Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

III SEMESTER B.Tech. (BME) DEGREE MAKE-UP EXAMINATIONS DECEMBER 2017

SUBJECT: NETWORK ANALYSIS (BME 2101)
(REVISED CREDIT SYSTEM)
Tuesday, 26th December 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**, find the values of current and power dissipated in each of the resistor. Use mesh current analysis. **(6)**

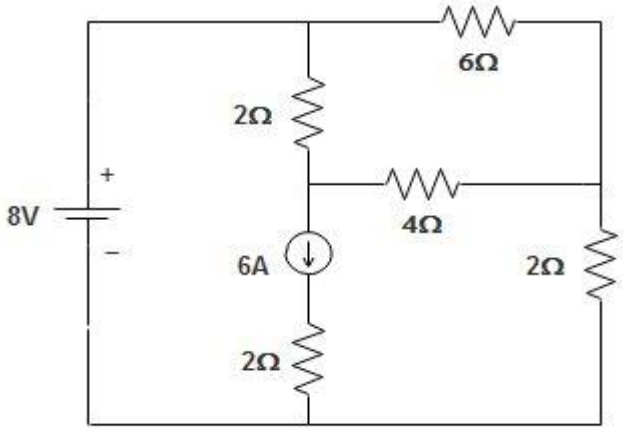

Fig.Q1a

1b) For the circuit shown in **Fig. Q1b**, i_1 and i_2 are the branch currents. For the elements values given, find the values of i_1 and i_2. **(8)**

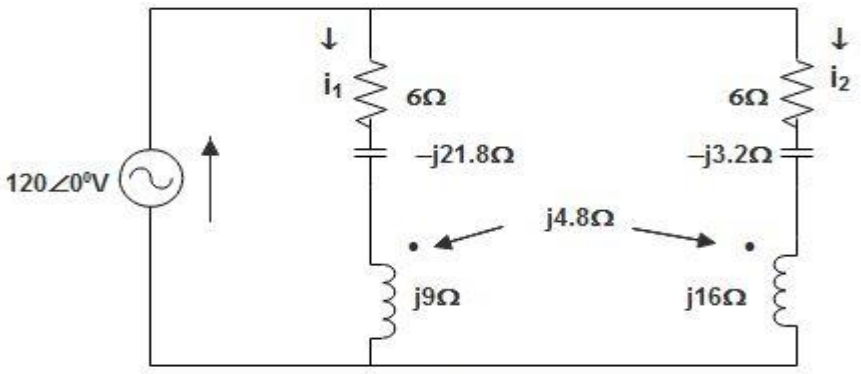

Fig.Q1b

1c) For a series RLC resonant circuit show that, the expression of bandwidth at half power frequency is equal to $\frac{f_0}{Q}$. **(6)**

2a) For the circuit shown in **Fig. Q2a**, determine the current I in 2Ω resistor using superposition theorem. **(8)**

