M.Sc. (Computer Science) - I (CBCS Pattern) Semester - I

PSCSCT02 - Paper-II : Discrete Mathematics

P. Pages : 2 **GUG/S/23/11143**

Time : Three Hours * 1 3 2 1 * Max. Marks : 80

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

Either:

1. a) Prove that: **8**

i) $A \cap (B - C) = (A \cap B) - (A \cap C)$ ii) $(A \cup B) \cup C = A \cup (B \cup C)$

b) If **8**

$$\begin{pmatrix} a+b & c+d \\ c-d & a-b \end{pmatrix} = \begin{pmatrix} 4 & 6 \\ 10 & 2 \end{pmatrix}$$

Find a, b, c, d

OR

c) Obtain disjunction normal form of $\neg(P \vee Q) \rightleftarrows (P \wedge Q)$. **8**

d) What do you mean by Normal form? Explain Disjunction & Conjunctive Normal form with suitable example. **8**

Either:

2. a) How many distinguishable permutations of the Letter in the following words **8**

1) MISSISSIPPI

2) REQUIREMENTS

3) BOOLEAN

4) HIPPOPOTAMOUS

b) What is Relation? Explain properties of Relation with suitable example. **8**

OR

c) Show that if n Pigeons are assigned to m Pigeonholes then one of the Pigeon holes must contain at least $[(n-1)/m] + y$ pigeons. **8**

d) Let $A = z^+$, the set of positive integer and let $R = \{(a,b) \in A \times A \mid a \text{ divides } b\}$ find R is transitive? **8**

Either:

3. a) Define following terms: **8**
1) Graph
2) Diagraph
3) Mixed graph

b) Show that following graph are isomorphic. **8**

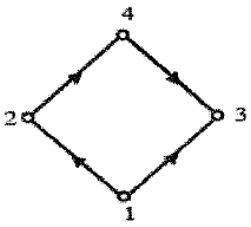


Fig. (a)

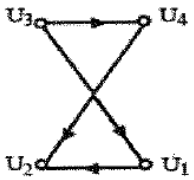


Fig. (b)

OR

c) Prove that in a distribute lattice the complement of a element is unique. **8**

d) Construct the Binary tree for the following expression. **8**

i) $(3-(2-(11-(9-4)))\div(2+3+(4+7)))$

ii) $(11-(11x(11+11)))+(11x11)$

Either:

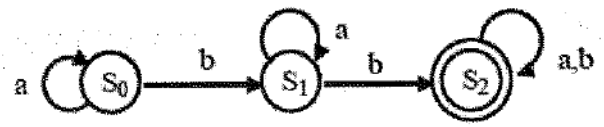
4. a) What do you mean by Binary Operations? Explain properties of Binary Operations. **8**

b) Let T be the set of all even integer. Show that the semi group $(Z,+)$ and $(T,+)$ are isomorphic. **8**

OR

c) If H and K are subgroup of G, show that, $H\cap K$ is a subgroup of G. **8**

d) Consider the Moore machine M where digraph is shown. Here state S_0 is the starting state, and $T=\{S_2\}$. What is L(M)? **8**



5. Attempt all the questions.

a) Write short note on equivalence of formula. **4**

b) Determine the value of following **4**
i) $^{10}C_6$ ii) $^{52}C_4$

c) Write a short note on Hamiltonian path and Euler path. **4**

d) Write in short about Finite State Machine. **4**

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