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

PSCSCT02 - Paper-II : Discrete Mathematics

P. Pages : 2 **GUG/W/22/11143**

Time : Three Hours * 1 8 9 7 * 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) Let a, b and c be integer, then prove **8**

i) If a/b and a/c, then a/b+c
ii) If a/b and a/c, where b>c, then a/b-c
iii) If a/b and a/c, then a/bc
iv) If a/b and b/c, then a/c

b) What is Set? Explain different operations on Set? **8**

OR

c) If A and B are matrices, then **8**

a) $\left(A^T\right)^T = A$

b) $(A+B)^T = A^T + B^T$

c) $(AB)^T = B^T A^T$

d) If a and b are +ve integer then GCD(a,b). LCM(a,b) = a.b **8**

Either :

2. a) Explain the Pigeonhole Principle with example. **8**

b) Prove that then the number of permutations of 'n' objects taken 'r' at a time, $r \leq n$ is given by **8**

$$^{n}p_{r} = \frac{n!}{(n-r)!} = n.(n-1).(n-2).....(n-r+1)$$

OR

c) Explain the Properties of Relation with examples? **8**

d) Write short note on Warshall's algorithm. **8**

Either :

3. a) Define : **8**
1) Partially ordered Set
2) Hasse Diagram

b) Define following terms: **8**
   i) Graph
   ii) Adjacent Node
   iii) Parallel Edges
   iv) Loop

OR

c) Explain Hamiltonian path and Circuit with example? **8**

d) Explain Euler path and Circuit with examples? **8**

Either :

4. a) Consider the binary operation * on Q, the set of rational number defined by **8**
$a * b = \frac{ab}{2}$ for every $a, b \in Q$

b) Prove the left Cancellation law i.e $ab = \Rightarrow ac\ b = c \forall\ a, b, c \in G$ (Left Cancellation). **8**

OR

c) Prove the right Cancellation law i.eba = ca $b = \Rightarrow a, b, c \in G$ (right cancellation) **8**

d) Explain Finite – State Machines. **8**

5. Attempt **all** the questions.

a) Construct a Truth table for $\sim (p\ v\ q) \equiv \sim p \wedge \sim q$ **4**

b) Prove that the number of permutations of 'n' thing taken all at a time in n! **4**

c) Prove that In a Distributive Lattice the complement of a element is unique. **4**

d) What is Abelian Group? **4**

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