M.Sc. I (Computer Science) (C.B.C.S. Pattern) Sem-I

PSCSCT02 - Paper-II : Discrete Mathematics

P. Pages : 2 **GUG/S/19/11143**

Time : Three Hours Max. Marks : 80

Notes :
1. All questions are compulsory and carry equal marks.
2. Draw neat and labeled diagram and use supporting data wherever necessary.
3. Avoid vague answer and write specific answers related to questions.

1. Either

a) What is sets? Explain different operations on sets. **8**

b) Show that **8**

i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$

ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

OR

c) Let A, B and C be finite sets then **8**

$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

d) Define Disjunction Normal form's. Obtain disjunction normal form of **8**

$\neg (P \vee Q) \rightleftarrows (P \wedge Q)$

2. Either

a) Prove that number of different permutations of n distinct objects, taken r at a time, $r \leq n$ is **8**

given by $^{n}p_{r} = \dfrac{n!}{(n-r)!} = n \cdot (n-1) \cdot (n-2) ...... (n-r+1)$

b) Let $A = \{1, 2, 3, 4\}$ and **8**

R = {(1, 1), (1, 2), (2, 1), (2, 2), (2, 3)

(2, 4), (3, 4), (4, 1)} Draw diagraph for relation R.

OR

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

d) Let A = {a, b, c, d, e} and **8**

R = {(a, a), (a, b), (b, c), (c, e)

(c, d), (d, e)}

Computer (a) R^2

(b) R^∞

3. Either

a) Define the following term's with Example **8**

i) Undirected Graph's

ii) Graph

iii) Tree

iv) Binary tree

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

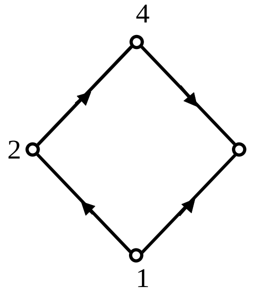

Fig. (a)

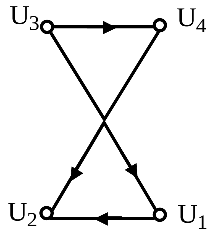

Fig. (b)

OR

c) Construct the tree, **8**

i) $3-(x+(6*(4\div(2-3))))$

ii) $(x+(y-(x+y)))\times(((3\div(2\times 7))\times 4)$

d) In a lattice prove that $(a*b)\oplus(a*c)\le a*[b\oplus(a*c)]$ **8**

4. Either

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

b) Let $v=\{v_o, w\}$, $s=\{a, b\}$ and $\mapsto$ be a relation on v^* given by **8**

$v_o \mapsto bv_o$

$v_o \mapsto aw$

$w \mapsto bw$

$w \mapsto b$

Find L(G) and Derivation tree for it.

OR

c) Explain Finite-state Machines in Detail. **8**

d) Find out Moore Machine, whose table is shown below. **8**

	a	b	c
S_0	S_0	S_0	S_0
S_1	S_2	S_3	S_2
S_2	S_1	S_0	S_3
S_3	S_3	S_2	S_3

5. Solve all questions.

a) To Find equivalency of statement $p\to q\equiv(\sim p)\vee q$ **4**

b) Determine the value of following **4**

i) $^{10}C_6$ ii) $^{52}C_4$

c) Define following **4**

i) Adjacent Node ii) Diagraph

d) Write a short note on Derivation trees. **4**

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