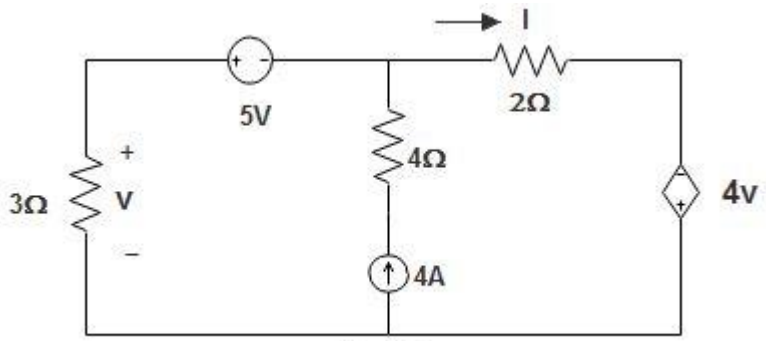

Fig.Q2a

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)**

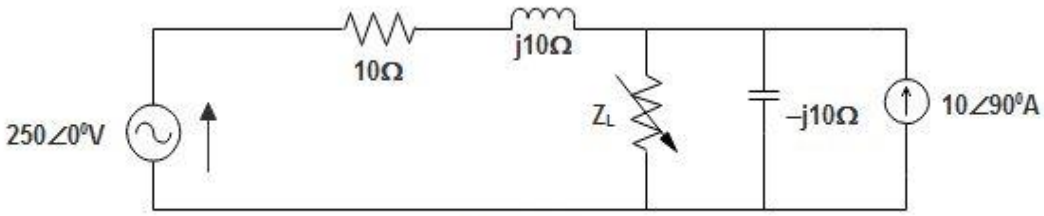

Fig.Q2b

2c) For the circuit shown in **Fig.Q2c**, find the current in 20Ω resistor using Norton's theorem. **(6)**

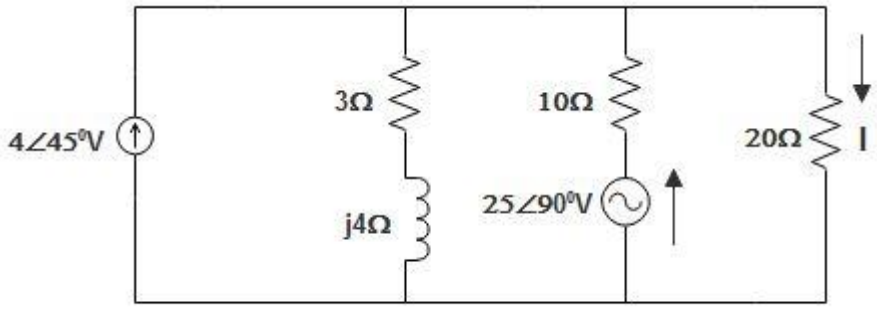

Fig.Q2c

3a) State and prove Initial value theorem and Final value theorem. **(6)**

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. For the element values given, determine the values of, $V_a(0^-)$ and $V_a(0^+)$ **(6)**

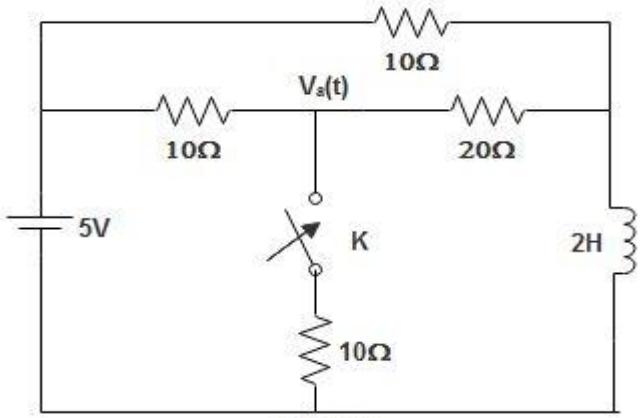

Fig.Q3b

3c) Find the Laplace Transform of, **(4)**

(i) Second derivative of a time function. (ii) First integral of a time function.

3d) Find the Inverse Laplace transform of the following. **(4)**

(i) $F_1(s) = \dfrac{11}{8s^2 + 1.19s + 0.022}$ (ii) $F_2(s) = \dfrac{1}{s^2 + 7s + 12}$

4a) For the circuit shown in **Fig.Q4a**, the switch K is closed at $t=0^+$. For the element values given, find the expression of $i(t)$ for t > 0. **(8)**

