

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

P. Pages : 2

Time : Three Hours



GUG/W/24/12048

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) Define set. Explain different operation of set. 4
- b) Find the inverse of matrix. If $A = \begin{bmatrix} 1 & 3 & 0 \\ 2 & 2 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 3 & -3 \\ 1 & -1 & 1 \\ 2 & -3 & 4 \end{bmatrix}$ 4
- find A and B are inverse matrix.

OR

- c) $A_1 = \{1, 2, 3\}$ $A_2 = \{2, 3\}$ $A_3 = \{1, 2, 3, 6\}$ then find $\bigcup_{i=1}^3 A_i$ and $\bigcap_{i=1}^3 A_i$. 4
- d) Prove that statement is true by using mathematical induction 4
- $1 + 3 + 5 + \dots + 2n - 1 = n^2$.

Either :

2. a) Construct the truth table for the following 4
- $(P \leftrightarrow Q) \leftrightarrow (R \leftrightarrow S)$
- b) Using the statements 4
- R = Ramu is rich.
- H = Ramu is happy.
- Write the following statements in a symbolic form,
- i) Ramu is poor but happy.
 - ii) Ramu is rich or unhappy.
 - iii) Ramu is neither rich nor happy.
 - iv) Ramu is poor or he is both rich and unhappy.

OR

- c) Explain Duality laws with example. 4
- d) Obtain conjunctive normal forms of $\neg(P \vee Q) \leftrightarrow (P \wedge Q)$. 4

Either :

3. a) Determine the value of n if, 4
i) $4 \times {}^n P_3 = {}^{n+1} P_3$ ii) $6 \times {}^n P_3 = 3 \times {}^{n+1} P_3$
b) How many distinguishable permutation of the letter in the word. 4
i) BOOLEAN ii) REQUIREMENTS

OR

- c) Let $A = \{a, b, c, d, e\}$ and $R = \{(a, a)(a, b)(b, c)(c, e)(c, d)(d, e)\}$ 4
compute (a) R^2 (b) R^∞ .
d) Let $P = \{(1, 2)(2, 4)(3, 3)\}$ and $Q = \{(1, 3)(2, 4)(4, 2)\}$ 4
find $P \cup Q, P \cap Q, \text{Dom}(P), \text{Dom}(Q)$
 $\text{Dom}(P \cup Q), \text{Ran}(P), \text{Ran}(Q)$ and $\text{Ran}(P \cap Q)$.

Either :

4. a) Prove the left cancellation law, i.e $ab = ac \Rightarrow b = c \quad \forall a, b, c \in G$ (left cancellation law). 4
b) Consider the binary operation $*$ on Q , the set of rational number defined by 4
 $a * b = \frac{ab}{2} \quad \forall a, b \in Q$
Determine wheather $*$ is
i) associative ii) commutative

OR

- c) What is monoid? Write in detail. 4
d) Show that identity element in a group is unique. 4
5. Solve all the questions.
a) Define sequences and its types. 2
b) Write the duals of 2
i) $(P \vee Q) \wedge R$ ii) $(P \wedge Q) \vee T$
c) Determine the value of 2
i) ${}^{10} C_6$ ii) ${}^{52} C_4$
d) Define Abelian group with example. 2
