Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
(A Constituent Institute of Manipal University)
Manipal – 576 104

III SEMESTER B.Tech.(BME) DEGREE MAKEUP EXAMINATIONS DEC/JAN 2015-16

SUBJECT:NETWORK ANALYSIS (BME 203)
(Revised Credit System)
Sunday, 3rd January 2016: 9 am to 12 noon

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

Instructions to Candidates:

1. **Answer any FIVE FULL questions.**
2. **Draw labeled diagram wherever necessary**

Q1a) State KVL and KCL. For the circuit shown in **Fig.Q1a**, find V_1 and V_2 using node voltage analysis. Also find the power dissipated in each of the resistor. 08

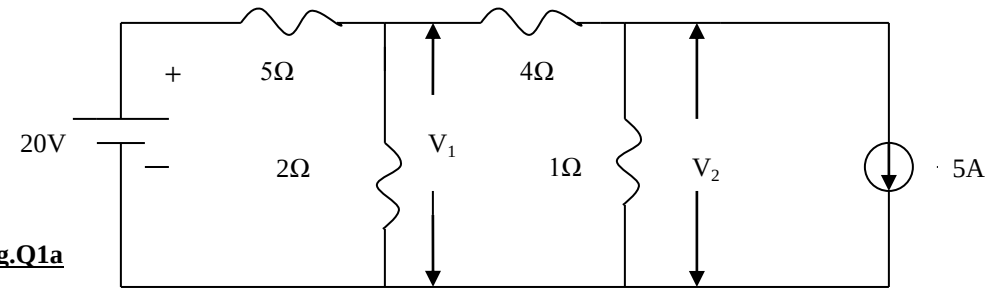

Fig.Q1a

Q1b) In the circuit shown in **Fig. Q1b**, both the reactance and resistance associated with the load are varied. What load Z_L for it to receive the maximum power and what is the maximum power? 08

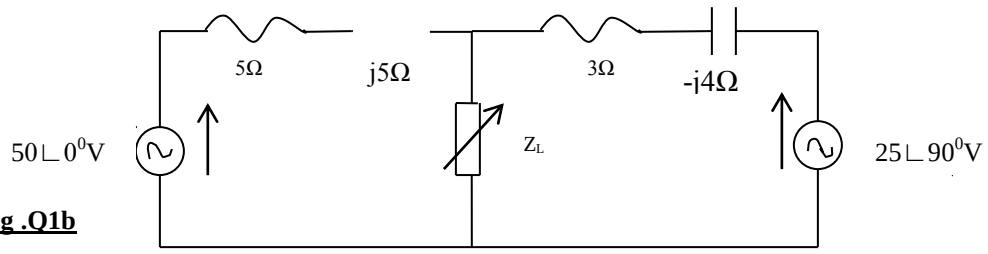

Fig .Q1b

Q1c) State and prove Millmans theorem for voltage sources. 04

Q2a) For the circuit shown in **Fig. Q2a**, find the Thevinins equivalent circuit at the terminal AB and hence determine the power dissipated in 5Ω resistor connected between the terminals A and B. 08

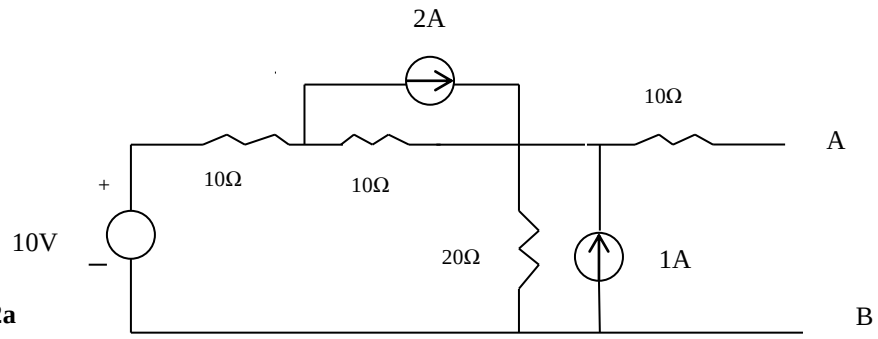

Fig. Q2a

Q2b) In the circuit shown in **Fig.Q2b**, determine the ratio $\frac{V_2}{V_1}$ when (i) I_1=0, (ii) I_2=0, 08

And the ratio $\frac{I_2}{I_1}$ when (iii) V_1=0, (iv) V_2=0.

