Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

THIRD SEMESTER B.TECH (INSTRUMENTATION & CONTROL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: ELECTRICAL CIRCUIT ANALYSIS [ICE 2101]

Time: 3 Hours MAX. MARKS:

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. In the network shown in FIG. Q1A determine a) current I b) current supplied by 4V battery using loop analysis. **5**

1B. For the circuit shown in FIG. Q1B, find the value of R_L for maximum power transfer. **3**

1C. Determine the current in R_L in the circuit shown in FIG. Q1C using superposition theorem. **2**

2A. Obtain the Norton's equivalent for the circuit shown in FIG. Q2A. **5**

2B. A series circuit with R= 5Ω , C=20μF and a variable inductance L has an applied voltage V = 10 V with a frequency of 1000 rad/s. L is adjusted until the voltage across the resistor is maximum. Find the voltage across each element. **3**

2C. Compare series and parallel resonance circuits. **2**

3A In the network shown in FIG. Q3A, steady state is reached with switch K opened . At t=0 switch is closed. Determine the values of Va(0-) and Va(0+). **5**

3B. For the network shown in FIG. Q3B, find V, dV/dt & d^2V/dt^2 at t=0+. **3**

3C. For the network shown in FIG. Q3C, a steady state is reached with switch closed. At t=0 the switch is opened. Solve for i(t) for t≥0. **2**

4A. In the network shown FIG. Q4A, the switch is opened at t=0, a steady state having previously been attained. Find i(t), for t≥0 using Laplace transform. **5**

4B. Sketch and write the Laplace transform of x(t) = r(t) –r(t-1) –r(t-3) + r(t-4) **3**

4C. Express the waveform shown in FIG. Q4C using basic signals and write the Laplace transform. **2**

5A. Find Y and Z parameters for the network shown in FIG. Q5A **5**

5B. The reduced incidence matrix of a linear graph is shown in FIG. Q5B.Draw the oriented graph. Select a tree with the branches 1 ,3,4,5 and construct tie set matrix. **3**

5C. For the network shown in FIG. Q5C, draw the oriented graph. Select a tree with branches 1 & 3 and construct the cut-set matrix. **2**

