

B.Sc.- I (Information Technology) CBCS Pattern Semester-II
UBITT204 - Paper-IV : Discrete Mathematics

P. Pages : 2

Time : Three Hours



GUG/W/23/10923

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 answer and write specific answer related to question.

Either

1. a) What is set? Explain different operations on set. 8
- b) Prove that 8
- i) $(A \cup B) \cup C = A \cup (B \cup C)$
- ii) $A \cap (B - C) = (A \cap B) - C$

OR

- c) If A and B are finite set, find $|A \cup B| = |A| + |B| - |A \cap B|$. 8
- d) Prove the statement is true by using mathematical induction. 8
- $$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

Either

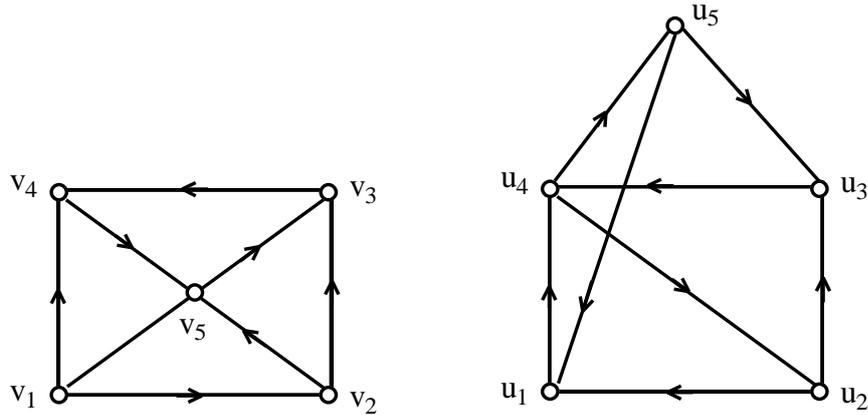
2. a) Determine the value of 'n' if 8
- i) $4 \times {}^n P_3 = {}^{n+1} P_3$
- ii) ${}^n C_4 = {}^n C_3$
- b) Let $A = \{a, c, e\}$ and $\mu\{a, b, c, d, e, f, g\}$ compute the following function value. 8
- i) $f_A(a)$
- ii) $f_A(g)$
- iii) $f_A(e)$
- iv) $f_A(t)$

OR

- c) Define function. Explain the types of function in detail. 8
- d) Prove that, composition (product) of two cycles may not be a cycle. 8

Either

3. a) Show the following graphs are isomorphic. 8



b) Construct the tree. 8

i) $(7 + (6 - 2)) - (x - y - 4)$

ii) $((2 + x) - (2 \times x)) - (x - 2)$

OR

c) Define the following terms. 8

i) Graph

ii) Adjacent node

d) Construct the tree. 8

i) $((3 * (1 - x)) \div ((4 + 7 - (y + 2))) * (7 + (z \div y)))$

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

Either

4. a) If $(S_1, *)$ and $(S_2, *)$ are semigroup then $(S_1 \times S_2, *)$ is a semigroup, where $*$ is defined by $(S_1', S_2') * (S_1'', S_2'') = (S_1' * S_1'', S_1' * S_2'')$. 8

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

OR

c) T be the set of all even integers. Show that, the semigroups $(\mathbb{Z}, +)$ and $(T, +)$ are isomorphic. 8

d) Show that $(a^{-1})^{-1} = a$ for all $a \in G$ where G is group and a^{-1} is an inverse of a. 8

5. Attempt all the questions.

a) Construct the truth table for $((P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R)))$. 4

b) Prove that, $p(n, n) = 2 \times p(n, n - 2)$. 4

c) Define Isomorphic graph with example. 4

d) Write a note on Normal subgroup. 4
