62452

Reg. No.

I Semester M.C.A. Degree Examination, May/June - 2025
COMPUTER APPLICATIONS
Discrete Mathematics
(CBCS Scheme Y2 K21)
Paper : 1MCA2

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates :

1) Answer any Five questions from Part - A .
2) Answer any Four questions from Part B.

PART - A

Answer any Five questions. Each question carries Six marks. **(5×6=30)**

1. a) Determine the sets A and B given that $A-B=\{1,3,7,11\}$, $B-A=\{2,6,8\}$, $A\cap B=\{4,9\}$.

b) For any three sets A, B and C Prove that $A\cup(B\cap C)=(A\cup B)\cap(A\cup C)$. **(3+3)**

2. Let A= {1, 2, 3, 4, 6}. Define a relation R on set A defined by R = {9a, b):a,b$\in$a$\leq$b}.

i) Write down elements of R

ii) Matrix representation of R and

iii) Digraph of R

3. Prove by mathematical Induction that

1.2+2.3+3.4+........+n (n+1)=

4. Prove that the proposition $[p\to(q\to r)]\leftrightarrow[(p\to q)\to(p\to r)]$ is a tautology.

5. State and Prove Extended Pigeonhole principle.

[P.T.O.

6. If P(A)=6/11, P(B)=5/11 and $P(A\cup B)=7/11$ then find

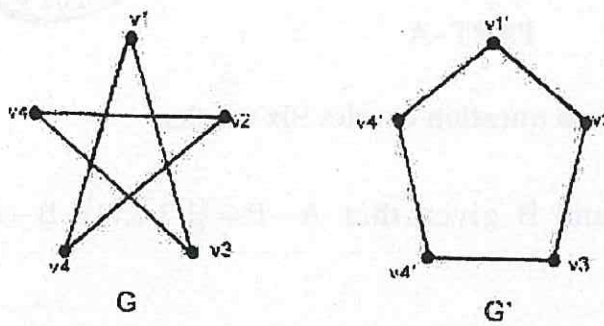
   i) $P(A\cap B)$

   ii) $P(A/B)$

   iii) $P(B/A)$

7. Explain different tree traversals with examples.

8. Examine the following graphs are isomorphic or not.



PART - B

Answer any Four questions. Each question carries Ten marks. (4×10=40)

9. a) Using Venn diagram prove that $A\Delta(B\Delta C)=(A\Delta B)\Delta C$.

   b) In a class consisting of 120 students, 30 are studying C++, 40 are studying python and 45 are studying java, 15 studying both C++ and python, 20 studying both python and java, 12 studying both C++ and java, 8 are studying all the three. How many do not take any of these subjects? How many take only one language? **(4+6)**

10. a) Let A={1, 2, 3, 4, 6, 12} a relation R defined on A by aRb if and only if "a divides b". Prove that R is a partial order on A. Draw the Hasse diagram for this relation.

b) Find the middle terms in the expansion $\left(\frac{x}{3}+9y\right)^{10}$

(5+5)

11. a) Let $f: X \to Y$ be a function defined as $f(x)=4x+3$, where Y is range of f. Show that f is invertible. Find the inverse of f.

b) A committee of eight is to be formed from 16 men and 10 women. In how many ways can the committee be formed if.

i) There must be 4 men and 4 women

ii) There should be an even number of women **(5+5)**

12. a) Show that $[p \to (q \wedge r)] \equiv [(p \to q) \wedge (p \to r)]$

b) Show that the following argument is valid

$\sim r \to (s \to \sim t)$

$\sim$ rVw

$\sim p \to s$

$\sim$ w **(5+5)**

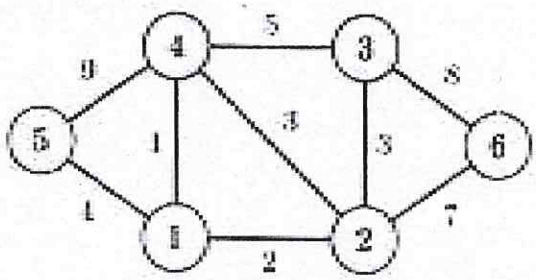
$t \to p$

13. a) A sequence $\{a_n\}$ is defined recursively by $a_1=4$, $a_n=a_{n-1}+n$ for $n \geq 2$ find, an in the explicit form.

b) Let a pair of dice be thrown and the random variable be the sum of the numbers that appear on the two dice. Find the mean, variance and standard deviation of X. **(5+5)**

14. a) Define Euler and Hamiltonian graph. Give an example of a graph which is Hamiltonian but not Eulerian vice versa.

b) Find the minimum cost spanning tree by Kruskal' algorithm. **(5+5)**



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