

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.

Q-1 Attempt the following questions: (14)

- a) Kirchoff'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 $6\mu\text{F}$ 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 (07)
 (v) Time invariant (vi) Lumped parameter and (vii) Dual with reference to Network.
- (b) Write down voltage and current relationships in resistor, inductor and capacitor. (07)
 Obtain these relationships in “s” domain also. State assumptions if any in obtaining the relationship.
- 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. (05)
 (i) Tree (ii) Twing (iii) Link (iv) Co-tree (v) Incidence Matrix
- (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 Kirchoff'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: $Z_{11}= 20\Omega, Z_{22}=30\Omega, Z_{12}=Z_{21}=10\Omega$. 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. (07)
 Assume initial voltage V_0 and initial current I_0 respectively.