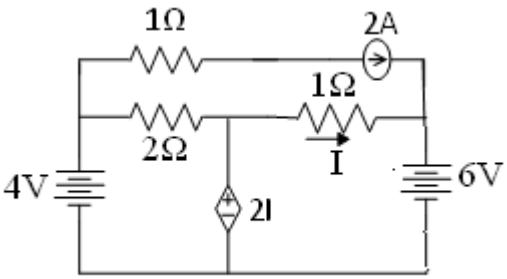

FIG. Q1A

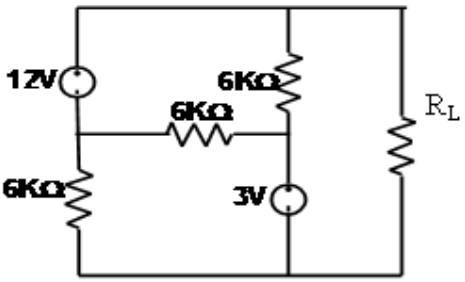

FIG. Q1B

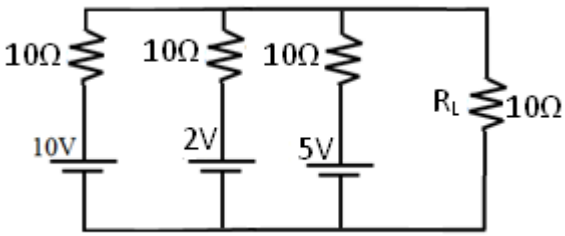

FIG. Q1C

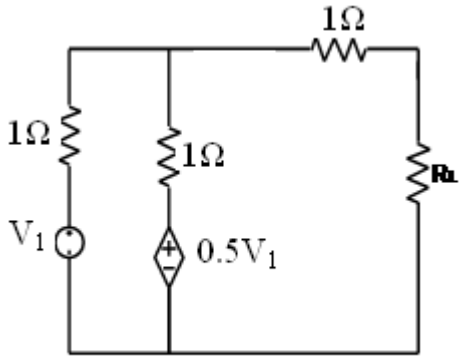

FIG. Q2A

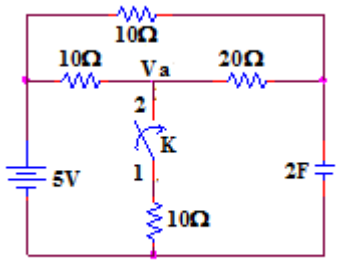

Fig. Q3A

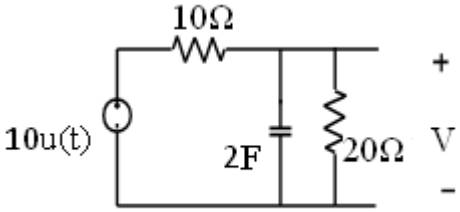

FIG. Q3B

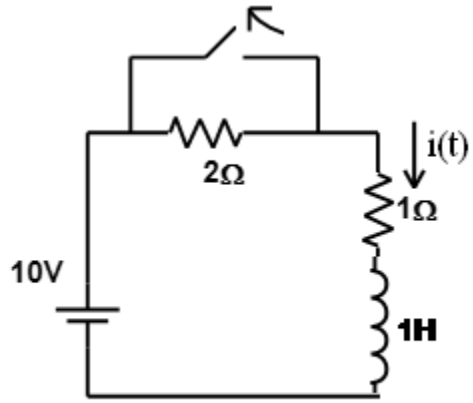

FIG. Q3C

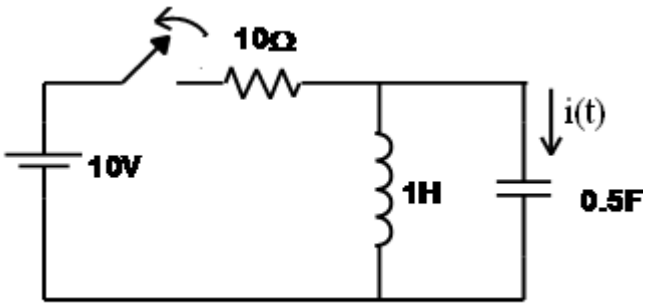

Fig. Q4A

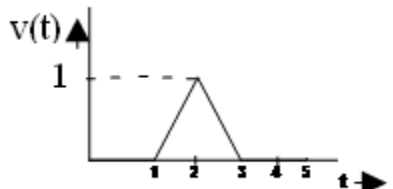

FIG. Q4C

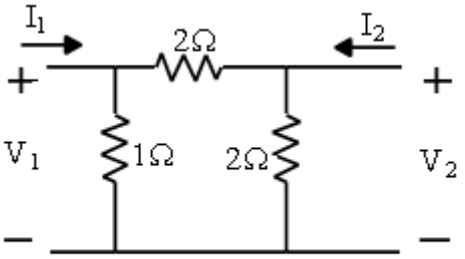

FIG. Q5A

$$\begin{bmatrix} +1 & +1 & 0 & 0 & 0 & 0 & +1 \\ -1 & -1 & +1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & +1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & -1 & -1 & 0 \end{bmatrix}$$

FIG. Q5B

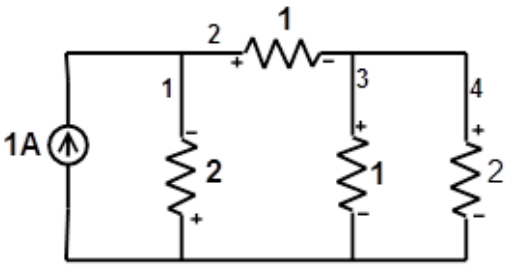

FIG. Q5C

****