Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

III SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS NOVEMBER 2019

SUBJECT: NETWORK ANALYSIS (BME 2154)
(REVISED CREDIT SYSTEM)
Saturday, 23rd November, 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. Q1,** find the current I in 2Ω resistor. You can minimize and simplify the circuit using source transformation. **(4)**

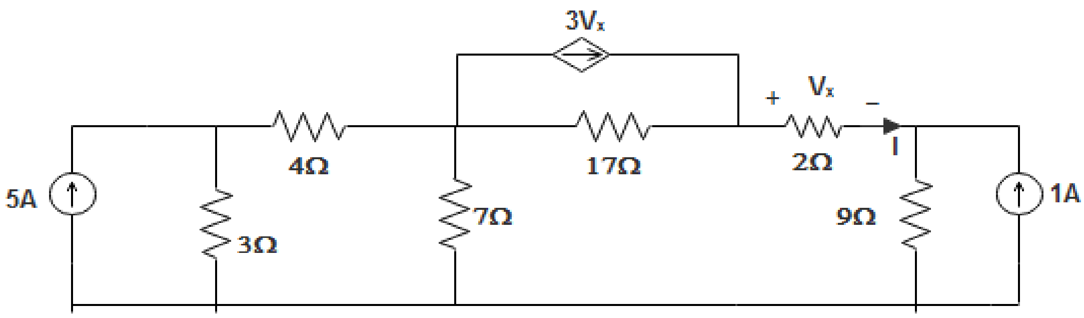

Fig.Q1

1B) For the circuit shown in **Fig. Q2**, find the voltage V_x. Then apply the reciprocity theorem and verify it. **(3)**

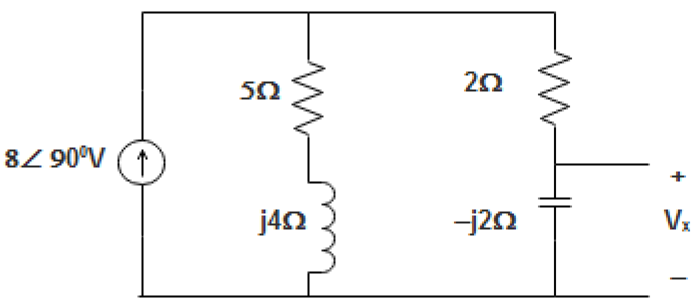

Fig.Q2

1C) For a series RLC resonant circuit show that, **(3)**

$Z = R[1 + j2Q_o\delta]$ Where $\delta = \frac{f - f_o}{f_o}$

2A) For the coupled circuit shown in **Fig. Q4**, find the voltage V_o across 8**Ω** resistor. **(4)**

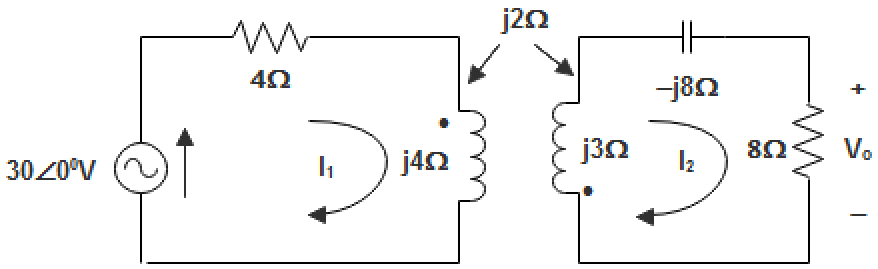

Fig Q4

2B) For the network shown in **Fig.Q5**, find the current I in 8Ω resistor using Thevenins theorem. **(3)**

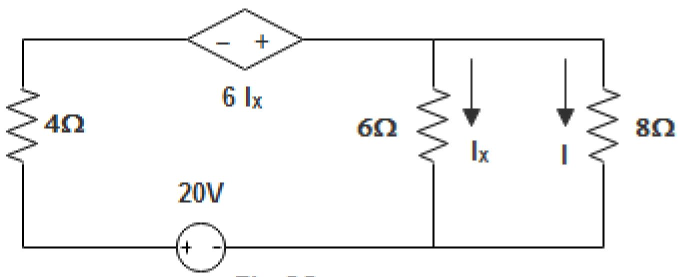

Fig.Q5

2C) For the circuit shown in Fig.Q6, the circuit attains steady state when the switch is at position "a" for t<0. At t=0 the switch is changed from the position "a" to position "b". Find, **(3)**

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

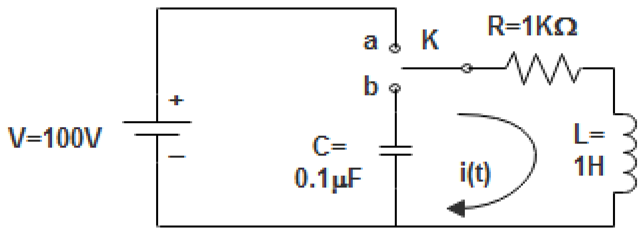

Fig.Q6

3A) In the network shown in Fig Q7, the load Z_L is variable in both reactance and resistance. What load Z_L will receive the maximum power? What is the maximum power? **(4)**

