(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2020 ONLY)

20UMS6E3 / 20UMA6E3

REG.NO. :

N.G.M. COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS: MAY - 2023

COURSE NAME: B.Sc.-MATHEMATICS **MAXIMUM MARKS: 70**

SEMESTER: VI **TIME : 3 HOURS**

PART - III

DISCRETE MATHEMATICS

SECTION - A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS. (K1)

1. The order of the recurrence relation $a_n = -2a_{n-1}$ is _____
   a) 0 b) 2 c) 3 d)1
2. The greatest and least elements in a posets are _____.
   a) 0 and 1 b) 0 and 2 c) 0 and 3 d) 3 and 4
3. A relation R said to be an partial ordering on A , if R is reflexive, antisymmetric and_____.
   a) poset b) transitive c) partial d) symmetric
4. A vertex said to be a pendent vertex or an end vertex if its degree is _____.
   a) 2 b) 3 c)1 d) 0
5. An alphabet is a non-empty finite set $\sum$ of _____ .
   a) letters b) symbols c) words d) strings

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. A recurrence relation is also called What equation?
7. What are the two possible states of an electric circuit?
8. Which special types are Boolean algebras?
9. Define a path.
10. What are the two types of Automata?

SECTION – B (5 X 4 = 20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Solve the recurrence relation $a_{n+2} - 3a_{n+1} + 2a_n = 0$

(OR)

b) Find the particular solution of the recurrence relation $a_{n+2} - 3a_{n+1} + 2a_n = 1$

12. a) Prove that the given statement is a tautology $(p \rightarrow q) \leftrightarrow (\neg p \vee q)$

(OR)

b) Show that R→S can be derived from the premises.
$P \rightarrow (Q \rightarrow S)$, ¬R∨P and Q

(CONTD…….2)

13. a) Prove that every chain is lattice.

(OR)

b) In a Boolean Algebra L, prove the De Morgan law's

14.a) If a simple Graph G with n vertices has more than $\frac{1}{2}$ (n-1)(n-2) edges, then prove that G is Connected.

(OR)

b) Explain the Types of Graph (Any Four).

15. a) Explain the Types of Grammars

(OR)

b) Explain Deterministic Finite State Automaton (DFA)

SECTION - C (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS (FROM Qn. No : 17 to 21). (K4 (Or) K5)

16. Design a finite state machine M where the input set is {0,1,2} and output set contains digits which are modulo3 sum of the digits in the input sequence.

17. Solve the recurrence relation $a_n - 2a_{n-1} - 3a_{n-2} = 0$, $n \geq 2$ by the generating function method with initial conditions $a_0 = 3$, $a_1 = 1$.

18. Obtain the PDNF without using truth table for (i) $P \leftrightarrow Q$ ii) ⅂P∨Q

19. Let f be an (order) isomorphism from a poset (L,≤) on to a poset (M, ≤'). If L is a lattice, then prove that M is also a lattice and f is a lattice isomorphism.

20. The connected Graph G has a Hamiltonian circuit if for any two vertices u and v are not adjacent, then prove that deg (u) +deg (v) ≥ n, where n is the number of vertices.

21. Explain the properties of Concatenation.

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