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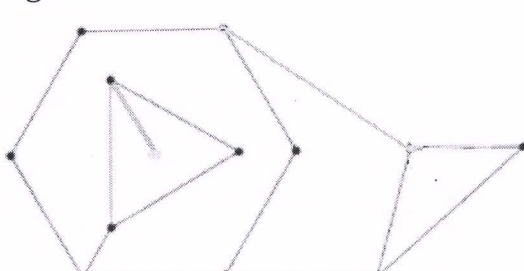
**DECEMBER 2021 - ENDSEM EXAM**  
**S. Y. B. TECH. (AI&DS) (SEMESTER - I)**  
**COURSE NAME: Discrete Mathematics**  
**COURSE CODE: ES21201AD**  
**(PATTERN 2020)**

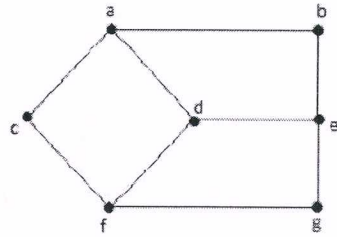
Time: [1Hr]

[Max. Marks: 30]

**(\*) Instructions to candidates:**

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Question No.	Question Description	Marks
Q.1 a	Determine number of regions in given graph. Evaluate rank of each region.	[4]
		
Q.1 b	Determine if Eulerian path, Eulerian circuit, Hamiltonian Path, Hamiltonian circuit is present in the given graph or not. If present write the sequence of vertices in respective path and circuit. Give justifications.	[6]



**OR**

Q2 a Discuss four necessary conditions for two graphs to be isomorphic. Determine whether  $K_6$  and  $K_{3,3}$  graphs are isomorphic or not. [4]

Q2 b Elaborate the concept of chromatic number of a graph? Discuss its usage in real life. Comment on chromatic numbers of cyclic, complete and bipartite graphs. [6]

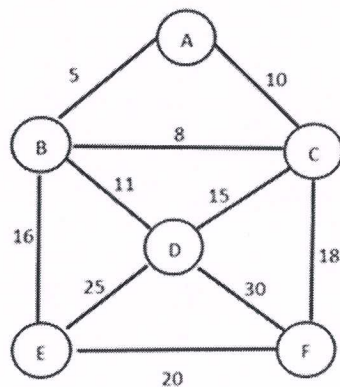
Q.3 a Explain the concept of spanning tree and minimum spanning tree using appropriate examples. Determine number of spanning trees that can be derived from a complete undirected graph having 5 vertices? [4]

Q.3 b Design an optimal Huffman tree for following frequencies. Determine Huffman codes for each frequency. Calculate average code length. Frequencies: 60,20,150,40,80,30 [6]

**OR**

Q.4 a Using of Aho, Hopcroft and Ullman (AHU algorithm) to determine isomorphism of two trees with appropriate example. [4]

Q.4 b Elaborate the steps in Kruskal's algorithm to derive minimum spanning tree. Also derive minimum spanning tree from given graph using Kruskal's algorithm. Show step by step results. [6]



Q.5 a Distinguish between finite geometric system and Euclidean geometric system. Discuss the basic axioms that are satisfied by finite projective geometry. [4]

- Q.5 b      Following is given the number of vaccines in the duration of 10 days.      [6]  
Develop a mathematical model to relate day and number of vaccines.  
Estimate the number of vaccines on the 11<sup>th</sup> day.

Day	Vaccines
Day 1	579
Day 2	635
Day 3	1299
Day 4	3017
Day 5	3946
Day 6	5367
Day 7	8128
Day 8	11192
Day 9	13156
Day 10	18858

**OR**

- Q.6 a      Discuss use of a dual graph for VLSI floor planning? Design dual graph for following floor plan.      [4]

A		E
B	C	
D		

- Q.6 b      Elaborate the concept of Graph Databases. Distinguish approach of relational database and graph database for addition of a new relation in database with appropriate example.      [6]

**(\*) Course coordinator can change instructions as per course requirement**