22. A Construct the truth table for the formula $x=(P\rightarrow(Q\rightarrow R))\rightarrow((P\rightarrow Q)\rightarrow(P\rightarrow R))$.

OR

B Show that $(P\rightarrow R)\rightarrow((Q\rightarrow R)\rightarrow(P\vee Q\rightarrow R))$ is a tautology by using Quine's method.

23. A Solve the Fibonacci recurrence relation $F_n = F_{n+1} + F_{n-2},\ F_1 = F_2 = 1$.

OR

B i) How many different 9 - letter words can be coined from the letters of ALLAHABAD?

ii) Find the number of ways of choosing 15 currency notes from available Indian currency notes.

24. A Find the inverse of a matrix by using Cayley Hamilton Theorem $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 0 & -1 \\ 1 & 1 & 2 \end{bmatrix}$

OR

B Solve the following system of linear equations $x+2y+2z=-2,\ 3x+2y+z=1$ and $x-2y-5z=1$.

25. A Explain the properties of Incidence matrices.

OR

B i) Define minimum and maximum degree of a graph g and give an example.

ii) State and Prove Whitney's Inequality.

29/11/23

23PCA01

Reg. No.								

END SEMESTER EXAMINATION NOV/DEC – 2023

First Semester

M.C.A

CORE - I DISCRETE MATHEMATICS

Time: Three Hours **Maximum: 75 marks**

SECTION A – (15 x 1 = 15 marks)
ANSWER ALL QUESTIONS

1. If mRn and $m^2 = n$ then______.
   A $(-3,-9) \in R$ B $(3,-9) \in R$
   C $(-3,9) \in R$ D $(3,9) \in R$
2. What is the number of relations from A to B with $|A| = m$ and $|B| = n$?
   A mn B 2^n
   C 2^m D 2^{mn}
3. Which one is true for the set {(1,2), (2,1), (1,1), (2,2)} is________?
   A an equivalence relation B a partial ordering
   C not an equivalence relation D not transitive
4. $T\rightarrow P$ is a ______.
   A Tautology B Contradiction
   C Contingency D Disjunctive
5. Which is equivalent to $P \wedge (\neg P \vee Q)$?
   A $P\vee Q$ B $P \wedge Q$

C P D Q

6. What is the negation of " some students like cricket" ?
   A Some students dislike cricket
   B every student dislikes cricket
   C every student likes cricket
   D Some students like cricket
7. C (5,2) is not equal to_______.
   A C(5,3)
   B 10
   C 5! / 3! 2!
   D 20
8. Find the number of permutation that can be formed from the letters of MASALA is _______.
   A 6!/3!
   B 6!/3! 3!
   C 3! 3!
   D 3!
9. What is the value of d if a_{n+1} -d a_n =0 , a_3=189 and a_5= 1701?
   A 9
   B -3
   C 3
   D ±3
10. What is the determinant of any identity matrix?
   A 0
   B 1
   C 0 or 1
   D any number
11. What is the commutative property of any two matrices A and B under addition?
   A AB=BA
   B A+B = B+A
   C A+B= -(A+B)
   D AB= A+B
12. What is the order of AB if order of a matrix A is 2x3 and the order of a matrix B is 3x4?
   A 3x3
   B 2x3
   C 2x4
   D 3x4
13. A complete bipartite graph $K_{m,n}$ is a tree when ______.
   A m=1 , n=2
   B m=2 , n=2
   C m=2 , n=3
   D m=3 , n=0
14. How many number of edges does complete graph K_n on n vertices?
   A n
   B n-1
   C n(n-1)
   D n(n-1)/2
15. A simple graph with n≥2 vertices has a hamiltonian circuit if d(u) +d(v) ≥ n for all non adjacent vertices u,v in G is often called ________.
   A Dirac's Theorem
   B Ore's Theorem
   C Euler's Theorem
   D Hamilton Theorem

SECTION B – (2 x 5 = 10 marks)
ANSWER ANY TWO QUESTIONS

16. Prove that the relation congruence modulo m defined in Z^+ by a≡b (mod m) if a-b is divisible by m is an equivalence relation on Z^+.
17. Show that ∃ x Q(x) is a valid conclusion from the premises ∀x(P(x)→ Q(x)) and ∃ x P(x).
18. Find a recurrence relations for the sequence $\{a_n\}$ given by a_n= A. 2^n + B.$(-3)^n$.
19, Solve by Cramers rule 3x+5y=-1and 5x+7y =4.
20. Prove that every tree is planar.

SECTION C– (5 x 10 = 50 marks)
ANSWER ALL QUESTIONS

21. A i) Let R be a relation from A to B and S be a relation from B to C. Then prove that $(S \circ R)^{-1} = R^{-1} \circ S^{-1}$
ii) If R,S,T are relation from A to B, B to C, C to D respectively then prove that $T\circ(S \circ R) = (T \circ S) \circ R$.

OR

B Let A= { -1,1,2,3,4,5}, B={1,2,4,6,8,9} and C= {4,5,8,9,11,13}. Let R be a relation from A to B defined by aRb if a^2=b and Sbc, a relation from B to C defined by bSc if c= b+3. Find $S \circ R$, R^{-1} and S^{-1}.