

B.E./B.TECH. Degree Examination, December 2020

Second Semester

EE16201- Circuit Theory

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

- If the current through a 10-mH inductor increases from zero to 2 A, how much energy is stored in the inductor?
(a) 40 mJ (b) 20 mJ (c) 10 mJ (d) 5 mJ
- For the circuit shown in Fig. 2 find the Thevenin voltage at terminals *a-b* is:

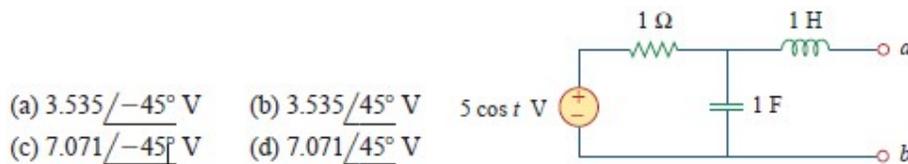


Fig.2

- The coefficient of coupling for two coils having $L_1 = 2 \text{ H}$, $L_2 = 8 \text{ H}$, $M = 3 \text{ H}$ is:
(a) 0.1875 (b) 0.75 (c) 1.333 (d) 5.333
- An RL circuit has $R = 2 \Omega$ and $L = 4 \text{ H}$. The time needed for the inductor current to reach 40 percent of its steady-state value is
(a) 0.5 s (b) 1 s (c) 2 s (d) 4 s
- A bulb is rated for 230 W at 230V. Find the rated current and resistance of the filament.
- A load is connected to a network. At the terminals to which the load is connected $R_{TH} = 20 \Omega$, and $V_{TH} = 40\text{V}$. Calculate the maximum possible power supplied to the load.
- Derive the resonant frequency for parallel RLC circuit.
- Discuss the equivalent circuit of a two-port network expressed in terms of h parameter characterization

PART B - (4 X16 = 64 marks)

09. (a) (i) Find the equivalent resistance of the circuit shown in Fig 9 (a) (i). (8)

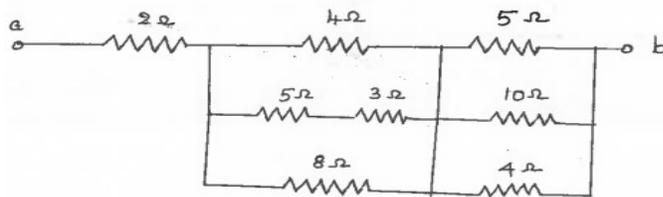


Fig 9. (a) (i)

- (ii) Find the total impedance and current I in the circuit shown in Fig 9. (a) (ii). (8)

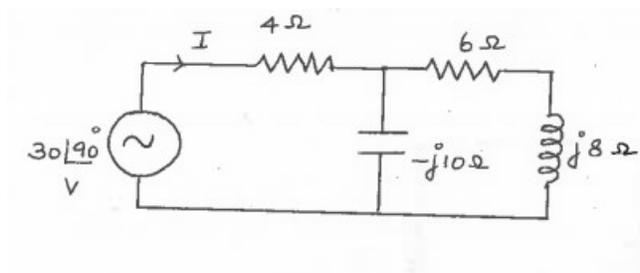


Fig 9. (a) (ii)

(OR)

- (b) Analyze using mesh analysis to find the currents I_1 and I_2 in the circuit shown in Fig 9. (b) (16)

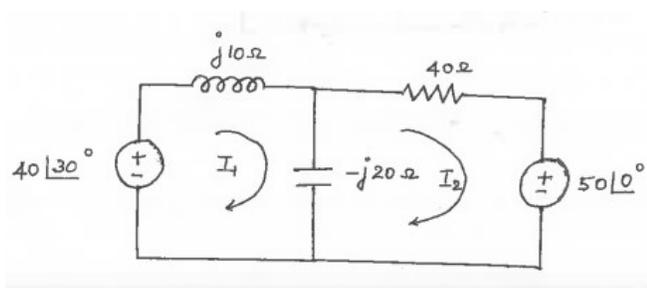


Fig 9. (b)

10. (a) Find the Norton equivalent circuit of the Fig 10. (a) at terminals $a-b$. (16)

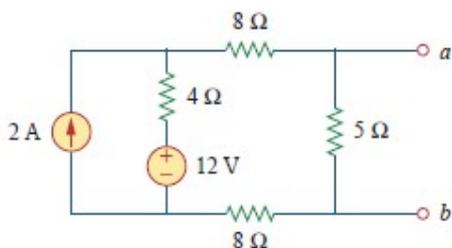


Fig 10. (a)

(OR)

- (b) The variable resistor R shown in Fig 10.(b) is adjusted until it absorbs the maximum power from the circuit. (16)

- (a) Calculate the value of R for maximum power.
 (b) Determine the maximum power absorbed by R .

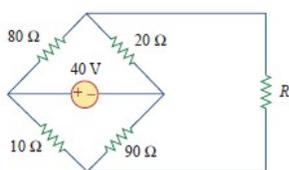


Fig 10. (b)

11. (a) Derive the expression for quality factor and bandwidth of a series RL & C resonant circuit. Also derive half power frequencies. (16)

(OR)

- (b) Calculate the mesh currents in the circuit of Fig 11.(b) (16)

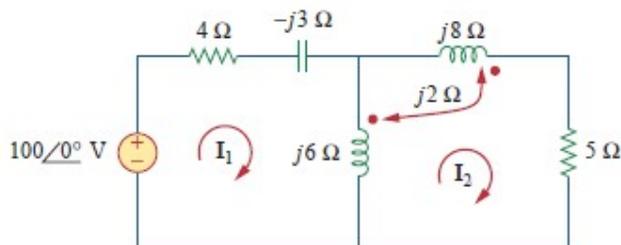


Fig 11. (b)

12. (a) A balanced 4 wire star connected source has a line voltage of 400V. It is connected to a star connected load whose impedances are $4+8j$, $4+3j$ and $15+20j$. Calculate the line currents, current in the neutral wire, phase voltages and total real, reactive and apparent power in the circuit. Take the phase sequence as RYB. (16)

(OR)

- (b) Discuss that two watt meters are sufficient to measure power in a balanced or unbalanced 3Φ load connected to a balanced supply. (16)