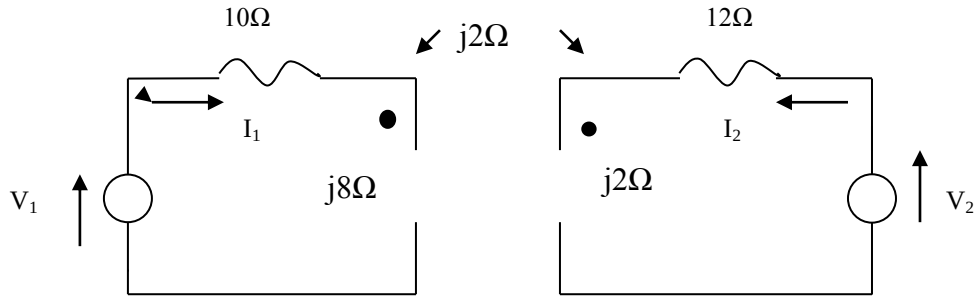

Fig.Q2b

Q2c) Discuss the property of duality in networks. 04

Q3a) For the circuit shown in **Fig.Q3a**, apply super position theorem to find the current I in 10Ω resistor. 08

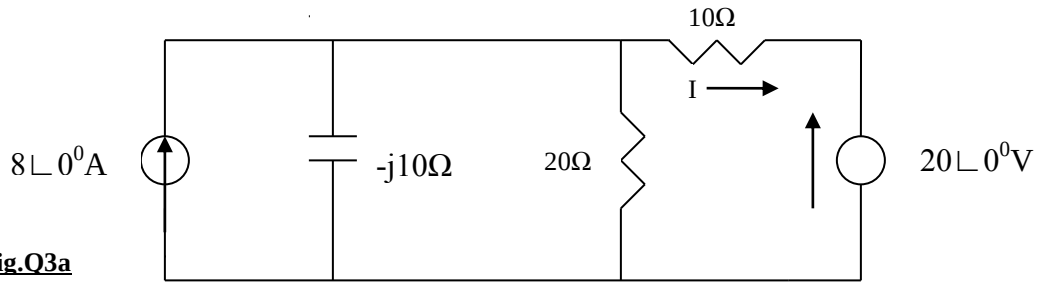

Fig.Q3a

Q3b) Derive the expression of Laplace Transform of (i) $f_1(t) = t^3$ (ii) $f_2(t) = \sin \omega t$ 06

Q3c) Find the expression of f(t) of the following function 06

$$F(s) = \frac{1}{s(s+2)(s+1)^3}$$

Q4a) In the network shown in **Fig.Q4a**, the switch K is closed at t=0, connecting a voltage $V\sin\omega t$ to parallel RL and RC circuit. Find (i) $\frac{di_1(0^+)}{dt}$ (ii) $\frac{di_2(0^+)}{dt}$ 07

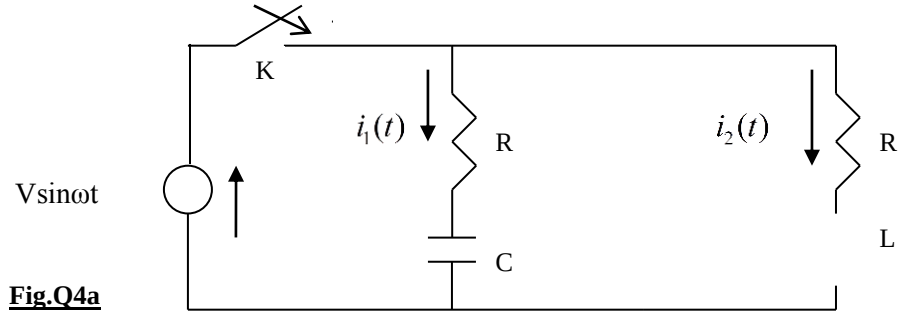

Fig.Q4a

Q4b) For the circuit shown in **Fig.Q4b**, the switch K is moved from the position '*a*' to position *'b*' at t=0. A steady state having previously established at position '*a*', solve for current i(t) using Laplace Transform method. 07

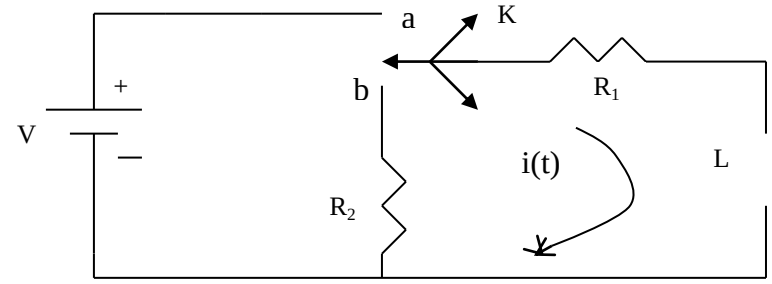

Fig.Q4b

Q4c) The periodic waveform shown in **Fig.Q4c**, obtain the expression Laplace transform F(s). 06

