Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

III SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS NOVEMBER 2017

SUBJECT: NETWORK ANALYSIS (BME 2101)
(REVISED CREDIT SYSTEM)
Tuesday, 21st November, 2017, 9 AM to 12 NOON

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer ALL questions.**
2. **Draw labeled diagram wherever necessary. Any missing data may be suitably assumed.**

1a) In the circuit shown in **Fig. Q1a**, calculate the power dissipated in each of the resistor. Use loop analysis to solve for the values of the current in each of the branch. **(8)**

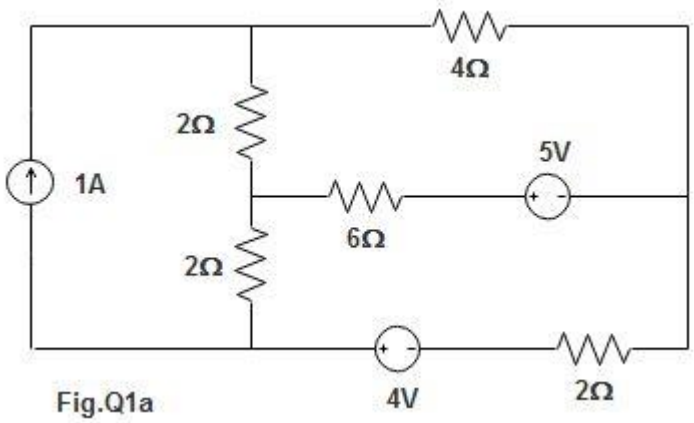


Fig.Q1a

1b) For the circuit shown in **Fig. Q1b**, find the current I through the (3-j4)Ω impedance. Then apply and verify the Reciprocity theorem for this circuit. **(6)**

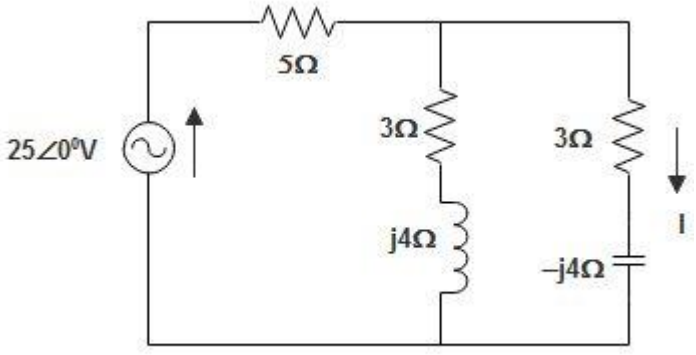


Fig.Q1b

1c) For a series RLC resonant circuit, V=50 Volts, L=20mH, C=250μF and R=10Ω. Determine the resonant frequency, voltage drop across each of the components and the circuit current at resonance. Also find the half power frequencies of the circuit. **(6)**

2a) For the circuit shown in **Fig. Q2a**, apply Thevinin's theorem to find the current in the 5Ω resister. Also find the power dissipated in this resistor. **(8)**

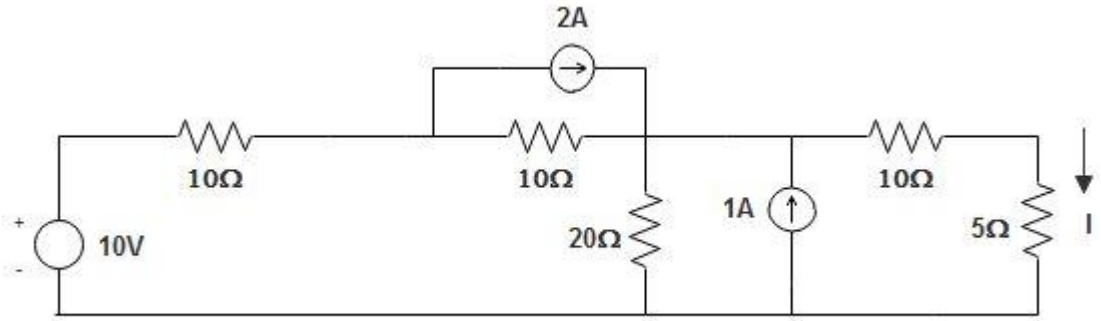


Fig.Q2a

2b) For the network shown in **Fig.Q2b**, the impedance Z_L is variable in terms of both resistance and reactance. Find the value of Z_L to get the maximum power in the load. What is the maximum power? **(6)**

