Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institute of Manipal University)

Manipal – 576 104

III SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS NOV/DEC, 2015

SUBJECT: NETWORK ANALYSIS (BME 203)

(Revised Credit System)

Tuesday, 1st December, 2015, 9am to 12 noon

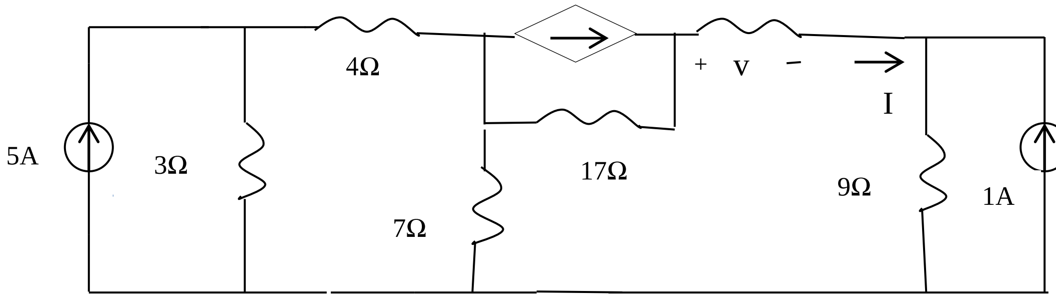
TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer any FIVE full questions.**
2. **Draw labeled diagrams wherever necessary**

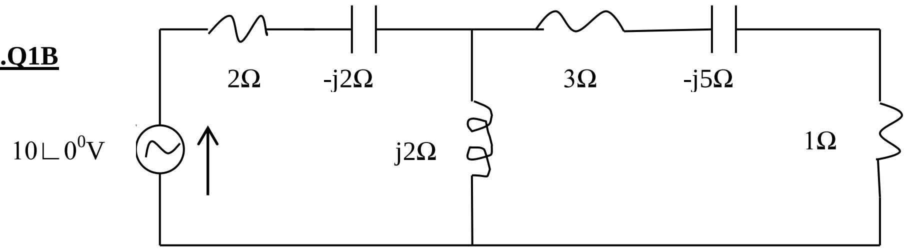
Q1A) For the network shown in Fig Q1A, a dependent current source indicates a *photo sensor* used in a biomedical equipment. Simplify the circuit using source transformation to obtain a single loop circuit and find the value of the current I. **(8)**

Fig. Q1A



Q1B) For the circuit shown in Fig.Q1B, Find the value of the power in each of the resistor. **(6)**

Fig.Q1B



Q1C) For the network shown in Fig. Q1C, obtain star and delta equivalent circuits. **(6)**

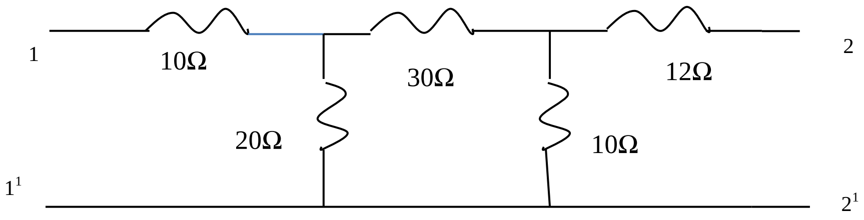


Fig. Q1C

Q2A) For the circuit shown in fig Q2A, apply super position theorem to find the value of the current I in 10Ω resistor. **(8)**

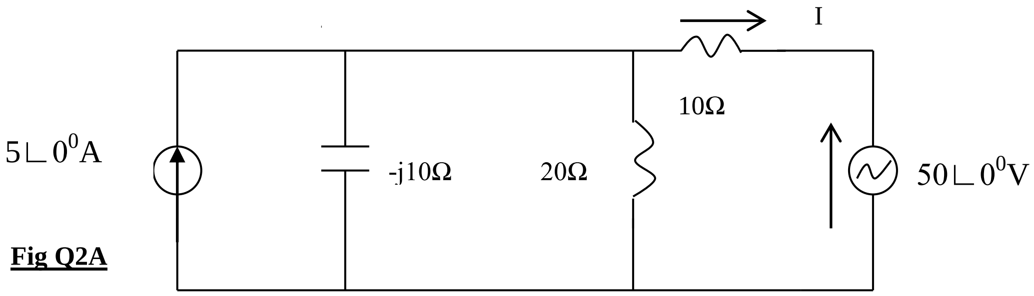


Fig Q2A

Q2B) For the circuit shown in Fig. Q2B, find the value of the current I. Then apply the reciprocity theorem and verify your result. **(6)**

