

B.C.A. - II (CBCS Pattern) Semester-III  
**UBCAT305 - Paper-V : Discrete Mathematics**

P. Pages : 2

Time : Three Hours



**GUG/W/24/11761**

Max. Marks : 40

- Notes :
1. All questions are compulsory and carry equal marks.
  2. Draw neat and labelled diagram and use supporting data wherever necessary.
  3. Avoid vague answers and write specific answers related to questions.

**Either:**

1. a) Define the different types of sets with example. 4
- b) Give two sets  $A = \{1, 2, 3, 4\}$  and  $B = \{3, 4, 5, 6\}$ , Find  $A \cup B$ ,  $A \cap B$  and  $A - B$ . 4

**OR**

- c) Explain the properties of integers, including the Greatest Common Divisor (GCD) and Least Common Multiple (LCM). 4
- d) Solve the matrix equation: 4

$$\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

**Either:**

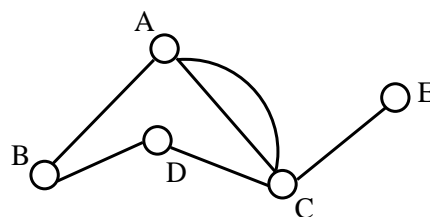
2. a) Describe the basic counting principles and how they are used in combinatorial problems. 4
- b) Calculate the number of permutations of the letter in the word 'MATHEMATICS'. 4

**OR**

- c) Calculate in how many ways one can select 3 objects out of a set of f object. 4
- d) What is the pigeon hole principle? How many line can be drawn through 10 points on a circle? 4

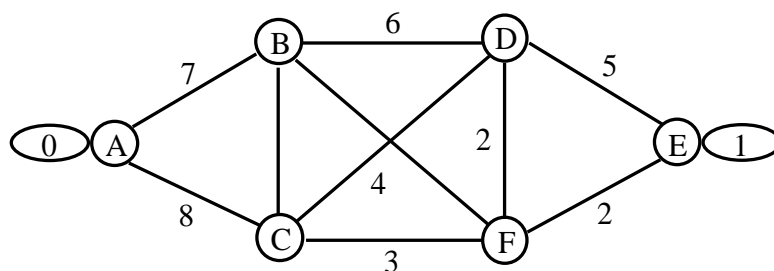
**Either:**

3. a) Explain the concept of Euler paths and circuits provide on example of each. 4
- b) Given a graph, determine if it contains an Euler Circuit. If it does list the circuit. 4



**OR**

- c) Determine the number of spanning tree in a complete graph with 4 vertices. 4
- d) Apply a Kruskal's algorithm on given weighted graph. Find minimal spanning tree. 4



**Either:**

4. a) Define a binary operation. What conditions must be met for a binary operation to be a graph. 4
- b) Given the binary operation  $*$  on the set  $\{1, 2, 3\}$  defined by  $a * b = a + b - 1$ , determine if this forms a semi-group. 4

**OR**

- c) Explain the concept of isomorphism and homomorphism with example. 4
- d) Given a group  $G$  with elements  $\{e, a, b\}$  and a group operation table, identify the identify element and the inverse of each element. 4
5. Solve all the questions.
- a) Write a note on Venn-Euler Diagram. 2
- b) Find out the number of distinguishable permutations of the word 'BANANA'. 2
- c) Write note on sub graph. 2
- d) Discuss about Abelian group. 2

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