B.C.C.A.- II (CBCS Pattern) Sem-IV

UBCCAT404 : Paper-IV : Mathematics

P. Pages : 2 **GUG/W/22/12048**

Time : Three Hours * 0 7 2 2 * Max. Marks : 40

Notes : 1. All questions are compulsory and carry equal marks.
2. Draw neat and labelled diagram wherever necessary.
3. Avoid vague answers and write the answers relevant and specific to questions only.

Either:

1. a) If A, B and C are three sets, then prove that $A \cup (B \cup C) = (A \cup B) \cup C$. **4**

b) What is set? Explain any two operations of set with example. **4**

OR

c) Prove by mathematical induction that $A_1, A_2, ---A_n$ are any n set then **4**

$$\left(\bigcup_{i=1}^{n} A_i \right) = \bigcap_{i=1}^{n} \overline{A_i}$$

d) If a, b, c are integers then prove that **4**
i) If a/b and b/c then a/c
ii) If a/b and a/c then a/(b+c)

Either:

2. a) Obtain the principal disjunctive normal form of $P \rightarrow ((P \rightarrow Q) \wedge \neg(\neg Q \vee \neg P))$ **4**

b) Explain the following with example **4**
i) Duality ii) Equivalence of formula

OR

c) Construct the truth table of **4**
i) $(P \vee Q) \vee \neg P$ ii) $\neg(\neg P \wedge \neg Q)$

d) Write the rules of inferences. **4**

Either:

3. a) Find the value of the following. **4**
i) 52_{P_4} ii) 5_{P_3}

b) Let $A = \{1, 2, 3, 4\}$ **4**
R = {(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (2, 4), (3, 4), (4, 1)}
Draw diagraph and M_R of relation.

OR

c) Explain in detail Warshall's algorithm. **4**

d) Explain in detail properties of Relations. **4**

Either:

4. a) Show that identity element in a group is unique. **4**

b) Explain in detail semi group. **4**

OR

c) Let T be the set of all even integer, show that the semi group (z, +) and (T, +) are isomorphic. **4**

d) Explain the following properties of binary operations. **4**
i) Closure property ii) Associative property

5. Solve all the questions.

a) Explain in short about sequences. **2**

b) What is normal forms? **2**

c) Prove that $P(n, n) = 2 \times P(n, n-2)$ **2**

d) What is Monoid? Write in short. **2**

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