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 2101)

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

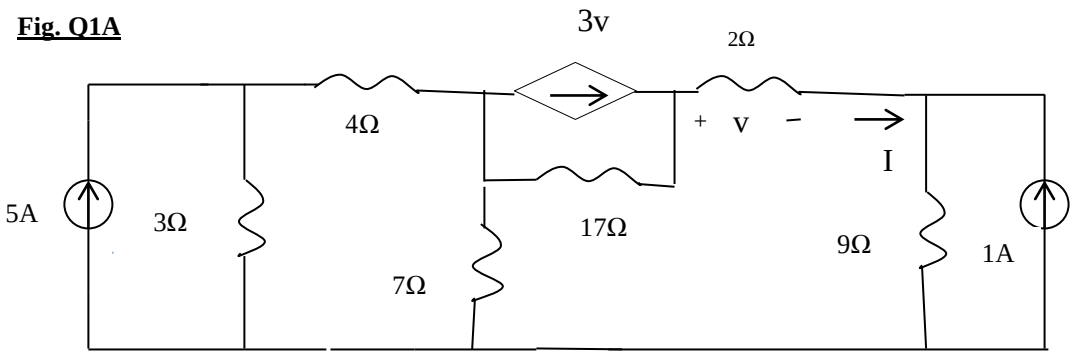
TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer ALL questions.**
2. **Draw labeled diagram 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 current I. Then apply the reciprocity theorem and verify your result. **(6)**

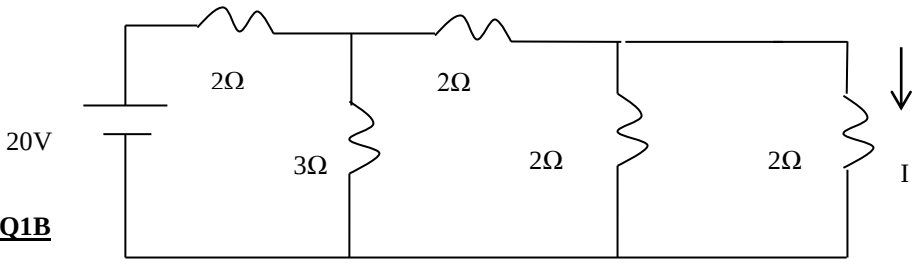


Fig. Q1B

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

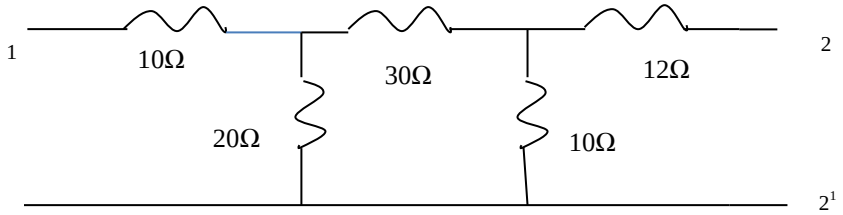


Fig. Q1C

Q2A) For the circuit shown in fig. Q2A, find the maximum power that can be transferred to the pure resistive load R_L. **(8)**

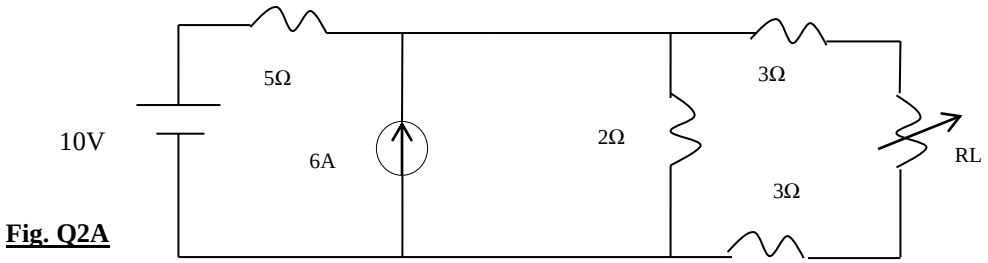


Fig. Q2A

Q2B) For the circuit shown in fig. Q2B, 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)**

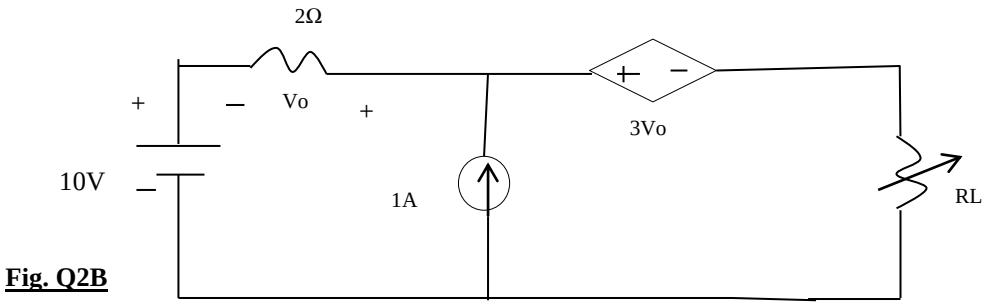


Fig. Q2B

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 value of the current I_L. **(8)**

