Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

III SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS MARCH 2021

SUBJECT: NETWORK ANALYSIS (BME 2154)
(REVISED CREDIT SYSTEM)
Monday, 8th March, 2021, 9 AM to 12 NOON

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.1, determine the current ***I*** and power dissipated in 4Ω resistor using node voltage analysis. **(4)**

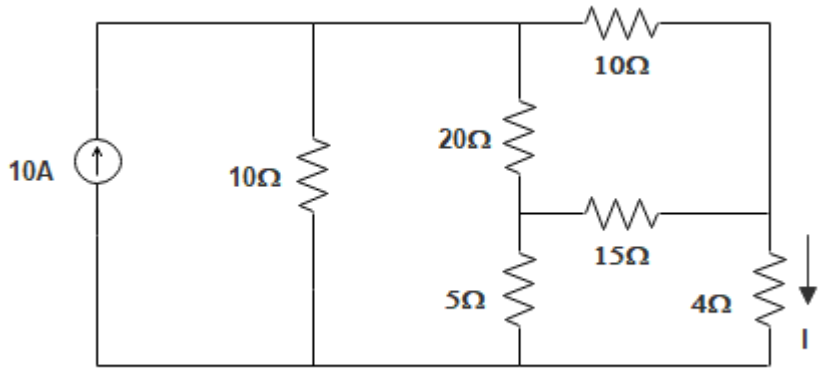

Fig.1

1B) For the circuit shown in Fig.2 determine the current I and power dissipated in 3Ω resistor using Thevenin's theorem. **(3)**

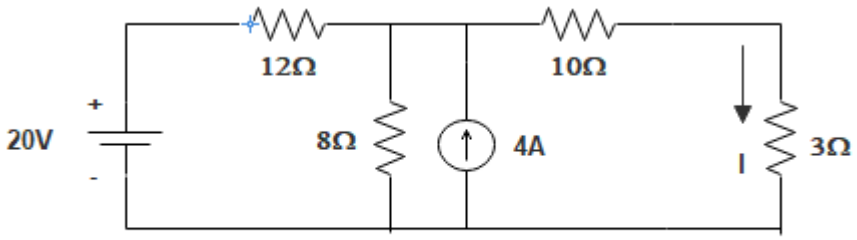

Fig.2

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 circuit shown in Fig.3, find the current I in 4Ω resistor using superposition theorem. **(4)**

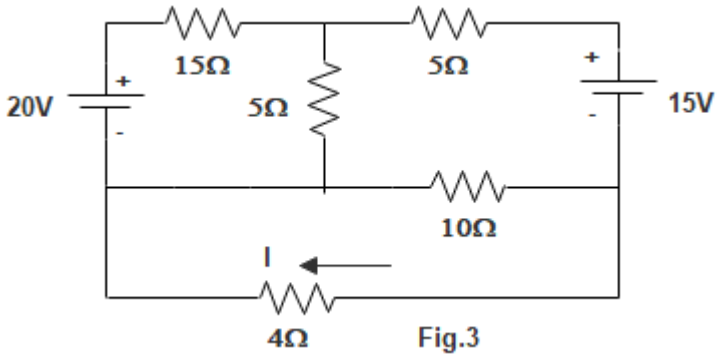

Fig.3

2B) For the circuit shown in Fig.4, find the current ***I*** in 5Ω resistor. **(3)**

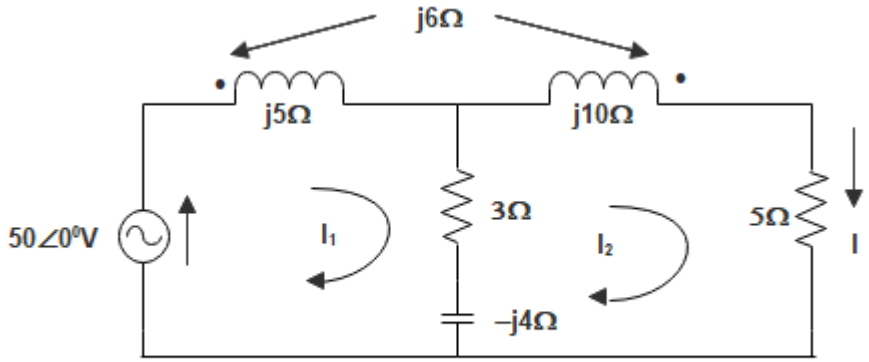

Fig.4

2C) State and prove Milliman's theorem for n number of voltage sources E_i connected in parallel considering the internal impedance Z_i in series with the sources. **(3)**

3A) For the network shown in Fig.5, the circuits attains steady state when the switch K is at the position "a" for t<0. At t=0, the switch K is changed from the position "a" to the position "b". find, **(4)**

$$(i)\ i(0^+), \qquad (ii)\ \frac{di(0^+)}{dt} \qquad (iii)\ \frac{d^2i(0^+)}{dt^2}$$

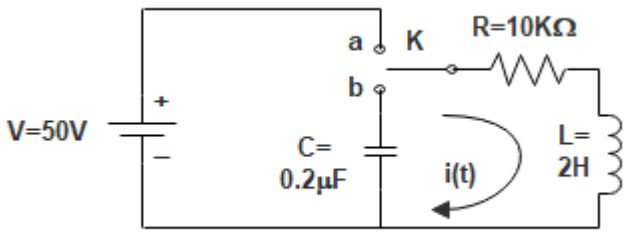

Fig.5

3B) For the circuit shown in Fig.6, the switch K is closed at t=0. Using Laplace transform find the expression of ***i(t)*** for t>0 and plot the waveform. **(3)**

