B.Sc. (Information Technology)-I (CBCS Pattern) Second Semester CBCS

UBITT204 - Discrete Mathematics Paper - IV

P. Pages : 2 **GUG/W/18/10923**

Time : Three Hours * 3 0 5 5 * Max. Marks : 80

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

1. Either

a) Suppose that A, B, C are matrices, then prove that **8**
i) (AB) C = A(BC) ii) A(B + C) = AB + AC

b) Let A, B & C be finite set, then **8**
$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$

OR

c) Write notes on **8**
i) Subset ii) Power set

d) Prove that $A \cup B = A \cap B \Leftrightarrow A = B$. **8**

2. Either

a) To prove that **8**
i) $p(n, n) = 2 \times p(n, n-2)$
ii) $p(n, n) = p(n, n-1)$

b) Explain following **8**
i) Invertible (inverse) function
ii) Identity functions

OR

c) Prove that **8**
i) $p(n, r) = p(n-1, r) + r \cdot p(n-1, r-1)$
ii) $p(n, r) = n \cdot p(n-1, r-1)$

d) Consider f, g, and h all functions on the Integers, by $f(n) = n^2$, $g(n) = n+1$, and $h(n) = n-1$. **8**
Determine
i) $h \circ f \circ g$ ii) $g \circ f \circ h$ iii) $f \circ g \circ h$

3. Either

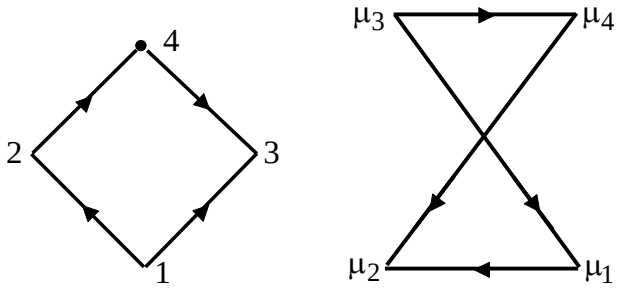
a) Explain following **8**
i) Undirected Graphs.
ii) Isomorphism of Graphs.

b) Construct the following tree. **8**

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

OR

c) Show that following Graph are isomorphic. **8**



d) Define following terms. **8**

i) Mixed Graph ii) Multi Graph

iii) Null Graph iv) Diagraph

4. Either

a) Show that inverse of an element 'a' in the group in unique. **8**

b) Let T be the set of all even integer. Show that the semigroups (Z, +) and (T, +) are Isomorphic. **8**

OR

c) If H and K are subgroup of G. Show that $H \bigcap K$ is a subgroup of G. **8**

d) A non-empty subset H of the group G is subgroup of G if and only if **8**

i) $a_1\ b \in H \Rightarrow a_0\ b \in H$

ii) $a \in H \Rightarrow a^{-1} \in H$

5. Solve all the questions.

a) Construct the truth table for the formula. **4**

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

b) Determine the value of n if **4**

i) $4 \times {}^{n}p_3 = {}^{n+1}p_3$

ii) $6 \times {}^{n}p_3 = 3 \times {}^{n+1}p_3$

c) Explain spanning tree in brief. **4**

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

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