Reg. No.

# MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

# THIRD SEMESTER B.Tech. (E & C) DEGREE END SEMESTER EXAMINATION NOV/DEC 2017

#### SUBJECT: NETWORK ANALYSIS (ECE - 2103) S MAX. MARKS: 50

## TIME: 3 HOURS

### Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.
- Do not use Laplace Transforms unless specified.
- 1A. For the circuit shown in Fig.Q1A, find the Thevenin's equivalent circuit between terminals a and b.
- 1B. In the network shown in Fig.Q1B, find the node voltages by nodal analysis.
- 1C. Find the current flow through the 50V source in the network of Fig.Q1C.

(5+3+2)

- 2A. In the network shown in Fig.Q2A, a steady state is reached with the switch open. At t = 0 the switch is closed. Determine  $V_{C}(0^{-})$ ,  $i_{1}(0^{+})$ ,  $i_{2}(0^{+})$ ,  $\frac{di_{1}}{dt}(0^{+})$  and  $\frac{di_{2}}{dt}(0^{+})$ .
- 2B. The network shown in Fig.Q2B reaches a steady state when the switch is closed. At t = 0, the switch is opened. Find v(t) for t > 0.
- 2C. The circuit shown in Fig.Q2C reaches a steady state when the switch is closed. The switch is opened at t = 0. Obtain an expression for  $i_L(t)$  valid for all *t*.

(5+3+2)

- 3A. A symmetrical square wave whose average value is zero has a peak to peak amplitude of 20V and a period of 2µs. The waveform is applied to a circuit whose upper 3-dB frequency is  $\frac{1}{2\pi}$  MHz. Calculate and sketch the steady state output waveform mentioning proper values. What is the peak to peak output amplitude?
- 3B. If a square wave of 5kHz is applied to an RC high pass circuit and the resultant waveform measured on a CRO was tilted from 15V to 10V, find out the lower 3-dB frequency of the high pass circuit.
- 3C. With the help of circuit and relevant expressions, explain how high pass RC circuit can be used as a differentiator.

(5+3+2)

- 4A. In the two-mesh network shown in Fig.Q4A, there is no initial charge on the capacitor. Find the loop currents  $i_1$  and  $i_2$  which result when the switch is closed at t = 0 using Laplace Transform.
- 4B. In the series *RL* circuit of Fig.Q4B, an exponential voltage  $v = 50e^{-100t}$  is applied by closing the switch at t = 0. Find the resulting current using Laplace Transform.

ECE -2103

4C. Write the equation for  $f_3(t)$  and find  $F_3(S)$  for the waveform shown in Fig.Q4C.

(5+3+2)

- 5A. For the network shown in Fig.Q5A, find the transmission parameters.
- 5B. For the network of Fig.Q5B, find  $Z_{11}$ ,  $Z_{12}$ , and  $G_{12}$ .
- 5C. Derive the expressions for z parameters in terms of y parameters.

(5+3+2)









Fig. Q1B



Fig. Q2A







Fig.Q2C



Fig.Q4A



Fig.Q4B









Page 3 of 3



Fig.Q5A