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MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL
(A Constituent Institute of MAHE, Deemed University)

THIRD SEMESTER B.E. DEGREE MAKE-UP EXAMINATION
(REVISED CREDIT SYSTEM)

05 January 2007

ELECTRICAL CIRCUITS (ELE 201)

Time: 3 hours

Max. Marks: 50

Note: Answer any **FIVE** full questions.

- Q1A. In the network shown in Fig Q.No 1A, the switch is closed at $t=0$. Assuming zero initial conditions, find
- i. v_1 and v_2 at $t = 0+$ and at $t=\infty$
 - ii. dv_1/dt and dv_2/dt at $t= 0+$.
- 05-
- Q1B. For the circuit shown in Fig. Q.No.1B, construct a tree in which V_1 and V_2 are the tree branch voltages. Determine V_1 using cut set analysis.
- 05-
- Q2A. A communication system from a space station uses short pulses to control a robot operating in space. The transmitter circuit is modeled as in Fig. Q.No. 2A. Find the output voltage $v_c(t)$ for $t>0$. Assume steady state condition at $t=0^-$.
- 06-
- Q2B. Find the branch currents i_0 through i_4 for the circuit shown in Fig. Q.No. 2B. using mesh current analysis
- 04-
- Q3A. Deduce the expressions for half power frequencies of a series RLC circuit. Also, show that the resonant frequency is the geometric mean of half power frequencies.
- 05-
- Q3B. For the locus diagram shown in Fig.Q No. 3B, draw the circuit configuration showing the element values. Also, find the value of R at unity power factor.
- 05-
- Q4A. For the circuit shown in Fig. Q. No.4A, find the voltage across the 4Ω reactance using superposition theorem. Assume $X_M = 2 \Omega$.
- 07-
- Q4B. Using admittance method, show that the circuit shown in fig.Q 4B, will not resonate for any value of X_L . Also, draw the locus diagram.
- 03-

Q5A. For the circuit shown in Fig Q.No.5A, determine the current flowing in the $5\ \Omega$ resistor using Norton's theorem. -06-

Q5B. For the circuit shown in Fig.Q.No.5B, determine θ such that max power is transferred to the $10\ \Omega$ resistor. -04-

Q6A. A 3ϕ , 3 wire, RYB sequence supply system supplies power to a star connected load consisting of $Z_R = 10\angle 0^\circ\ \Omega$, $Z_Y = 15\angle 30^\circ\ \Omega$ and $Z_B = 10\angle -30^\circ\ \Omega$. If $V_{BC} = 208\angle 0^\circ\ \text{V}$, determine the line currents and the total power consumed using the mesh current method. Also draw the phasor diagram representing all the quantities. -05-

Q6B. For the circuit shown in Fig.Q.No.6B, determine the readings of the two wattmeters assuming an RYB phase sequence. -05-

