

B.C.C.A.- II (CBCS Pattern) Semester-IV
UBCCAT404 - Paper-IV - Mathematics

P. Pages : 2

Time : Three Hours



GUG/S/25/12048

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 answer and write specific answer related to question.

Either:

1. a) What is set? Explain types of set. 4
- b) Let A is a set of $A = \{a, b, c, d, e\}$, $B = \{a, b, e, g, h\}$, $C = \{b, d, e, g, h, k, m, n\}$ then verify 4
 $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

OR

- c) If $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & 1 & -2 \end{bmatrix}$ & $B = \begin{bmatrix} -3 & 2 \\ 4 & 1 \\ 5 & -2 \end{bmatrix}$ find $A \times B$. 4
- d) If A, B and C are three sets, then prove that $A \cup (B \cap C) = (A \cup B) \cap C$ 4

Either:

2. a) Explain the following with example. 4
- i) Duality
- ii) Equivalence of formula
- b) Explain the form tautology and contradiction in the context of truth table. 4

OR

- c) Construct the truth table for the following 4
- i) $(P \leftrightarrow Q) \leftrightarrow (R \leftrightarrow S)$
- ii) $(P \vee Q) \vee \sim P$
- d) Prove the following statement. 4
 $(P \rightarrow Q) \leftrightarrow (\sim P \rightarrow \sim Q)$

Either:

3. a) Let $A = \{1, 2, 3, 4\}$ and $R = \{(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (2, 4), (3, 4), (4, 1)\}$ 4
Draw diagram and MR Relation
- b) Determine the value of following 4
i) $P(15, 3)$
ii) ${}_{52}P_4$

OR

- c) To prove $p(n, r) = p(n-1, r) + r p(n-1, r-1)$ 4
- d) Write a notes on propositional logic and predictive logic. 4

Either:

4. a) Explain the properties of group in brief. 4
- b) Prove the $(ab)^{-1} = b^{-1} a^{-1}$ for all, $a, b \in G$. 4

OR

- c) Consider the binary operation $*$ on θ , the set of relational number defined by $a * b = ab / 2 \quad \forall a, b \in \theta$. Determine whether $*$ is (i) associative (ii) commutative 4
- d) Let $(A, *)$ be semigroup. Show that for a, b, c , in A , if $a * c = c * a$ and $b * c = c * b$, then $(a * b) * c = c * (a * b)$ 4

5. Solve all the questions.

- a) Draw the Venn diagram for $A \cup B, A \cap B$ 2
- b) Determine the value of n if $n_{C_n} - 2 = 10$ 2
- c) How many distinguish permutation of the letter in the word BOOLEAN. 2
- d) Write a short note on Abelian group. 2