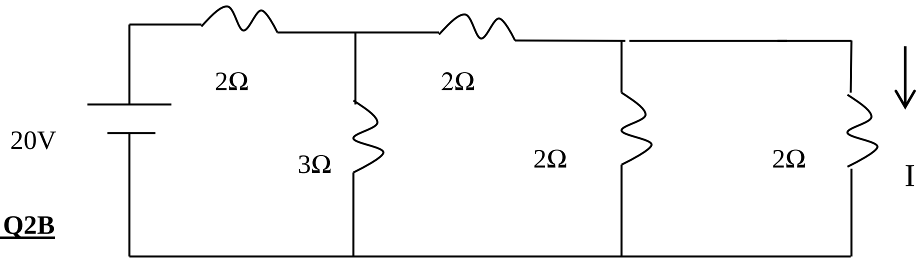


Fig. Q2B

Q2C) For a series RLC circuit V=2Volts, L=20mH, C=0.02µF and R=20Ω, Find, (i) Resonant frequency f_0, (ii) Q of the coil, (iii) Circuit maximum current I_0, (iv) Band width, (v) Half power frequencies f_1 and f_2, (vi) Voltage drop across L, C and R at resonant frequency. **(6)**

Q3A) For the circuit shown in fig. Q3A, find the maximum power that can be transferred to the pure resistive load R_L. **(8)**

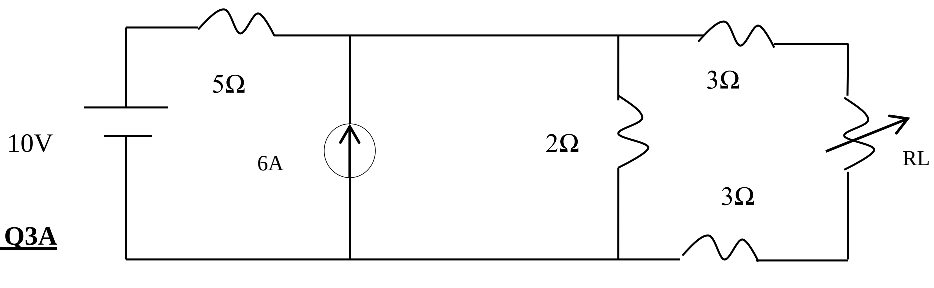


Fig. Q3A

Q3B) For the circuit shown in fig Q3B, a dependent voltage source indicates the body skin resistance which is to be modeled to find the value of the voltage drop across it. Apply Thevenin's theorem to find the current through R_L and also find Vo, if R_L=2Ω. **(6)**

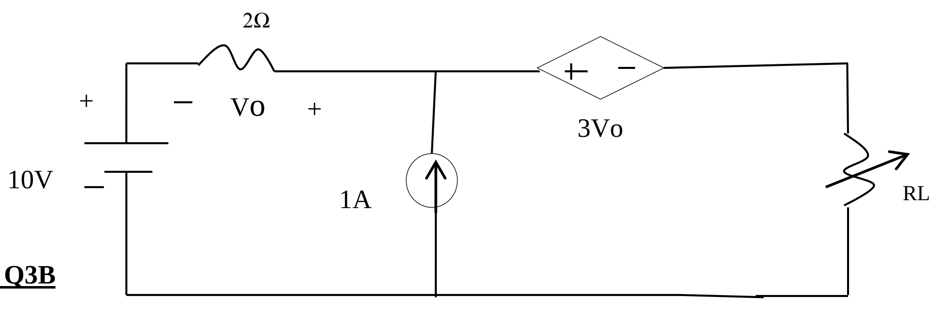


Fig. Q3B

Q3C) Obtain the Laplace Transform of first and second derivative of f(t), and first integral of f(t). **(6)**

Q4A) For the circuit shown in Fig. Q4A, find the value of the current I_L. **(8)**

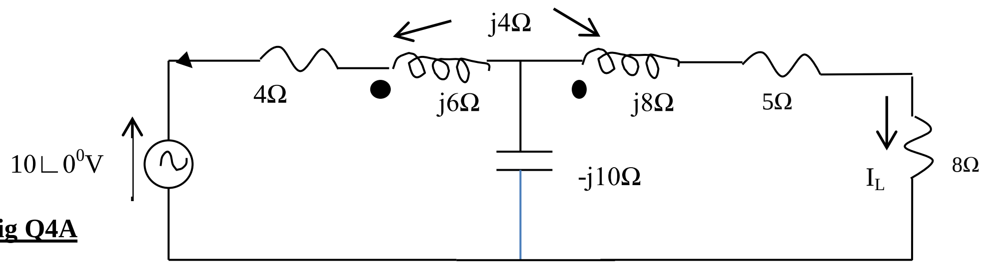


Fig Q4A

Q4B) For the circuit shown in Fig. Q4B, the switch K is at position 'a' for t<0. At t=0, switch is moved from the position 'a' to position 'b'. Find, **(6)**

$$i(0^+),\ \frac{di(0^+)}{dt},\ \text{and}\ \frac{d^2i(0^+)}{dt^2}$$

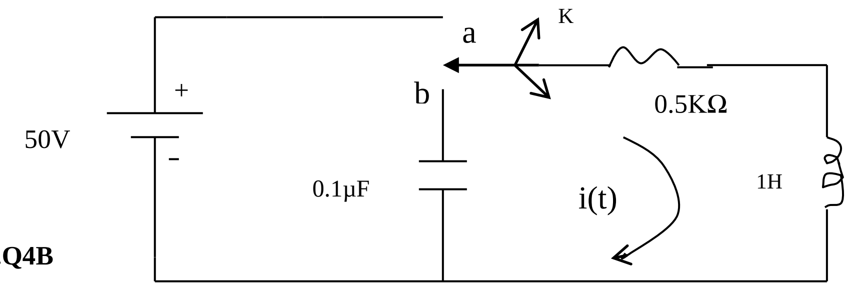


Fig.Q4B

Q4C) Find the inverse Laplace transform associated with the following expressions. **(6)**

