**Enrollment No: _____ Exam Seat No:_____**

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

**Subject Name: Circuit Theory**

**Subject Code: 4TE03CIT1** **Branch: B.Tech (EE,EEE,IC)**

**Semester: 3** **Date: 8/12/2015** **Time: 2:30 To5:30** **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.

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

**a)** Kirchhoff's law (KCL & KVL) are applicable to
(i) DC Circuit (ii)AC Circuit (iii) Dc as well as AC Circuits (iv) Passive network alone

**b)** Ideal Current Source and Voltage source have
(i) Low internal resistance and high internal resistance respectively
(ii) High internal resistance and low internal resistance respectively
(iii) Both of above
(iv) None of above

**c)** Define: Branch

**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)** Define: Linear graph

**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)** Define: Node

**l)** Define: Loop

**m)** A capacitance of 6μμF means
(i) 6pF (ii) 6nF (iii) 6fF (iv) 6aF

**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 terms ( i ) Linear (ii) Bilateral ( iii) Passive (iv) Reciprocal (v) Time invariant (vi) Lumped parameter and (vii) Dual with reference to Network. | **(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)** | For the circuit shown in the Fig.1, Find current through 6Ω resistance using loop analysis. | **(07)** |
| | **(b)** | Find the current through each resistor of the circuit shown in the Fig.2, using nodal analysis. | **(07)** |
| **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)** | Write basic cutset and loop incidence matrix for the following graph by taking 1, 2, 3 as tree branches as shown in the Fig.3. | **(05)** |
| | **(c)** | State and explain Kirchhoff's Laws with a suitable example. | **(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 Impulse Function. | **(05)** |
| | **(c)** | Write a short note on coefficient of coupling. | **(04)** |
| **Q-6** | | **Attempt all questions** | **(14)** |
| | **(a)** | Find the Inverse Laplace transform of given F(s) = (S+2) / S(S+3) (S+4) | **(05)** |
| | **(b)** | For the circuit shown in Fig.4, Find the current through branch AB using Thevenin's Theorem. | **(05)** |
| | **(c)** | The Z- Parameter of a two port network: $Z_{11}$= 20Ω, $Z_{22}$=30Ω, $Z_{12}$ =$Z_{21}$=10Ω. Find the ABCD parameter of the network. | **(04)** |
| **Q-7** | | **Attempt all questions** | **(14)** |
| | **(a)** | Find the system function if the d.c.gain of the system is 10 and pole-zero plots is as shown in the Fig.5. | **(05)** |
| | **(b)** | Find Z-Parameter for the network shown in Fig.6. | **(05)** |
| | **(c)** | Obtain Laplace transform of f(t) = 5 (t-2) u(t-1) | **(04)** |
| **Q-8** | | **Attempt all questions** | **(14)** |
| | **(a)** | In the network shown Fig.7 switch is opened at t = 0.Solve for $V_L$ ,dV/dt, $d^2V/dt^2$ for $t=0^+$. | **(07)** |
| | **(b)** | Obtain the response $v_c(t)$ and $i_L(t)$ for the source free RC and RL circuits respectively. Assume initial voltage $V_0$ and initial current $I_0$ respectively. | **(07)** |