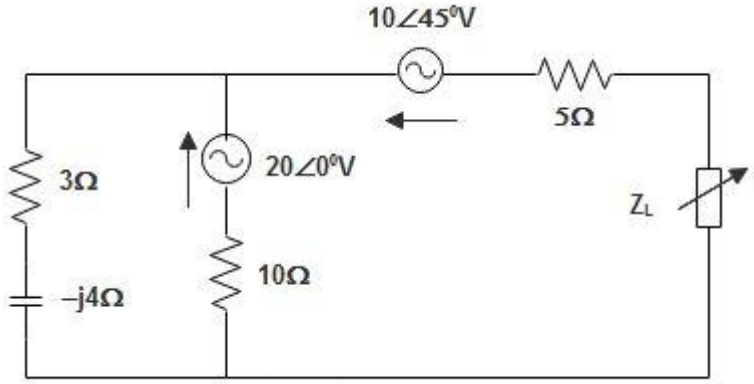
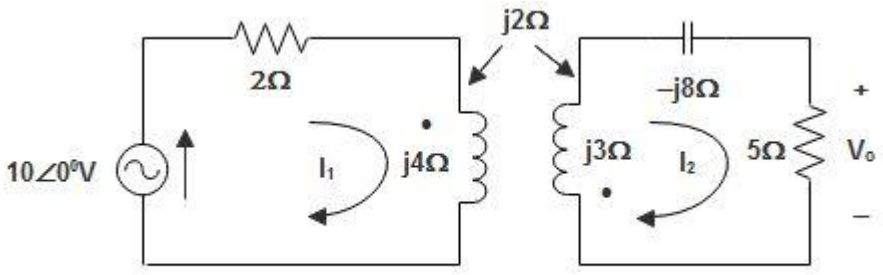


Fig.Q2b

2c) For the coupled circuit shown in **Fig.Q2c**, find the values of I_1, I_2 and V_o **(6)**



Fig,Q2c

3a) For the network shown in **Fig.Q3a**, obtain the star equivalent circuit. **(6)**

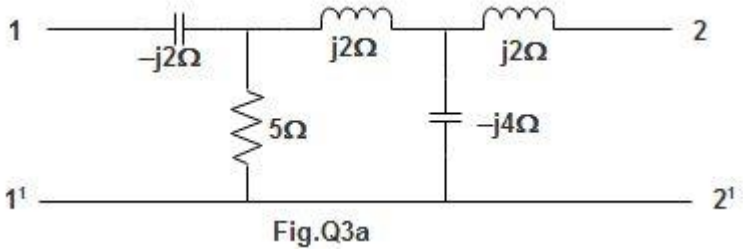


Fig.Q3a

3b) In the network shown in **Fig.Q3b**, a steady state is reached with the switch K open for t<0. At t=0, the switch K is closed. Find the values of, **(8)**

$i_1(0^+)$, $i_2(0^+)$, $\frac{di_1(0^+)}{dt}$ *and* $\frac{di_2(0^+)}{dt}$

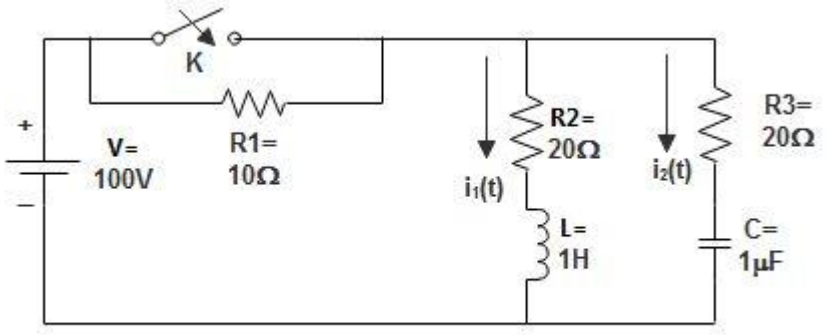


Fig.Q3b

3c) Find the inverse Laplace Transform of **(6)**

(i) $F_1(s) = \frac{2s}{(s^2+4)(s+5)}$ (ii) $F_2(s) = \frac{5s}{s^2+3s+2}$ (ii) $F_3(s) = \frac{s+5}{s^2+4}$

