

# C.U.SHAH UNIVERSITY

## Summer Examination-2016

**Subject Name: Circuit Theory**

**Subject Code: 4TE03CIT1**

**Branch: B.Tech (Electrical,EEE,IC)**

**Semester: 3**

**Date: 28/04/2016**

**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) KCL is a consequence of law of conservation of  
(a) energy (b) charge (c) flux (d) all of above
- b) The maximum value of the transmission parameter A for a passive, reciprocal, linear two port network is  
(a) 1 (b) 2 (c) 3 (d) none of the above
- c) Consider the following statements.  
1.orientation of the coils  
2.core material  
3. Number of turns on the two coils.  
4. self inductance of the two coils.  
Of these statements  
(a) 1,2 and 3 are correct (b) 1 and 2 are correct (c) 3 and 4 are correct (d) 1,2 and 4 are correct
- d) Given  $F(s) = \frac{s+2}{s(s+1)}$ , the initial and final values of f(t) will be respectively.  
(a) 1,2 (b) 2,1 (c) 1,1 (d) 2,2
- e) Kirchoff's law (KCL & KVL) are applicable to  
(a) DC Circuit (b) AC Circuit (c) Dc as well as AC Circuits (d) Passive network alone
- f) Define: Node
- g) Which one of the following theorems is a manifestation of the Law of conservation of Energy?  
(a) Tellegen's theorem (b) Reciprocity theorem (c) Thevenin's theorem (d) Norton's theorem
- h) The ideal transformer cannot be described by  
(a) h parameters (b) ABCD parameters (C) g parameters (d) z Parametres
- i) A dependent source  
(a) may be a current source or a voltage source (b) is always a voltage source (c) is always a current source (d) is neither a current source nor a voltage source.
- j) Maximum power transfer theorem finds its application in  
(a) power circuits (b) distribution circuits (c) communications circuits (d) both power and



communication

- k) A loop which does not contain any other loop within it ,is called  
(a)independent loop (b) closed loop (c) open loop (d) mesh
- l) Steady state response is obtained from the transient response by substituting  
(a) t=0 (b) t = -∞ (c) t = 1 (d) t = ∞
- m) In an electric circuit, the dual of resistance is  
(a) conductance (b) inductance (c) open circuit (d) short circuit
- n) What is an impulse Function?

**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 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) Find the voltage across 6Ω resistor in the network of Fig.1 using nodal analysis. (07)
  - (b) Find the current through 4Ω resistor branch of the network given in Fig.2 using mesh analysis. (07)
- Q-4 Attempt all questions (14)**
- (a) For the graph shown in Fig.3write the incidence matrix, tie set matrix. (05)
  - (b) Explain following terms of graph in network terminology with suitable example. (05)  
(i) Tree (ii) Twing (iii) Link (iv) Co-tree (v) Incidence Matrix
  - (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 step 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  $\frac{P(s)}{Q(s)} = \frac{s-1}{s^2+3s+2}$  (05)
  - (b) Find the current in the 5 Ω resistors for the circuit shown in Fig.4 using Norton’s theorem. (05)
  - (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) Explain following in Brief: Ideal and Practical Energy sources. (05)
  - (b) Find the Y-Parameter for the network shown in Fig.5. (05)
  - (c) Obtain the Laplace transformation of  $f(t) = 1-e^{-at}$  ,a being a constant. (04)
- Q-8 Attempt all questions (14)**
- (a) A series RLC circuit shown in Fig.6 with zero inductor current and zero capacitor voltage is excited by 50V dc source. Find  $i(0^+)$  and  $\frac{di}{dt}(0^+)$ . Take  $R=20\Omega$ ,  $C=10\mu F$ ,  $L=1H$ . (07)
  - (b) In the network of Fig.7 the switch K is moved from 1 to 2 position at  $t=0$ , steady state having previously been attained. Find the current  $i(t)$ . (07)



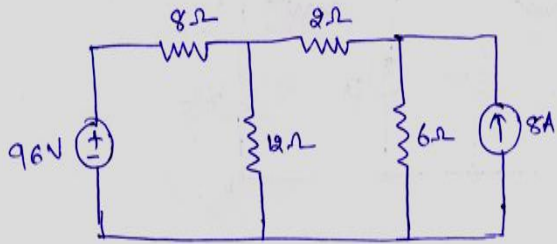


Fig. 1

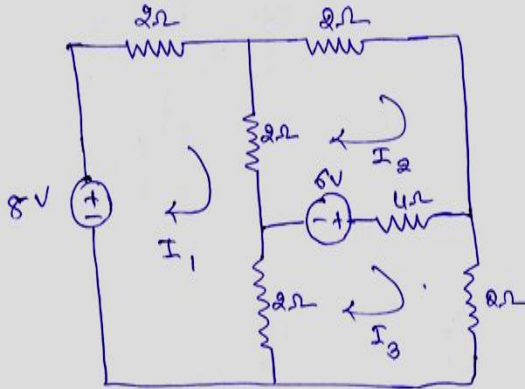


Fig. 2

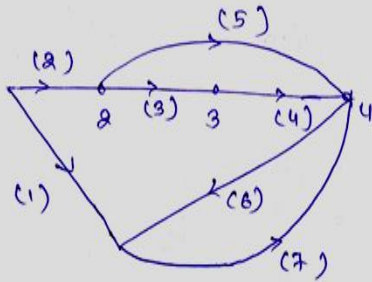


Fig. 3

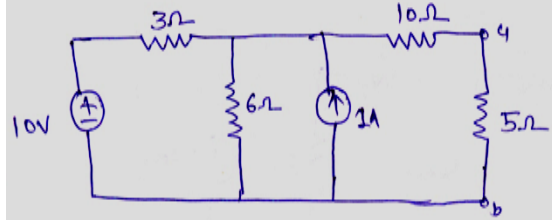


Fig. 4

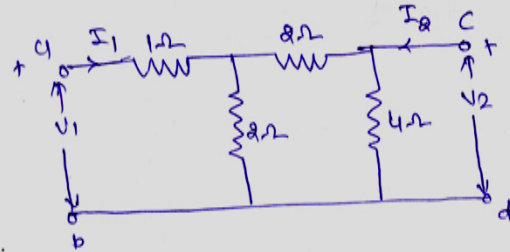


Fig. 5

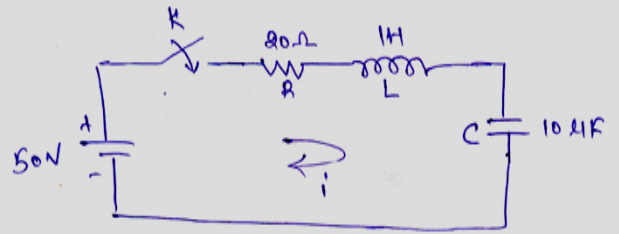


Fig. 6

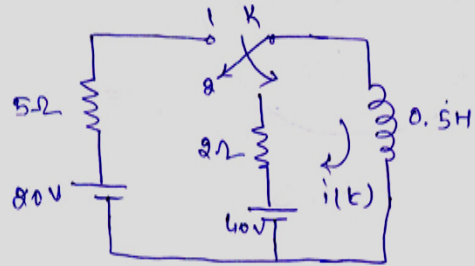


Fig. 7

