

B.E DEGREE EXAMINATIONS: NOV / DEC 2014

(Regulation 2009)

Seventh Semester

COMPUTER SCIENCE AND ENGINEERING

MAT111: Graph Theory

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The number of edges in a complete graph with 6 vertices is

a) 6	b) 5
c) 30	d) 15
2. The degree sequence of the Hamiltonian graph with 5 vertices cannot be

a) 2,2,2,2,2	b) 2,2,1,1,2
c) 2,2,3,3,2	d) 2,3,3,3,3
3. Number of Edges in a tree with n vertices is

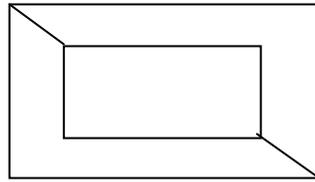
a) n	b) n+1
c) n-1	d) n(n-1)/2
4. The eccentricity of a vertex v in a graph G is

a) $\text{Max}_{u \in V} d(u, v)$	b) $\text{Max}_{u \in V} d(u, v)^2$
c) $\text{Min}_{u \in V} d(u, v)$	d) $\text{Min}_{u \in V} d(u, v)^2$
5. The number of edges in a k – chromatic graph with n vertices is at least

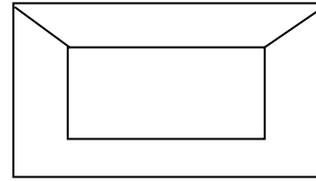
a) $\binom{n}{2}$	b) n
c) $\binom{k}{2}$	d) k
6. A Connected planer graph with 5 vertices and 5 edges has

- b) (i) Prove that a simple graph with n vertices and k components can have at most (8)
 $\frac{(n-k)(n-k+1)}{2}$ edges.

- (ii) Prove that the following two graphs G_1 and G_2 are not isomorphic. (6)



G_1



G_2

22. a) (i) For a simple graph G if $diam(G) \geq 3$ then show that $diam(\overline{G}) \leq 3$ (7)
(ii) Define Binary tree and represent the expression $((a-c)*d)/(a+(b-d))$ as a binary tree. (7)
tree.

(OR)

- b) Prove that the following statements are equivalent

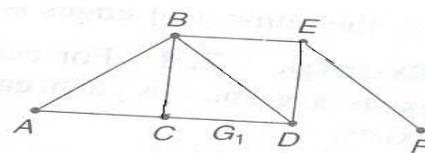
- (i) T is a tree with n vertices
- (ii) T is connected and number of edges in T is $n-1$
- (iii) T is minimally connected
- (iv) There is exactly one path between every pair of vertices

23. a) Prove that a connected planer graph with n vertices and e edges has $e - n + 2$ regions

(OR)

- b) (i) Show that the chromatic number of a cycle C_n is two if n is even and three if n is odd (7)
(ii) If H is a k -critical graph then show that $\delta(H) \geq k - 1$ (7)

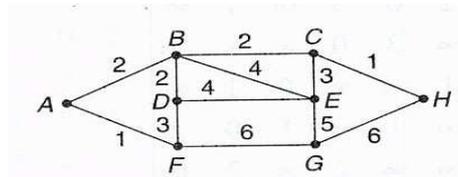
24. a) For the graph G_1 given below find (i) Incidence matrix (ii) Circuit Matrix (iii) adjacency matrix and (iv) path matrix from A to E , A to F



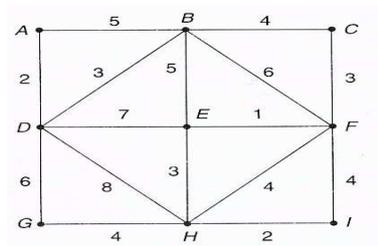
(OR)

- b) (i) Mention the properties of Incidence Matrix of a Graph (7)
(ii) Show that the rank of a circuit matrix of a connected graph with e edges and n vertices is $e - n + 1$ (7)

25. a) (i) Use Dijkstra's Algorithm to find the shortest path between the vertices A and H (7) in the weighted graph given below

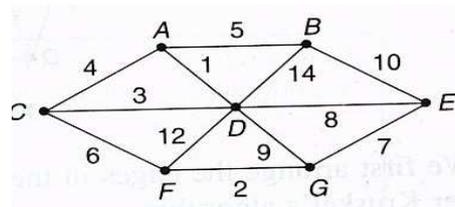


- (ii) Use Kruskal's Algorithm to find a minimum spanning tree for the weighted graph given below (7)



(OR)

- b) (i) Use Prim's Algorithm to find a minimum spanning tree for the weighted graph given below (7)



- (ii) Define a spanning tree. Find all the spanning tree for the graph given below (7)