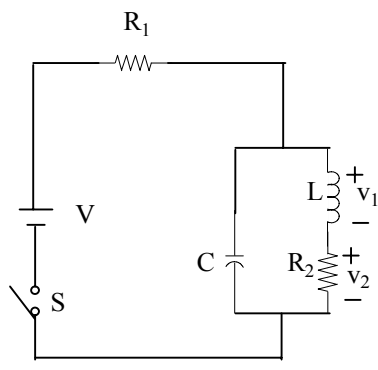


Fig. Q.No.1A

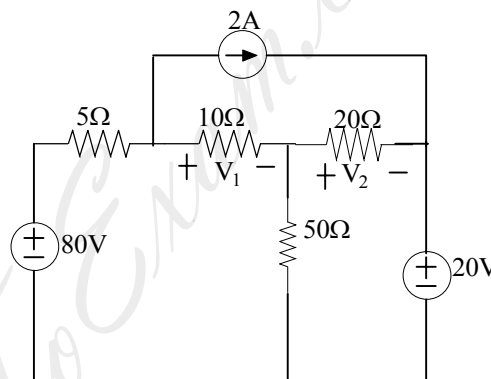


Fig. Q.No.1B

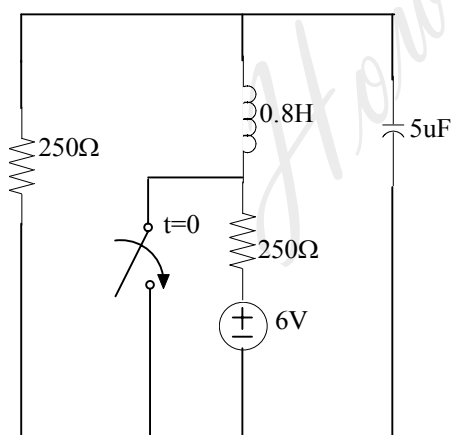


Fig.Q.No.2A

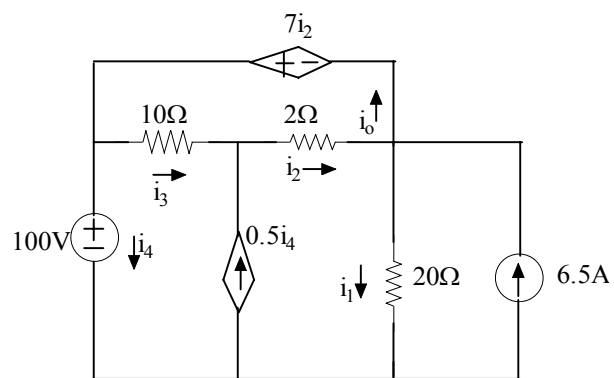


Fig. Q.No.2B

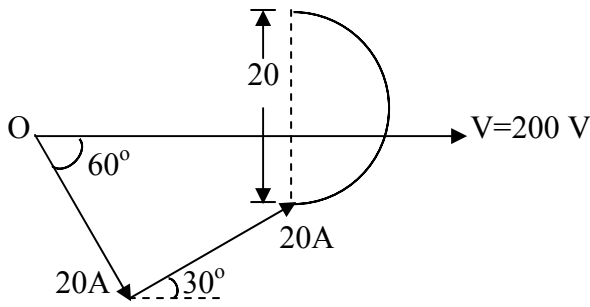


Fig. Q3(B)

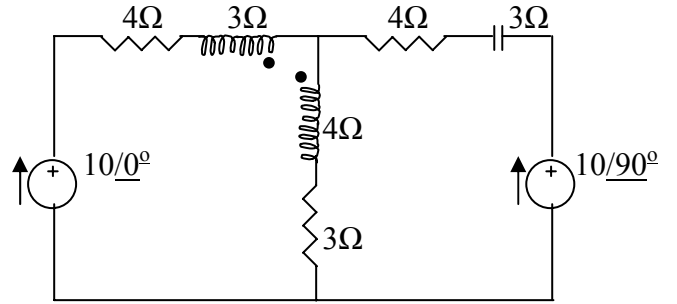


Fig. Q4(A)

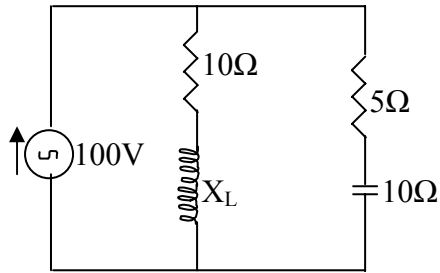


Fig. Q4(B)

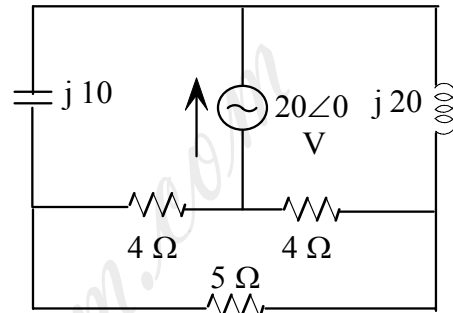


Fig. Q. No.5A

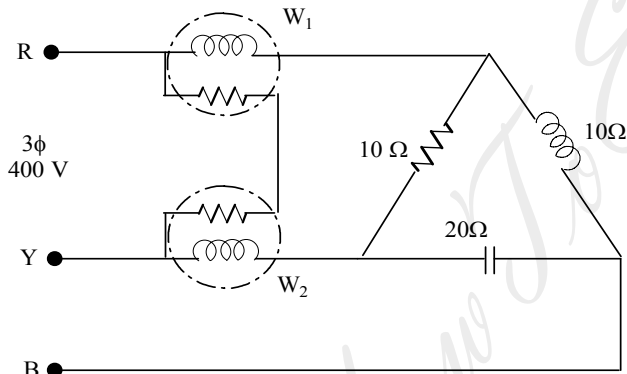


Fig. Q.No.6B

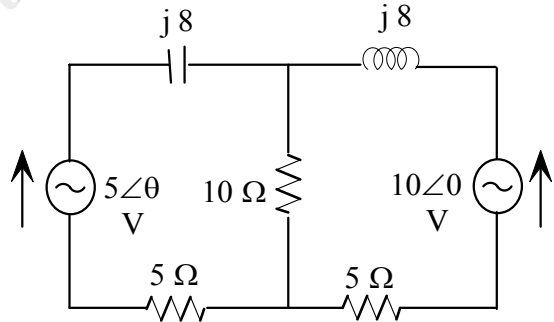


Fig. Q. No.5B