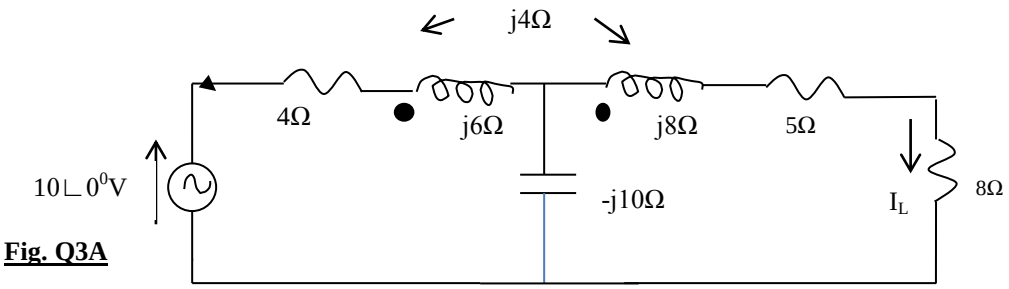


Fig. Q3A

Q3B) For the circuit shown in Fig. Q3B, 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)**

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

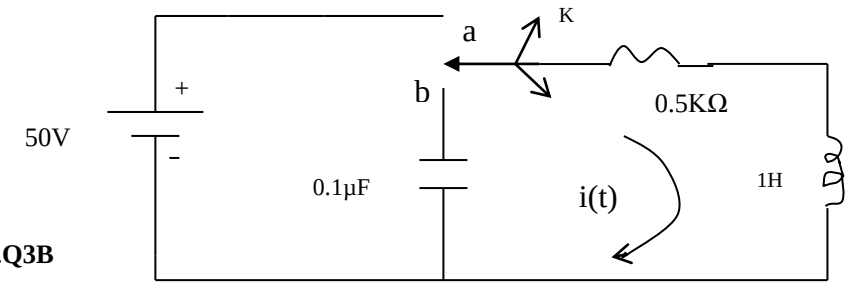


Fig.Q3B

Q3C) Find the inverse Laplace transform associated with the following expressions. **(6)**

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

Q4A) State and prove the initial and the final value theorems. **(6)**

Q4B) For the circuit shown in Fig. Q4B, the switch K is closed at t=0. Find $i_1(t)$ and $i_2(t)$ for t>0. **(6)**

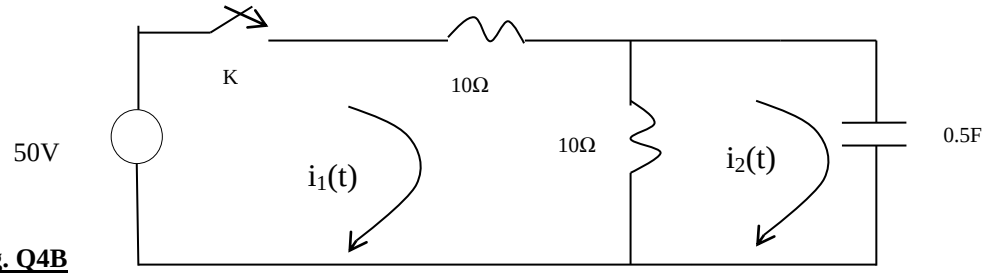


Fig. Q4B

Q4C) Convert h-parameters in terms of (i) Z-parameters. (ii) Y-parameters. **(8)**

Q5A) For the waveform shown in Fig. Q5A, obtain F(s) using waveform synthesis. **(6)**

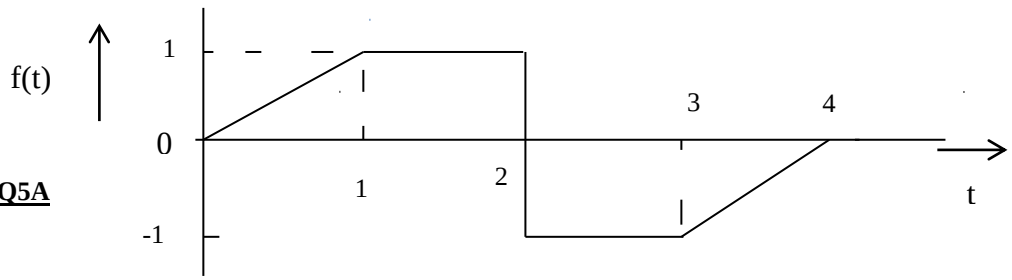


Fig. Q5A

Q5B) For the periodic waveform f(t) shown in fig. Q5B, show that $F(s) = \frac{1}{as^2} - \frac{e^{-as}}{s(1-e^{-as})}$ **(6)**

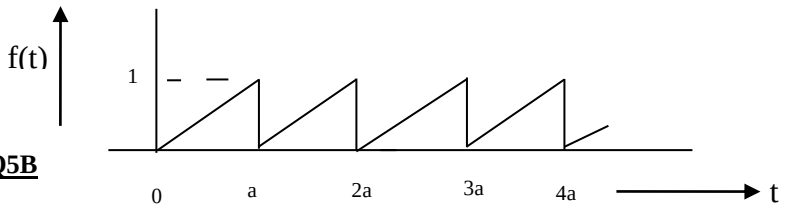


Fig. Q5B

Q5C) For the circuit shown in Fig. Q5C, 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) $G_{12}(s) = \frac{V_2(s)}{V_1(s)}$

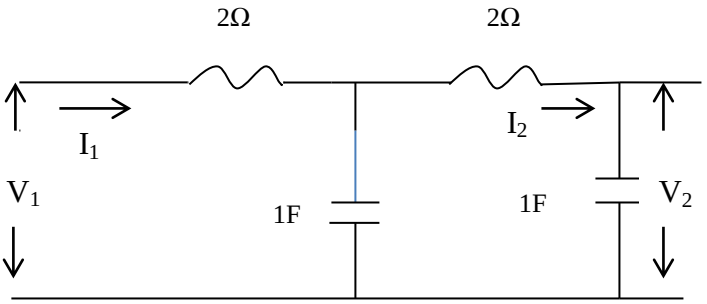


Fig. Q5C