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Printed Pages : 6

Paper Code : BCA204

BCA (Year-I) (Semester-II) Examination, 2022

COMPUTER APPLICATION

[Paper : Fourth]

(Discrete Mathematics)

Time : 3 Hours] **[Maximum Marks : 100**

Note : Attempt questions from all sections as per given instructions.

Section-A

(Very Short Answer Type Questions)

Note : Attempt **all** parts of this question. Give answer of each part in about **50** words. [2×10=20]

1. (i) Define power set with an example.

   (ii) Define cyclic group.

   (iii) Define simple graph with an example.

   (iv) Define isomorphic graph.

   (v) State path and circuit.

   (vi) Define Singly linked list.

   (vii) Show that every self complementary graph has 4k or 4k-1 vertices.

   (viii) Define Bipartite graph.

   (ix) Define tree and their properties.

   (x) Write Ford and Fulkerson algorithm.

Section-B

(Short Answer Type Questions)

Note : Attempt **all** questions of this section. Give answer of each question in about **200** words. [10×5=50]

2. State and prove Handshaking Lemma.

OR

What is Graph? Explain its terminology.

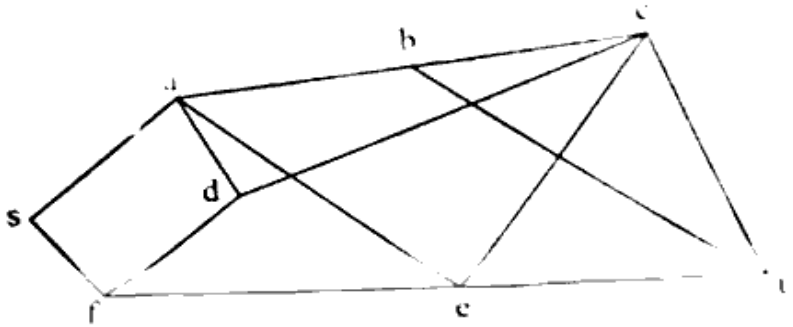
3. **(a)** If $A = \{2, 3, 4, 5\}$ and $B = \{0, 1, 2, 3\}$, find $A \cap B$.

   (b) If $A = \{1, 2, 3\}$, $B = \{3, 4, 5\}$ and $C = \{0, 2, 3\}$, find $(A \cap B) \times C$.

OR

Prove that a graph G with n vertices $(n - 1)$ edges and no circuits is a tree.

4. Find the shortest path from vertex s to t and its length from the graph given below:



OR

Give an example of a graph which is Hamiltonian but not non-Eulerian.

5. Write Fleury's Algorithm.

OR

A simple graph G has a spanning tree if and only if G is connected.

6. A tree has two vertices of degree 2, one vertex of degree 3 and three vertices of degree 4. How many vertices of degree 1 does it have?

OR

Write short notes on the following with example.

(a) Pseudo graph

(b) Cycle graph

(c) Directed graph

Section-C

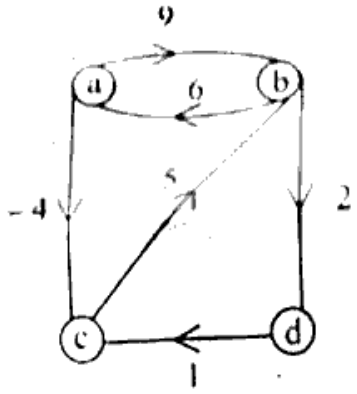
(Long Answer Type Questions)

Note : Answer **any two** questions of this section. Give answer of each question in about **500** words.

[15 · 2 = 30]

7. For the set $I_4 = \{0, 1, 3\}$, show that the modulo 4 system is a ring.

8. In the given graph G :



Find the all pair shortest path by using Folyd Waishal Algorithm.

9 Write short notes on the following :

(a) Travelling salesman problem

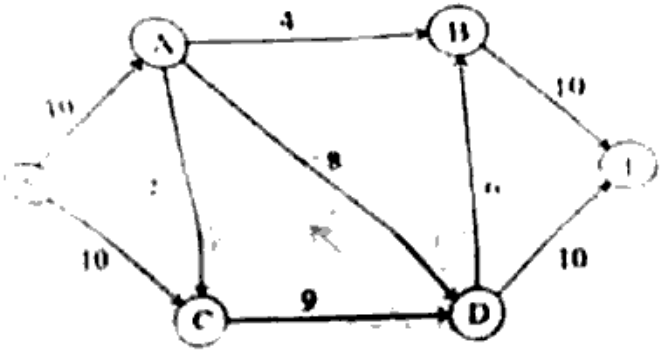
(b) Max-flow Min-cut theory

10. Let $f = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{bmatrix}$ and

$$g = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$$

be two permutations of degree 3. Then find fg and gf, and $fg = gf$ or not.

11



Calculate the Bottle neck capacity using Ford-Fulkerson Algorithm.

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