

**2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**

**I I B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS  
APPLIED SYSTEM ENGINEERING  
(COMPUTER SCIENCE & SYSTEMS ENGINEERING)**

APRIL/MAY 2005

TIME 3 HOURS  
MARKS: 80

Answer any **FIVE** Questions  
All Questions carry equal marks

1. (a) Prove that the number of vertices of odd degree in a graph is always even.  
(b) Find whether Hamiltonian circuit or path is present in the following graph.
2. (a) Define the following terms with respect to trees:
  - i. eccentricity
  - ii. Center
  - iii. Diameter
 (b) Discuss the steps involved in Kruskal's algorithm for shortest spanning tree. Demonstrate with a suitable example.
3. (a) Find the dual of the following graph.  
(b) State and prove that Euler's formula for planar graphs.
4. (a) Explain the steps involved in detection of planarity.  
(b) If  $x$  is the adjacency matrix of a graph  $G$ , with  $n$  vertices and  $y = x + x^2 + x^3 + \dots + x^{n-1}$  then  $G$  is disconnected if and only if there exist at least one entry in matrix  $y$  that is zero.
5. (a) If the following is the best of all spanning trees of a graph  $G$ , determine  $G$ .  
 $\{a, c, d, c\}$ ,  $\{a, c, d, f\}$ ,  $\{b, c, d, e\}$ ,  $\{b, c, d, f\}$ ,  $\{a, c, e, f\}$ ,  $\{b, c, e, f\}$ ,  $\{a, d, e, f\}$ ,  
 $\{b, d, e, f\}$ ,  $\{a, b, d, e\}$ ,  $\{a, b, d, f\}$  and  $\{a, b, e, f\}$ .  
 (b) Prove that every connected graph has a directed Hamiltonian path.
6. (a) Discuss about systems approach for modeling.  
(b) Describe the linear lumped models.
7. (a) Explain how the linear approximation is performed on non-linear systems.  
(b) Discuss about various topological models of systems.
8. (a) Describe the systems with multiterminal components.  
(b) Explain the general rules followed in formulation of systems equation