

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**PDDC SEM-II Examination-Dec-2011**

Subject code: X20901

Date: 22/12/2011

Subject Name: Circuits &amp; Network

Time: 10.30 am -1.00 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) Give the classification of networks. 07  
(b) State and explain Millman's theorem. 07

- Q.2** (a) Derive the symmetry and reciprocity condition for y-parameters. 07  
(b) Explain tree, co-tree and incidence matrix with one suitable example and also give the properties of tree. 07

**OR**

- (b) Discuss the techniques of Source transformation. 07

- Q.3** (a) Give the important features and explain physical significance of poles and zeros in network functions. 07  
(b) Obtain the Laplace transform of the following: 07  
1)  $u(t - a)$  2)  $r(t - a)$  3)  $\delta(t - a)$

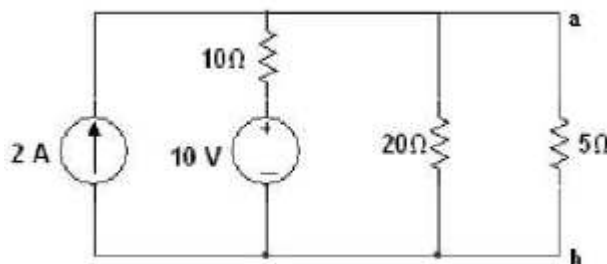
**OR**

- Q.3** (a) A series RLC circuit with  $R = 2 \text{ ohm}$ ,  $L = 1 \text{ H}$  and  $C = 0.5 \text{ Farad}$  with the applied voltage  $V(t) = \sin t$ . Find  $i(t)$  if the switch is closed at  $t = 0$ . Use Laplace transform method. 07  
(b) What is time constant? Explain its significance through one suitable example. 07

- Q.4** (a) Give the advantage of node analysis over mesh analysis. Explain the concept of super-node and Super-mesh. 07  
(b) State and Explain super-position theorem 07

**OR**

- Q.4** (a) Using thevenin's theorem find out the load current through  $5 \text{ ohm}$  resistance shown in figure below: 07



- (b) Derive the orthogonal relationship between fundamental loop matrix and cut-set matrix. 07

- Q.5 (a)** Prepare a list of dual quantities encountered in electrical engineering. Give a procedure to draw the dual of network. **07**
- (b)** State and explain the initial and final value theorem? Under what condition final value theorem is not applicable. **07**

**OR**

- Q.5 (a)** Derive the conditions of maximum power transfer **07**
- When load consists of a variable resistance
  - When load consists of a variable resistance and variable reactance
- (b)** The z-parameters of certain two-port networks are:  $z_{11} = 5$  ohm,  $z_{12} = z_{21} = 3$  ohm,  $z_{22} = 4$  ohm find: ABCD parameters and h-paramtres **07**

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