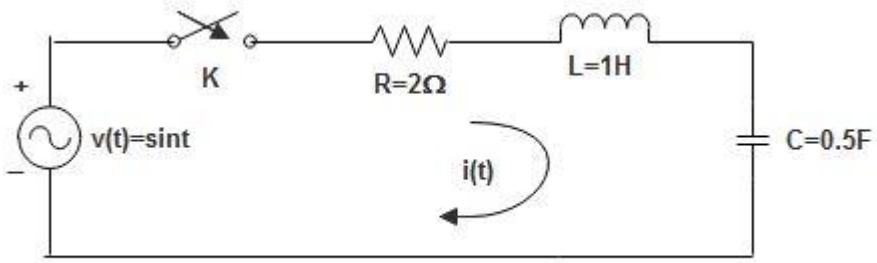

Fig.Q4a

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)**

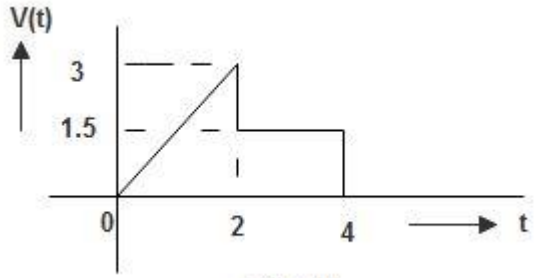

Fig.Q4b

4c) The waveform shown in **Fig.Q4c**. is a sweep voltage used to deflect the beam in a cathode ray oscilloscope. Show that the transform of this function is **(6)**

$$F(s) = \frac{1}{as^2} - \frac{e^{-as}}{s(1-e^{-as})}$$

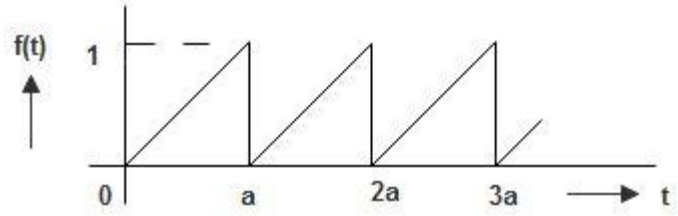

Fig.Q4c

5a) Obtain the conversion of Z parameters in terms of Inverse transmission parameters. **(6)**

5b) For the network shown in **Fig.Q5b**, obtain Y parameters. **(6)**

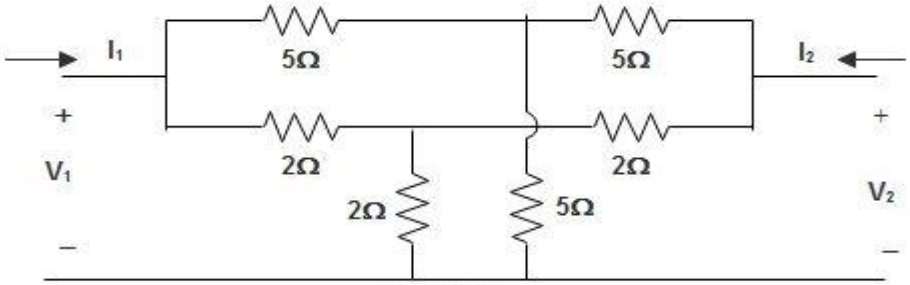

Fig.Q5b

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

(*i*) $G_{12}(s) = \frac{V_2(s)}{V_1(s)}$ (ii) $Z_{12}(s) = \frac{V_2(s)}{I_1(s)}$ (iii) $\alpha_{12}(s) = \frac{I_2(s)}{I_1(s)}$

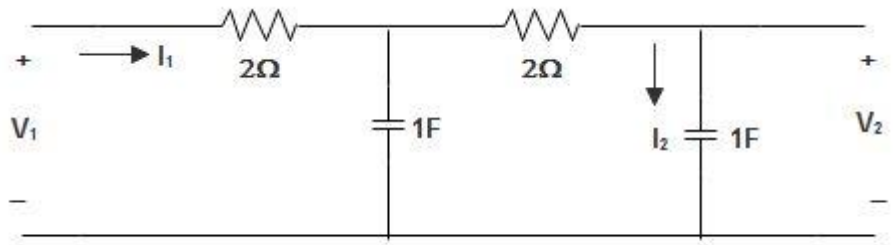

Fig.Q5c