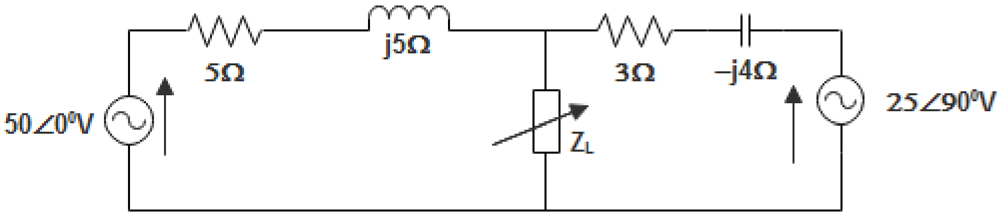

Fig. Q7

3B) For the circuit shown in Fig.Q8, the circuit attains steady state when the switch is at position "a" for t<0. At t=0 the switch is changed from the position "a" to position "b". Solve for the current i(t) using Laplace transform and sketch the waveform. **(3)**

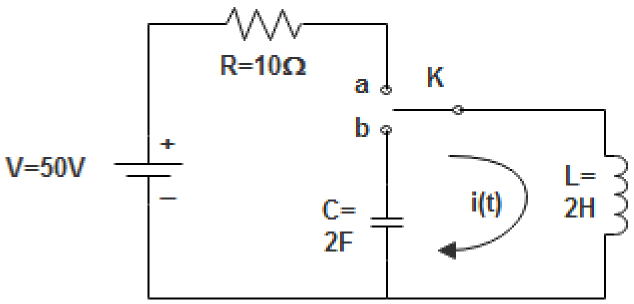

Fig.Q8

3C) For the signal shown in Fig.Q9, obtain its Laplace transform F(s) using waveform synthesis. **(3)**

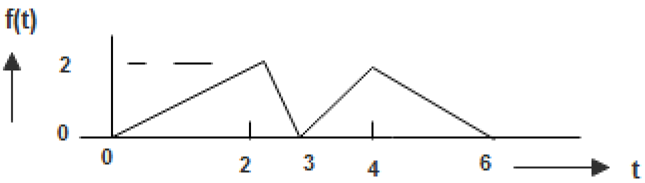

Fig Q9

4A) State and prove Initial value theorem and Final value theorem. **(4)**

4B) For the periodic waveform shown in Fig.Q11, obtain its Laplace transform. **(3)**

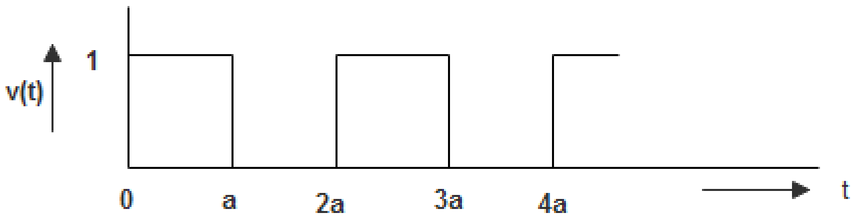

Fig.Q11

4C) Convert h-parameters in terms of ABCD parameters. **(3)**

5A) For the network shown in **Fig. Q13**, find the expressions of, **(4)**

$$(i)\quad G_{12}(s)=\frac{V_2(s)}{V_1(s)} \qquad \text{(ii)}\quad Z_{12}(s)=\frac{V_2(s)}{I_1(s)}$$

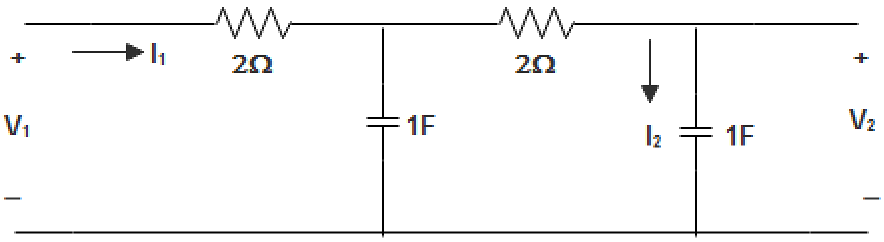

Fig.Q13

5B) A pulse waveform of amplitude V volts and the pulse width of t_P is applied to a high pass RC circuit having a time constant RC. Sketch the output waveform and derive the expressions of the output. **(3)**

5C) A 2 µseconds pulse of amplitude 5 volts is applied to a low pass RC circuit whose time constant is 3 µsec. Calculate and sketch the output waveform. **(3)**