4a) For the circuit shown in **Fig.Q4a**, the switch K is closed at t=0 with the network previously un-energized. For the element values given, find the values of currents $i_1(t)$ and $i_2(t)$. **(8)**

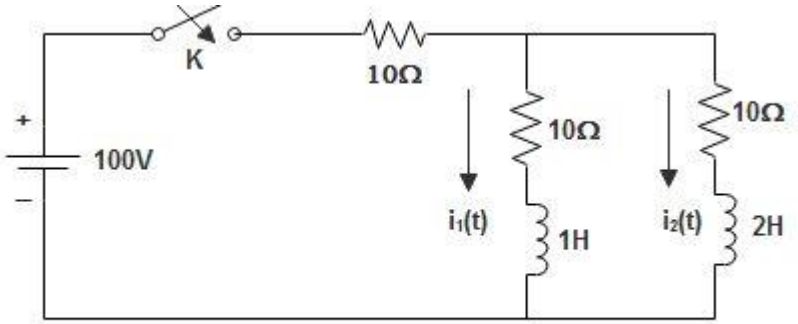


Fig.Q4a

4b) For the waveform shown in the **Fig.Q4b**, write an equation for $v(t)$ in terms of steps, ramps and related waveforms as needed. Also obtain the expression of its Laplace transform V(s). **(6)**

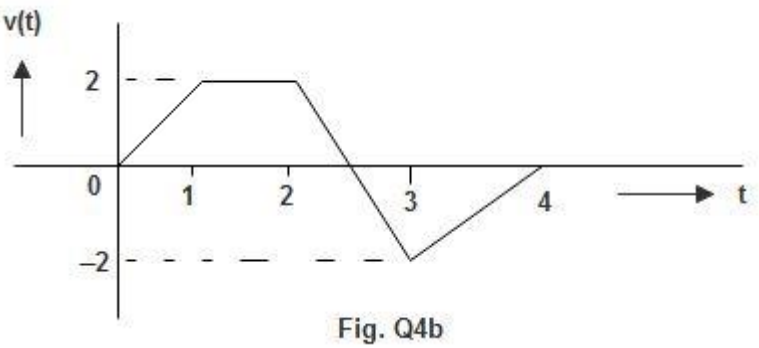


Fig. Q4b

4c) Determine the Laplace transform for the periodic waveform shown in **Fig.Q4c**. **(6)**

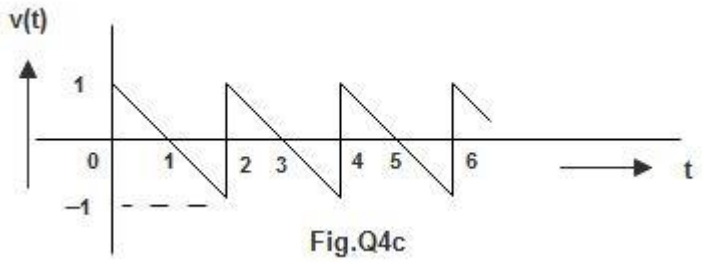


Fig.Q4c

5a) Show that, the overall transmission parameter matrix for cascaded two port network is the matrix product of the transmission matrices associated with each of the two port networks in cascade. **(6)**

5b) Obtain the conversion of *h*-parameters in terms of transmission parameters. **(6)**

5c) For the network shown in **Fig. Q5c**, find the expressions of, **(8)**

(*i*) $G_{12}(s) = \dfrac{V_2(s)}{V_1(s)}$ (ii) $Z_{12}(s) = \dfrac{V_2(s)}{I_1(s)}$

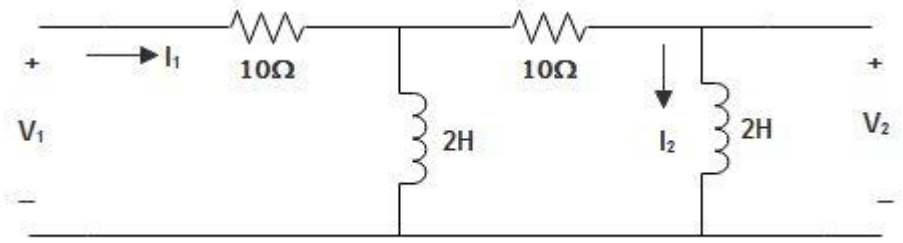


Fig.Q5c