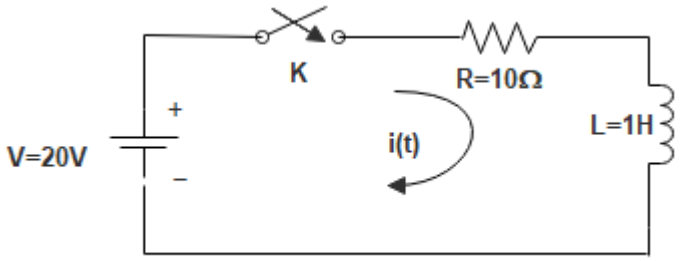

Fig.6

3C) . For the network shown in Fig.7, obtain its star equivalent circuit and draw the circuit with star equivalent components. **(3)**

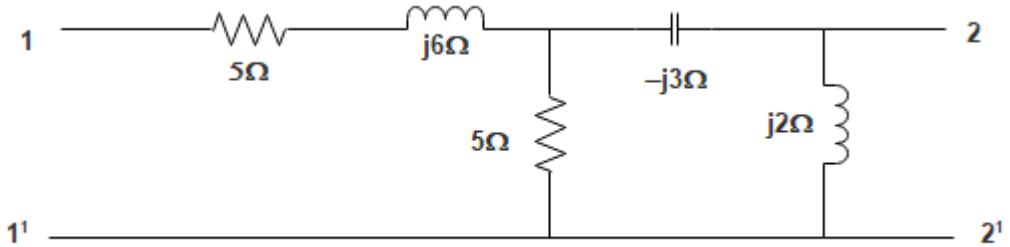

Fig.7

4A) For the circuit shown in Fig.8, find the h-parameters and draw the h-parameter model of this circuit. **(4)**

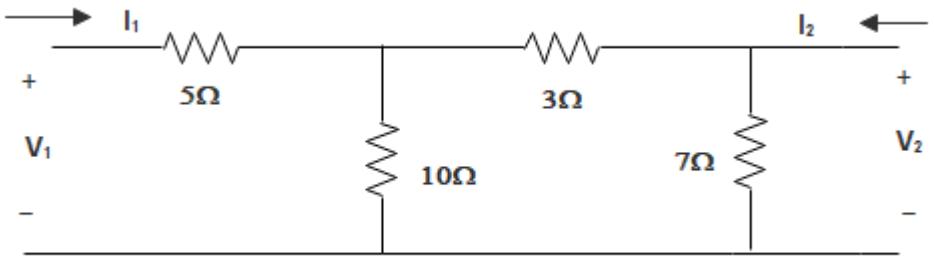

Fig.8

4B) For the waveform shown in Fig.9, obtain its Laplace transform using gate function. **(3)**

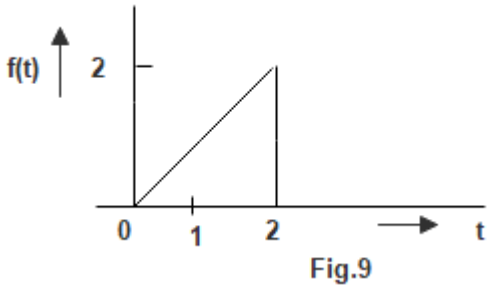

Fig.9

4C) For the periodic waveform shown in Fig.10, obtain its Laplace transform. **(3)**

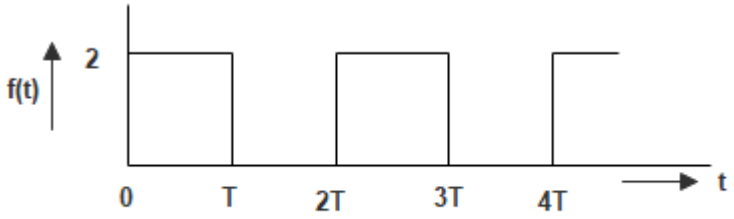

Fig.10

5A) For the network shown in Fig.11, find the expressions, **(4)**

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

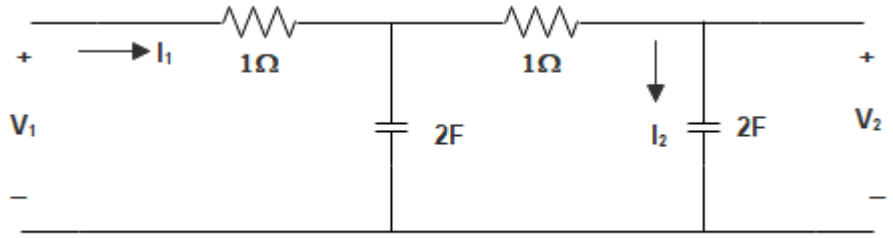

Fig.11

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. Derive the expressions of the output and sketch the waveform. **(3)**

5C) A symmetrical square wave whose average value is zero has peak to peak amplitude of 20 volts and a time period of 2 µSec. This waveform is applied to a low pass RC circuit having a RC time constant of 1 µSec. Calculate and sketch the steady state output waveform. **(3)**