COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute Of Government Of Maharashtra)

End-Sem Examination

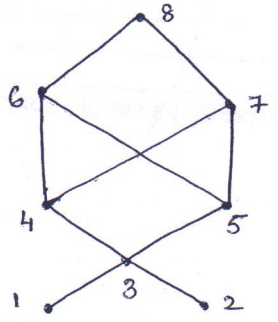
(CT 201) DISCRETE STRUCTURE AND GRAPH THEORY

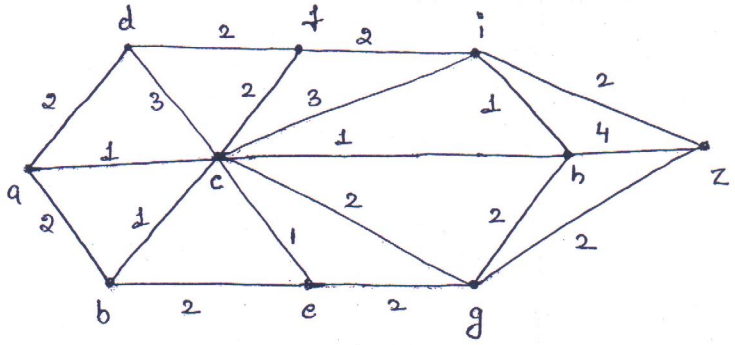
Programme: S.Y.B.Tech
Year: 2011-12
Duration: 3 hrs

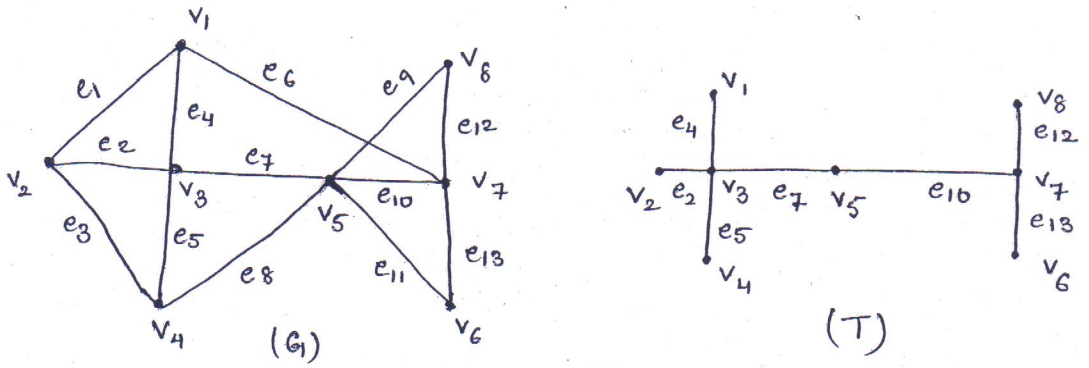
Semester: Autumn
Max.Marks: 50

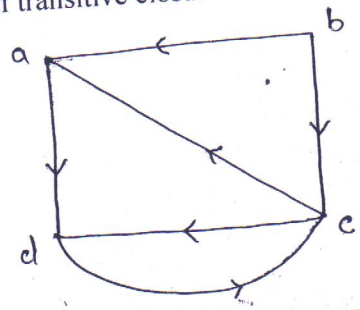
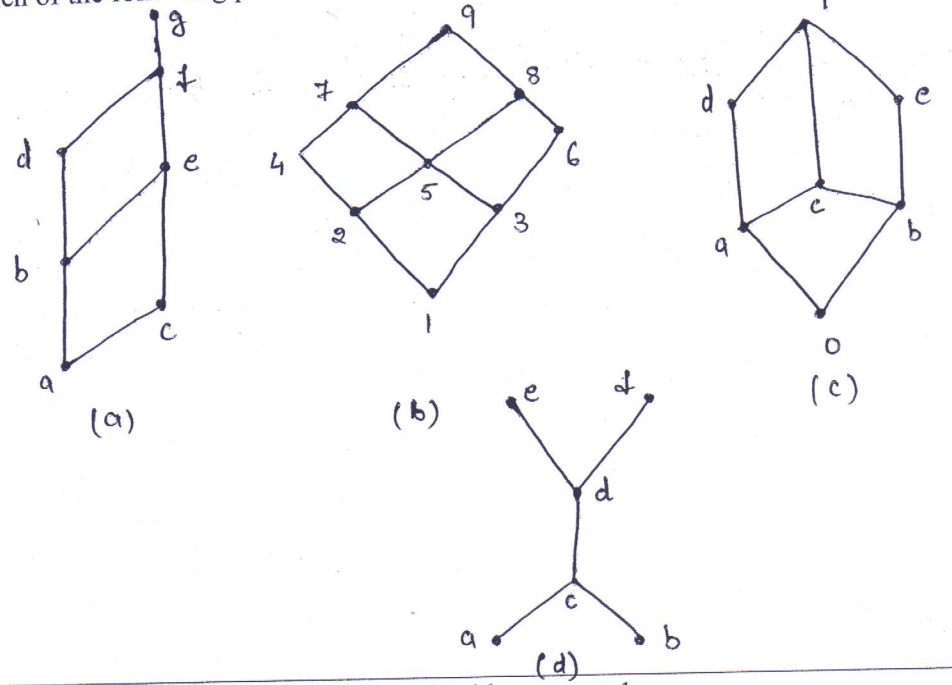
Instructions:

1. Draw the diagrams whenever required.
2. Explain with suitable example, whenever required.

SR. NO.	QUESTIONS	MARKS
Qu1.		
A.	A connected planar graph has 9 vertices having degrees 2, 2,2,3,3,3,4,4 and 5. How many edges and faces are there?	**2**
B	A telephone network is established among 100 people. Information received by the first person is passed along to the 99 others as follows; the first person calls exactly 3 people, and each of these people calls 3 others, and so on until there are no others to call. If each call takes 5 minutes, how long does it take for a message to be relayed from the first person to receive the message to everyone else? How many people make no calls?	**5**
C	Construct a unique binary tree whose in-order, pre-order and post-order traversal is given below: **a)** In-order : d g b e i h j a c f Pre-order: a b d g e h i j c f b) In-order : d c e b f a h g i Post-order: d e c f b h i g a	**4**
D.	Consider the poset A={1,2,3,4,5,6,7,8}under partial order whose Hasse diagram is given below. Consider the subset B={1,2}, C={3,4,5} of A.  Determine: a) All the Lower bound and Upper bound of B, C. b) glb(B) & lub(B) c) glb(C) & lub(C)	**4**
Qu 2.		
A.	Find the shortest path between a and z for the following graph using Dijkstra's algorithm.	**5**



B.	Find the fundamental cut set for the graph G with respect to spanning tree T is given below: 	3
C.	When a wheel graph on n vertices is regular? Draw the appropriate graph.	2
D.	Show that if 20 persons are selected for presenting a cultural programme, then one may select a subset of 3 so that all three would be able to present their programmes on the same day of the week.	3
Qu3.		
A.	Which of the following degree sequence represent a simple non directed graph? Justify your answer with appropriate reason. a) {2, 3, 3, 4, 4, 5} b) {2, 3, 4, 4, 5} c) {1, 3, 3, 4, 5, 6, 6} d) {2, 2, 3, 3}	2
B.	Find how many integers from 1 to 60 that are divisible by2 nor by 3 and nor by 5. Also determine the number of integers divisible by 5, not by2, not by 3.	3
C.	Check the validity of the following arguments: a)"if A has completed MCA or MBA, then she is assured of a good job. If A is assured of a good job, she is happy. A is not happy. So A has not completed MBA". b) "If today is Sunday, then Yesterday was Saturday. Yesterday was Saturday. Today is Sunday".	2

	c)"If I drive to work then I will arrive in time. I do not drive to work. Therefore I will not arrive in time". d)"If I try hard and I have a talent, then I will become Scientist. If I become a Scientist, then I will be happy. Therefore, if I will not be happy, then I did not try hard or do not have talent".	
D.	Let $R=\left\{ \begin{bmatrix} a & b \\ b & a \end{bmatrix} : a, b \in z \right\}$ f is the mapping that takes $\begin{bmatrix} a & b \\ b & a \end{bmatrix}$ to $(a-b)$ Show that it is a homomorphism?	3
Qu4.		
A.	Find the matrix of transitive closure of R using Warshall's algorithm. 	3
B	Which of the following posets are lattices? Justify your answer with appropriate reason. 	2
C.	Solve $a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r$, $r >= 2$ with $a_0 = a_1 = 1$	3
D.	Consider the following Statements: S1: $\exists x \left(P(x) \rightarrow Q(x) \right) \iff \forall x\, P(x) \rightarrow \exists x\, Q(x)$	2

	S2: $\left[\exists_x p(x) \rightarrow \forall_x q(x)\right] \Leftrightarrow \forall_x \left[p(x) \rightarrow q(x)\right]$ Which of the statement is correct? a) S1 is True & S2 is False b) S1 is False & S2 is True c) S1 is True & S2 is True d) S1 is False & S2 is False	
E	If A is a set of all non singular matrices of order n and * is a matrix multiplication operation then which of the following is false? Justify with appropriate reason. a) (A, *) is a monoid b) (A, *) is a group c) (A, *) is a semigroup d) (A, *) is a abelian	**2**