



Date: 31-10-2018  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

ANSWER ALL QUESTIONS

1. (a) Show that the girth of a Petersen graph is 5.

[OR]

- (b) Prove that every closed walk contains an odd cycle.

(5)

- (c) (i) State and prove the characterization theorem for trees.

- (ii) Write Fleury's algorithm.

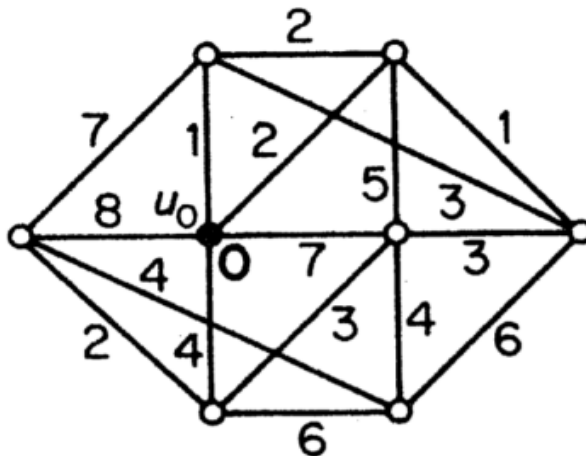
(10+5)

[OR]

- (d) (i) Write Dijkstra's algorithm.

- (ii) Apply Dijkstra's algorithm to find shortest path from  $u_0$  to all other vertices of the following graph.

(5+10)



2. (a) Prove that in a planar graph inner bridges avoid each other.

[OR]

- (b) Find the number of different perfect matching in  $K_{n,n}$ .

(5)

- (c) State and prove Kuratowski's theorem.

(15)

[OR]

- (d) (i) State and prove Chvatal theorem for Hamiltonian graphs.

- (ii) State and prove marriage theorem.

(10+5)

3. (a) Write DFS algorithm.

[OR]

(b) Write transitive orientation property and give an example . (5)

(c) (i) Prove that an interval graph satisfies the triangulated graph property. Also discuss about the converse.

(ii) Prove that  $C_7$  is not a comparability graph. (8 + 7)

[OR]

(d) (i) State and prove any three properties of a split graph.

(ii) Prove that every triangulated graph  $G$  has a simplicial vertex. If  $G$  is not a clique then prove that it has two nonadjacent simplicial vertices. (9 + 6)

4. (a) Draw the permutation graph for  $(4,3,5,2,7,6,1)$  .

[OR]

(b) Give necessary and sufficient conditions for a tree to be a split graph  $G$ . (5)

(c) (i) State and prove the characterization theorem for permutation graphs.

(ii) Discuss about permutation labeling with an example. (10 + 5)

[OR]

(d) (i) State and prove Hammer Simone theorem for degree sequence of a split graph.

(ii) Derive the permutation to obtain  $K_n$  . (10 + 5)

5. (a) Define a circular arc graph and give an example.

[OR]

(b) Give an example for an interval graph which is not an unit interval graph . (5)

(c) State and prove the characterization theorem for interval graphs. (15)

[OR]

(d) (i) State and prove Characterization theorem for proper circular-arc-graphs.

(ii) Write any two applications of intersection graphs. (10+5)

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