

(FOR THE CANDIDATES ADMITTED

SUB CODE : 23UMS6E6

DURING THE ACADEMIC YEAR 2023 –2024 ONLY)

REG.NO. :

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

END-OF-SEMESTER EXAMINATIONS : MAY 2026

BSC MATHS

MAXIMUM MARKS: 75

SEMESTER : VI

TIME : 3 HOURS

PART - III

DISCRETE MATHEMATICS

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

(K1)

1. A polynomial defined recursively is said to be _____ form
(a) sequence (b) linear (c) Telescopic (d) iterative
2. If $\phi \leftrightarrow \psi$ is a tautology , then _____
(a) $\phi \Rightarrow \psi$ (b) $\psi \Rightarrow \phi$ (c) $\phi \Leftrightarrow \psi$ (d) $\phi \neq \psi$
3. A complemented _____ lattice is called a Boolean algebra.
(a) Commutative (b) distributive (c) associative (d) modular
4. Which of the following statement is wrong?
(a) Every Eulerian graph is Hamiltonian
(b) Every Hamiltonian graph is not Eulerian
(c) If $c(G)$ is complete then G is Hamiltonian
(d) If G is Hamiltonian iff $c(G)$ is Hamiltonian
5. A final state is called _____
(a) State diagram (b) quit (c) accepting state (d) string

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. Define generating function of a sequence.
7. Define tautology.
8. What is called equivalence relation?
9. Define Euler graph.
10. What is called finite state automaton

SECTION – B

(5 X 5 = 25 MARKS)

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

(K3)

11. a) Find the recurrence relation satisfying $y_n = A(3)^n + B(-4)^n$

(OR)

- b) Solve the following recurrence relation
 $S(k) - 10S(k-1) + 9S(k-2) = 0$, $S(0) = 3$, $S(1) = 11$

12. a) Verify whether $(PVQ) \rightarrow P$ is a tautology.

(OR)

- b) Obtain a conjunctive normal form of $P \rightarrow ((P \rightarrow Q) \wedge \neg(\neg Q \vee \neg P))$.

13. a) Prove that a lattice L is modular iff $\forall x, y, z \in L$,

$$(x \vee (y \wedge z)) \wedge (y \vee z) = (x \wedge (y \vee z)) \vee (y \wedge z)$$

(OR)

- b) Prove that any lattice $(L, \leq)$, the operations $\vee$ and $\wedge$ are isotone

14. a) Prove that the number of vertices of odd degree in a graph is always even.
(OR)
b) Prove that every Hamiltonian graph is 2-connected.

15. a) Explain context free grammar.
(OR)
b) Explain non-deterministic automation

SECTION – C**(5 X 8 = 40 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K4 (Or) K5)**

16. a) Using the generating function, solve the difference equation $y_{n+2} - y_{n+1} - 6y_n = 0$ given $y_1 = 1, y_0 = 2$
(OR)

- b) Solve $S(k) - 4S(k-1) + 4S(k-2) = 3k + 2^k$; $S(0) = 1, S(1) = 1$.

17. a) Show that (i) $(P \rightarrow (Q \rightarrow R)) \Rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$
(ii) $(P \rightarrow Q) \Rightarrow (\neg Q \rightarrow \neg P)$
(OR)

- b) Obtain principal disjunctive normal forms

(a) $P \leftrightarrow Q$

(b) $\neg P \vee Q$

18. a) In a Boolean algebra, the following results hold

(i) $(a \wedge b)' = a' \vee b'$ (ii) $(a \vee b)' = a' \wedge b'$.

(OR)

- b) Prove that $(L \times M, \wedge, \vee)$ is a lattice

19. a) State and prove Dirac theorem.

(OR)

- b) Prove that a graph G with at least two points is bipartite $\Leftrightarrow$ all its cycles are of even length.

20. a) Briefly explain conversion of NDFSA to DFSA.

(OR)

- b) Explain context sensitive grammar, regular grammar, and languages generated by grammars.
