Fig. 9.** **[CO5, 3M]**

(b) Let N_1 = 1000 turns and N_2 = 5000 turns in the ideal transformer shown in **Fig.10**. If $\mathbf{Z_L}$=500−j400Ω, find the average power delivered to $\mathbf{Z_L}$ for $\mathbf{V_s}$= 200 ∠0°V rms. **[CO5, 3M]**

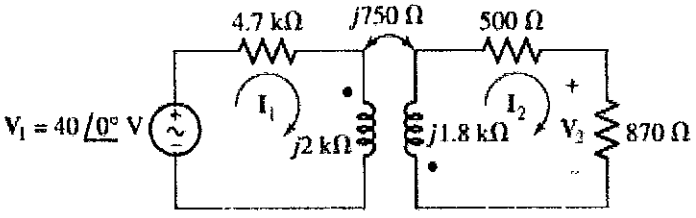

Fig. 9

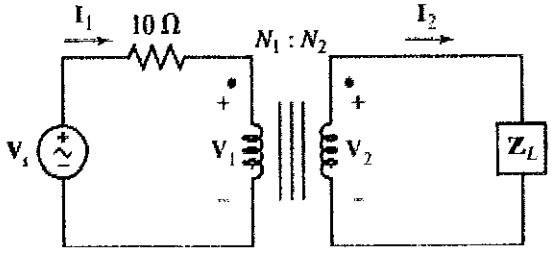

Fig. 10

Q6. Write short notes on the following: **[CO1, 5M]**

(a) Norton's Theorem.
(b) Super node in circuit analysis.
(c) Time constant in transient analysis.
(d) Power factor in AC circuits.
(e) Impedance in AC circuits.