Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Circuit Theory
Subject Code: 4TE03CIT1 **Branch:** B.Tech (EEE,EE)

Semester: 3 **Date: 28/03/2018** **Time: 02:30 To 05:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Kirchhoff second law is based on law of conservation of
(a) energy (b) charge (c) flux (d) Momentums

b) In an electric circuit, the dual of resistance is
(a) conductance (b) inductance (c) open circuit (d) short circuit

c) KCL works on the principle of which of the following
(a) Law of conservation of charge (b) Law of conservation of energy (c) Both (d) None of the above

d) The Superposition Theorem is used when the circuit contains
(i) Reactive Element
(ii) Active Element
(iii) Number of voltage Sources
(iv) Single voltage Source

e) To apply reciprocity theorem response to excitation ratio is
(a) Ohm (b) Mho (c) No units (d) Either Mho or Ohm

f) What is an step Function?

g) The internal Resistance of an ideal voltage source is
(i) Infinite (ii) Equal to the load resistance (iii) Zero (iv) To be determined

h) Norton's theorem is _____ Thevenin's Theorem.
(i) The same as (ii) older that (iii) The converse of (iv) more accurate than

i) Whenever current is supplied by a source its terminal voltage.
(i) increases (ii) decreases (iii) remains constant (iv) increases exponentially

j) A Branch of a network is said to be active when it consists of one
(i) resistor (ii) voltage source (iii) inductor (iv) Capacitor

k) Millman's theorem yield
(a) equivalent voltage & current source (b) equivalent impedance (c)equivalent resistance (d)All of the above

l) Define: Loop

m) If two resistors have same voltage drop in a series circuit it means

(a) they are equal value (b) they are connected in parallel (c) they are equal (d) They are unequal

n) Obtain the Laplace Transform for $f_1(t) = t$

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

(a) Explain the poles and zeros of the network function. State its important features. **(07)**

(b) Write down voltage and current relationships in resistor, inductor and capacitor. Obtain these relationships in "s" domain also. State assumptions if any in obtaining the relationship. **(07)**

Q-3 **Attempt all questions** **(14)**

(a) Use nodal analysis to find the voltage across the 5Ω resistor in the network of Fig.1 **(07)**

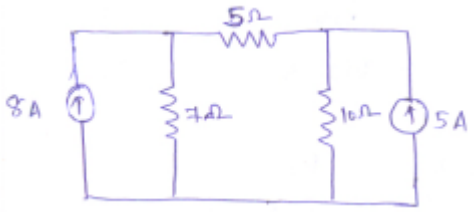

Fig.1

(b) Find the currents I_1, I_2 and I_3 in the given network of Fig 2 using mesh analysis. **(07)**

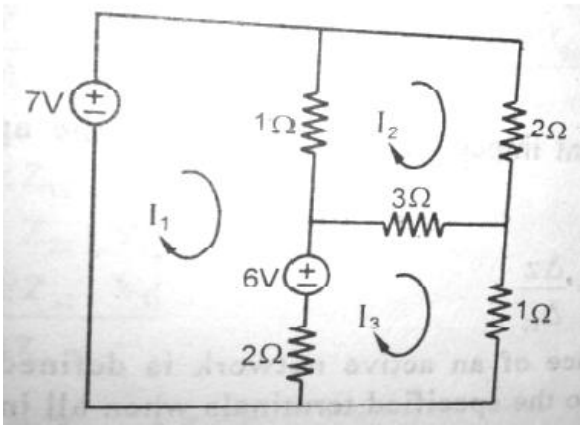

Fig.2

Q-4 **Attempt all questions** **(14)**

(a) Explain following terms of graph in network terminology with suitable example. (i) Tree (ii) Twing (iii) Link (iv) Co-tree (v) Incidence Matrix **(05)**

(b) Explain Ideal and Practical Energy sources. **(05)**

(c) Write a note on coefficient of coupling. **(04)**

Q-5 **Attempt all questions** **(14)**

(a) State maximum power transfer theorem and obtain proof of maximum power transfer theorem. **(05)**

(b) Explain Laplace transform of Exponential Function. **(05)**

(c) State and explain Kirchhoff's Laws with a suitable example. **(04)**

Q-6 **Attempt all questions** **(14)**

(a) Explain source transformation. **(05)**

(b) Find the voltage across 1 kΩ resistor in the circuit shown in Fig.3 using superposition **(05)**

theorem.

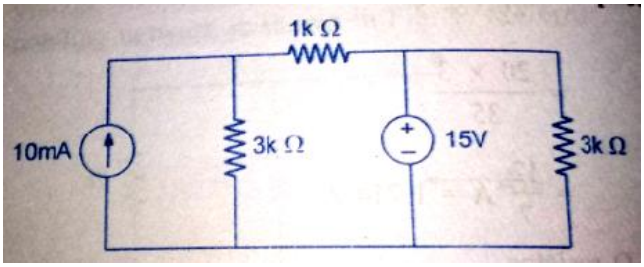

Fig.3

(c) The Z –Parameters of a circuit are given by $\begin{bmatrix} 4 & 1 \\ 3 & 3 \end{bmatrix}$ Find the transmission parameters. **(04)**

Q-7 **Attempt all questions** **(14)**

(a) Find the relation between ABCD parameter and Z- parameter & also find Vice-Versa. **(07)**

(b) A series R-L circuit is in parallel with a capacitance. Find the input impedance in Laplace domain. **(07)**

Q-8 **Attempt all questions** **(14)**

(a) In the network of Fig.4 the switch K is moved from 1 to 2 position at t =0, steady state having previously been attained. Find the current $V_c(t)$. **(07)**

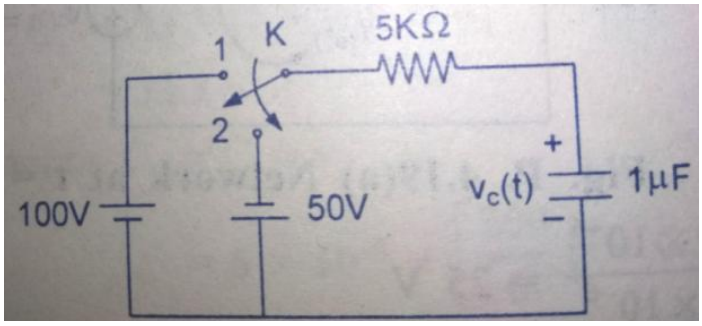

Fig.4

(b) In the network of the Fig.5 the switch k is closed at t=0 with the capacitor uncharged and with zero current in the inductor. Find the values of i, di/dt and d^2i/dt^2 at $t=0^+$.if V=100V, R=10 Ω, L= 1H and C=10μF. **(07)**

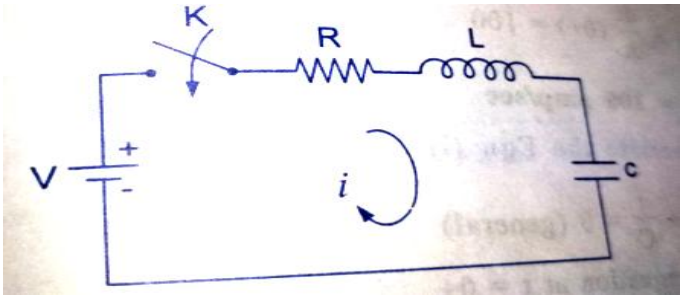

Fig.5