Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

III SEMESTER B.Tech. (BME) DEGREE MAKE UP EXAMINATIONS NOV/DEC 2019-20

SUBJECT: NETWORK ANALYSIS (BME 2154)
(REVISED CREDIT SYSTEM)
Saturday, 28th December 2019: 8.30 AM to 11.30 AM.

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to Candidates:

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

1A. For the circuit shown in Fig.1A, find the currents $\mathbf{I_1}$ and $\mathbf{I_2}$. Also calculate the power dissipation in all the resistors. **(4)**

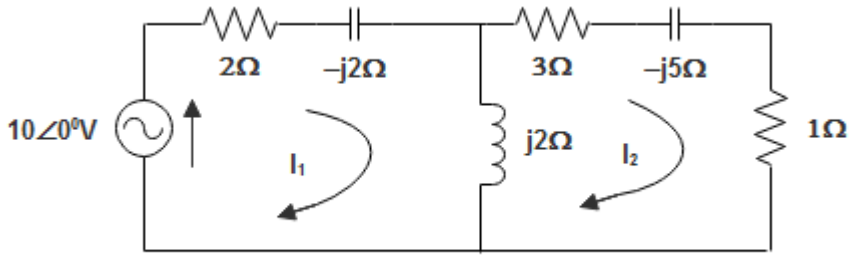

Fig.1A

1B. For the circuit shown in Fig.1B, using node voltage analysis, find the currents in all resistors. **(3)**

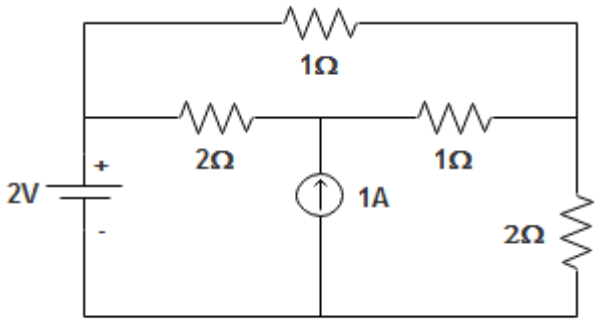

Fig.1B

1C. For a series RLC resonant circuit, R=5Ω, L=4mH, C=0.1μF and V=10 volts. Find the frequency of resonance, quality factor, voltage drop across L, C and R at resonance, maximum current of the circuit and half power band width. **(3)**

2A. For the circuit shown in Fig.2A, determine the current **I** in 10**Ω** resistor using superposition theorem. **(4)**

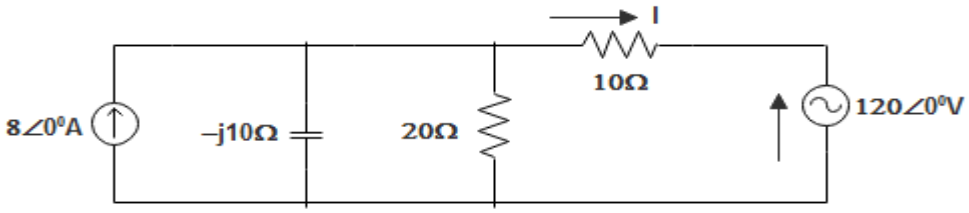

Fig. 2A

2B. For the network shown in Fig.2B, determine the current I in 2Ω resistor connected across the terminals AB using Thevenin's theorem. **(3)**

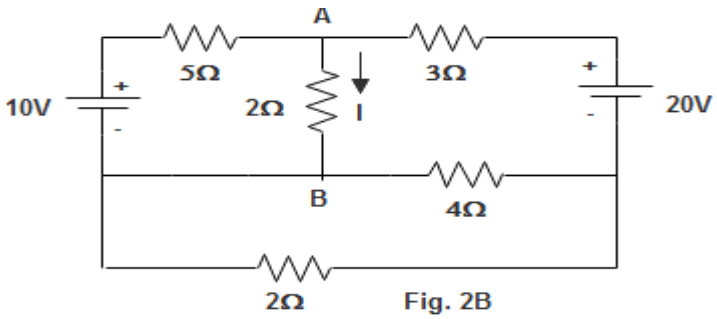

Fig. 2B

2C. In the network shown in Fig 2C, find the value of load resistance $\mathbf{R_L}$ when it receives maximum power. What is the maximum power? **(3)**

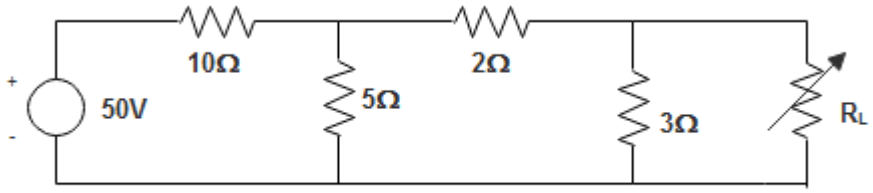

Fig.2C

3A. For the circuit shown in Fig.3A, a steady state is reached with K is open for t<0. At t=0 the switch K is closed. Find, **(4)**

