

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

P. Pages : 2

Time : Three Hours



GUG/S/25/11761

Max. Marks : 40

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

Either :

1. a) What is set? Explain different operations on set in detail. 4
- b) Prove that $A \cap (B - C) = (A \cap B) - (A \cap C)$. 4

OR

- c) If $A_1 = \{1, 2\}$, $A_2 = \{2, 3\}$ and $A_3 = \{1, 2, 3, 6\}$ then find $\bigcup_{i=1}^3 A_i$ and $\bigcap_{k=1}^3 A_i$ 4

- d) If $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{bmatrix}$ compute $A \circ B$ 4

Either :

2. a) To prove $p(n, n) = 2 \times p(n, n-2)$ 4
- b) Determine the value of n if 4

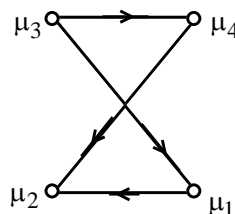
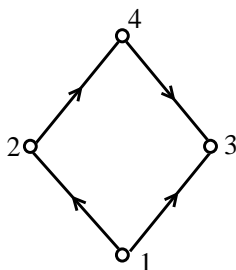
$$6 \times {}^{n+1}P_3 = 3 * P_3$$

OR

- c) If there are 4 Blue, 3 Red and 2 Black pens. These are drawn one by one. Determine all different permutations. 4
- d) How many distinguishable permutations of the letter in word BOOLEAN 4

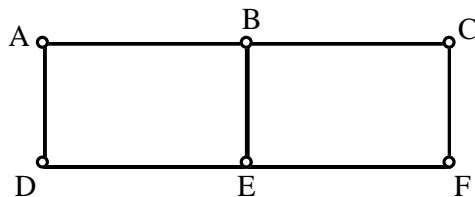
Either :

3. a) Construct the trees 4
 $((3 * (1 - x)) \div ((4 + (7 - (y + z)))) * (7 + (z \div y)))$
- b) Prove following graphs are isomorphic. 4



OR

- c) Define following terms 4
- i) Mixed Graph ii) Parallel Edges
- iii) Adjacent Graph iv) Loop
- d) Find spanning trees for following graph 4



Either :

4. a) Consider the binary operations $*$ on Q . the set of rational number defined by 4
- $$a * b = \frac{ab}{2} \forall a, b \in Q$$
- Determine whether $*$ is
- a) associative
- b) commutative
- b) Show that $(ab^{-1}) = b^{-1}a^{-1}$ for all $a, b \in G$ 4

OR

- c) Let $(S, *)$ and $(T, *)$ be commutative semigroup. Show that $S \times T$ is also a commutative semigroup. 4
- d) Fill the following table, so that the binary operations $*$ is commutative. 4

$*$	a	b	c
a	b	-	-
b	c	b	a
c	a	-	c

5. Solve all the questions.
- a) Construct the truth table for the following 2
- $$(A \oplus B) \oplus C$$
- b) Determine the value of the following 2
- $5P_3$
- c) Define Euler path and circuit. 2
- d) Consider the set $A = \{-1, 0, 1\}$ 2
- Determine whether A is closed under
- i) Addition ii) Multiplication
