

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (OLD) EXAMINATION – WINTER 2017

Subject Code:130901

Date:17/11/2017

Subject Name: Circuits and Networks

Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Define following terms: **07**
(1) Linear and Nonlinear networks (2) Lumped and Distributed networks
(3) Passive and Active networks (4) Dependent source
- (b)** Explain following in Brief: Ideal and Practical Energy source. Using Node voltage analysis obtain the node voltages for the network shown in Fig. 1. **07**
- Q.2 (a)** For the network shown in Fig. 2, all sources are time invariant. Determine the branch current in $2\ \Omega$ resistor using source transformation method. **07**
- (b)** State thevenin's theorem; find R_{th} and V_{th} for the network shown in Fig.3. Also draw thevenin's equivalent circuit. **07**
- OR**
- (b)** State Norton's theorem and find R_N , I_{sc} and I_L for the network shown in Fig.4 **07**
- Q.3 (a)** Explain the "Dot Convention Rule" for the magnetically coupled Network. Explain the method to put the Dots on different linked coils using suitable example. **07**
- (b)** State KVL and find loop currents I_1 , I_2 and I_3 using mesh current analysis for the network shown in Fig.5. **07**
- OR**
- Q.3 (a)** State and explain Millman's theorem. Obtain the Millman's equivalent circuit for the circuit shown in Fig.6 **07**
- (b)** Explain the dual network and concept of duality with suitable Example. **07**
- Q.4 (a)** Explain the Laplace Transformation method and its advantages over the classical methods. **07**
- (b)** State and give the proof of the Initial and Final Value Theorem. **07**
- OR**
- Q.4 (a)** Explain the Poles and Zeros of the Network function. State its important features and explain its physical significance **07**
- (b)** In the circuit shown in Fig.7, the switch K is moved from position a to position b at time $t=0$, the steady state having previously established. Find the particular solution for the circuit for $t \geq 0$. **07**
- Q.5 (a)** Define Y parameters. Also derive ABCD parameters from Y parameters. **07**
- (b)** Obtain z-parameters for the network shown in Fig. 8. Draw the z- parameter equivalent model and find whether the network is (a) reciprocal (b) symmetrical **07**

OR

Q.5 (a) What is an impulse function? For the network function $H(s)$ given below, Find the impulse response $h(t)$. **07**

$$H(s) = \frac{1}{s^2 + 2s + 1}$$

(b) The reduced incidence matrix of an oriented graph is **07**

$$A_r = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

- (i) Draw the graph
- (ii) How many trees are possible for this graph
- (iii) Write the tieset and f-cutset matrices.

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