$v_a(0^-),\ v_b(0^-),\ v_a(0^+),\ v_b(0^+)\ and\ v_b(\infty)$

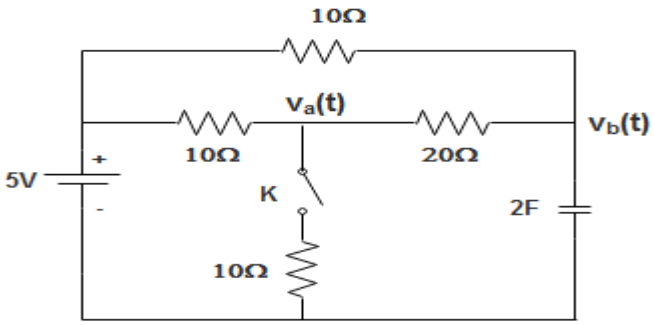

Fig. 3A

3B. In the network shown in Fig.3B, the switch K is closed at t=0. Using Laplace transform solve for the current i(t) and sketch the waveform. **(3)**

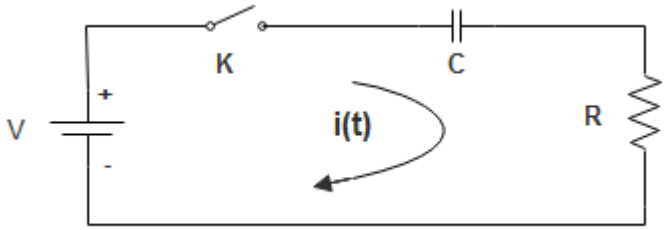

Fig. 3B

3C. Determine the inverse Laplace transform of the following. **(3)**

$(i)\ F(s) = \frac{1}{(s+1)(s+2)^2}$ $(ii)\ F(s) = \frac{5s^2+4s+1}{(s+3)(s+1)^2}$

4A. For the circuit shown in the fig. 4A, determine Z-Parameters. **(4)**

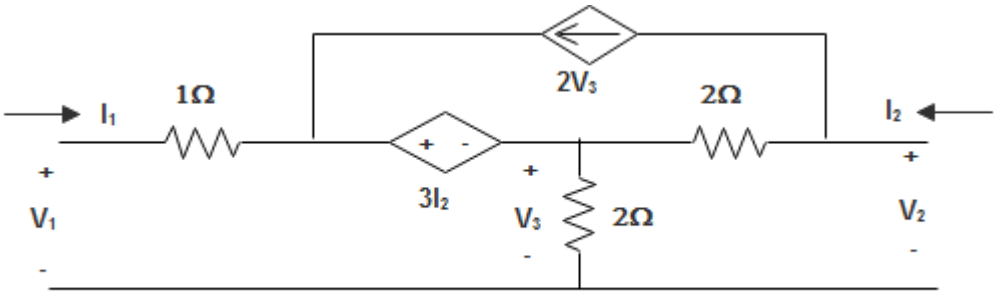

Fig. 4A

4B. For the waveform shown in Fig.4B, determine its Laplace transform. **(3)**

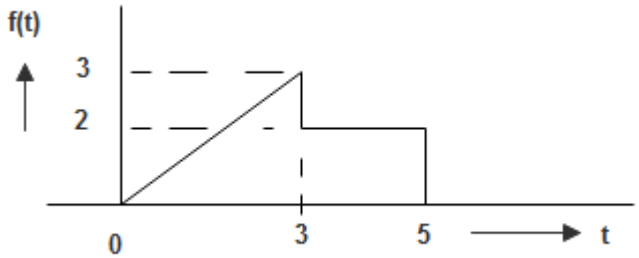

Fig. 4B

4C. For the periodic waveform v(t) shown in Fig.4C, determine its Laplace transform. **(3)**

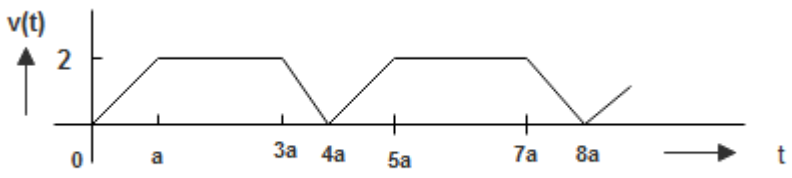

Fig.4C

5A. For the network shown in Fig. 5A**,** find the expressions of, **(4)**

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

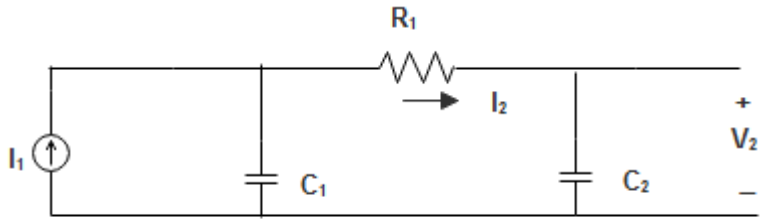

Fig. 5A

5B. A step voltage is applied to a low pass RC circuit whose time constant is RC. Show that for the output waveform the rise time t_r is given by, **(3)**

$t_r = 2.2 \times RC$

5C. A square wave whose peak to peak amplitude is 1 Volt extends ±0.5 Volts w.r.t. ground. The duration of the positive section is 0.1 seconds and of the negative section is 0.2 seconds. If this waveform is impressed upon a high pass RC circuit whose time constant is 0.2 seconds. Calculate and sketch the output waveform and label all voltage levels. **(3)**