2025

Four Year Under Graduate Programme (FYUGP)

1st Semester Examination (Under NEP)
(Old Session 2023-24)

COMPUTER SCIENCE (Major)

Paper Code : CMSMJ MC-01

(Discrete Mathematics and Graph Theory)

Full Marks : 40 Time : Two Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group - A

1. Answer any *five* questions : 2×5=10

(a) Define weighted graphs with an example.

(b) What is the probability when two dice are rolled, the sum of the numbers on the two dice is 6?

(c) What is the power set of the set {U, G, C}?

(d) Define closure in the context of relations.

(e) What are generating functions?

(f) What is the significance of the **"Connectivity"** in Graph theory?

P.T.O.

(g) State the **inverse** and **contrapositive** of the conditional statement "If it rains today, I will watch a movie".

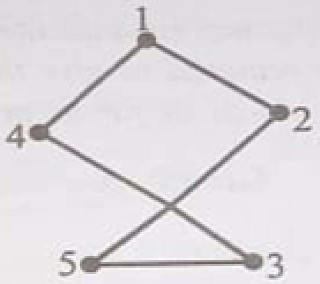
Group - B

Answer any *three* questions : $10 \times 3 = 30$

2. (a) Two fair coins are tossed three times.

Find the probability that *exactly two heads* occur.

(b) Find the adjacency matrix of the graph given below.



(c) Find the negation of $P \rightarrow Q$. 3+4+3

3. (a) Find the generating function for the sequence 1, 2, 3,...

(b) Use mathematical induction to prove the following :

$1+2+3+\cdots\cdots+n = n*(n+1)/2$; for all positive integers n.

(c) Show that the relation $x \equiv y \pmod 5$ defined on the set of integers I is an equivalence relation.

5+2+3