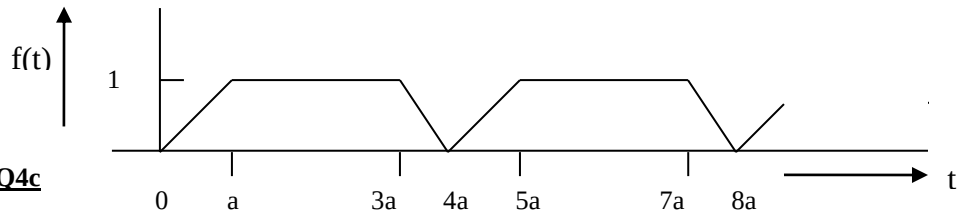

Fig.Q4c

Q5a) For the circuit shown in **Fig.Q5a**, find the Z and ABCD parameters 08

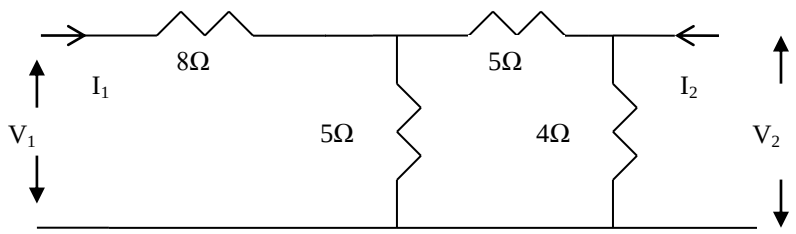

Fig.Q5a

Q5b) For the circuit shown in **Fig.Q5b**, find (i) $\alpha_{12}(s) = \frac{I_2(s)}{I_1(s)}$ (ii) $Z_{12}(s) = \frac{V_2(s)}{I_1(s)}$ 08

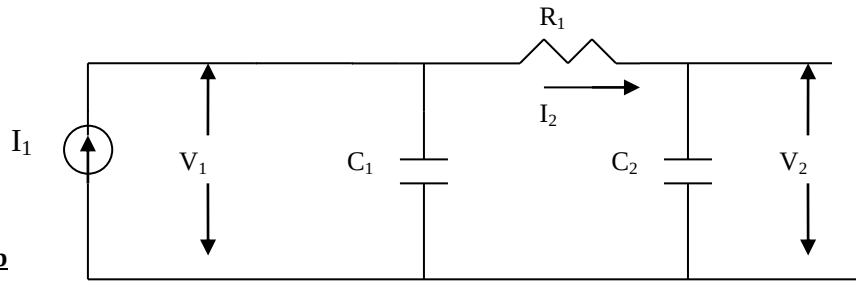

Fig.Q5b

Q5c) For the waveform shown in **Fig.Q5c**, find the Laplace transform F(s) using Gate function 04

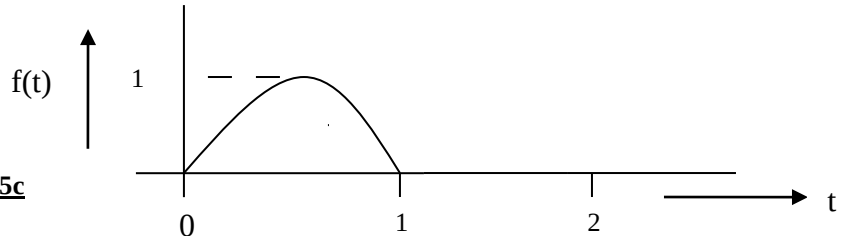

Fig.Q5c

Q6a) For the circuit shown in the F**ig. Q6a**, Write the loop equations. Obtain the dual of the circuit and verify the property of duality with the node equations of the dual circuit. 06

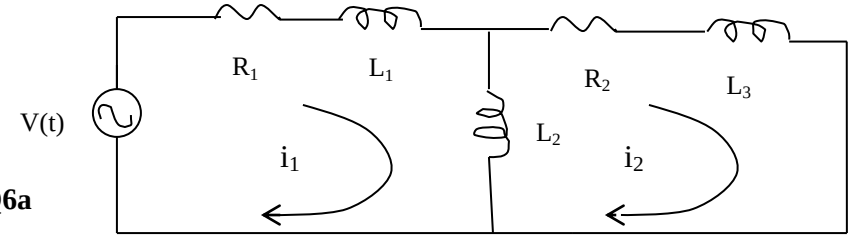

Fig. Q6a

Q6b) Derive the expression of resonant frequency f_o of a series RLC circuit. 06

Q6c) For the circuit shown in F**ig. Q6c**, find the current I in (3-j4)Ω impedance. Apply and verify the Reciprocity theorem for this circuit 08

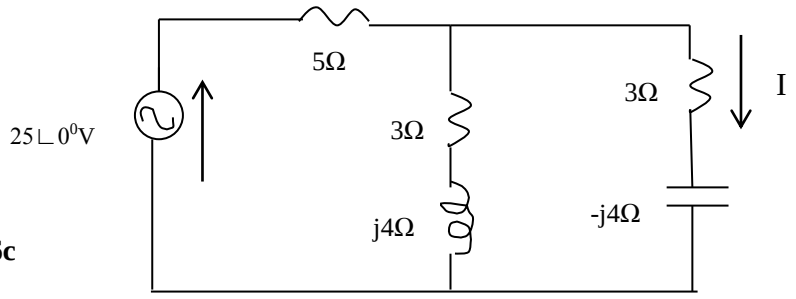

Fig. Q6c