(i) $F_1(s) = \dfrac{s+5}{s(s+1)^2}$ (ii) $F_2(s) = \dfrac{s+3}{s^2+4}$

Q5A) State and prove the initial and the final value theorems. **(6)**

Q5B) For the circuit shown in Fig. Q5B, the switch K is closed at t=0. Find $i_1(t)$ and $i_2(t)$ for t>0. **(6)**

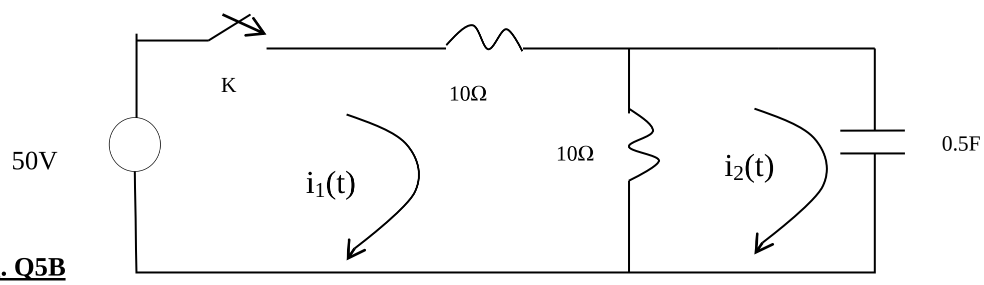


Fig. Q5B

Q5C) Convert h-parameters in terms of (i) Z-parameters. (ii) Y-parameters. **(8)**

Q6A) For the waveform shown in Fig. Q6A, obtain F(s) using waveform synthesis. **(6)**

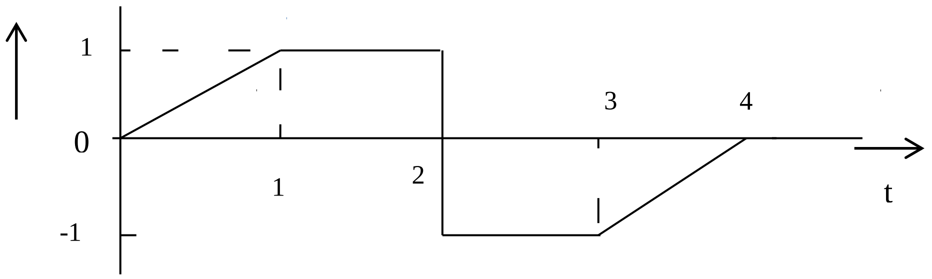


Fig. Q6A

Q6B) For the periodic waveform f(t) shown in fig. Q6B, show that $F(s) = \frac{1}{as^2} - \frac{e^{-as}}{s(1-e^{-as})}$ **(6)**

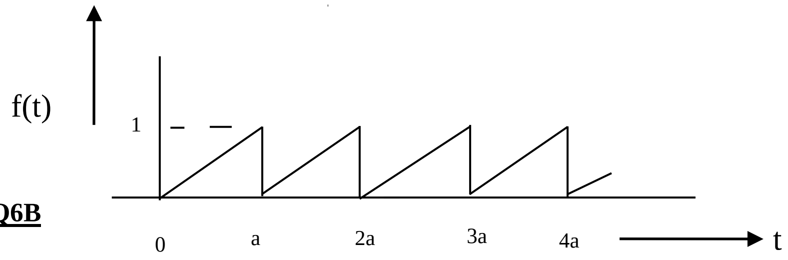


Fig. Q6B

Q6C) For the circuit shown in Fig. Q6C, find the values of (i) $\alpha_{12} = \frac{I_2(s)}{I_1(s)}$ (ii) $Z_{12}(s) = \frac{V_2(s)}{I_1(s)}$ **(8)**

(iii) $G_{12}(s) = \frac{V_2(s)}{V_1(s)}$

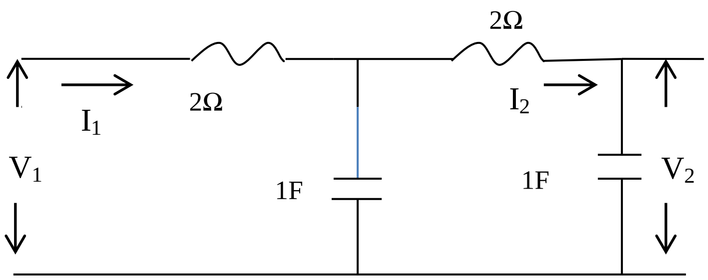


Fig. Q6C