

(FOR THE CANDIDATES ADMITTED
DURING THE ACADEMIC YEAR 2019 ONLY)

19UMS6E3 / 19UMA6E3

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

END-OF-SEMESTER EXAMINATIONS : JULY- 2022

B.Sc. MATHEMATICS

MAXIMUM MARKS: 75

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. A way of giving information in terms of prior knowledge is known as _____.
a) Relation b) recurrence c) recursion d) induction
2. The conjunction of the statements p and q is denoted as _____.
a) $P \vee q$ b) $p \wedge q$ c) $p \rightarrow q$ d) $p \Rightarrow q$
3. A lattice which has both 0 and 1 is called as _____.
a) distributive b) complemented c) bounded d) chain
4. A vertex is said to be pendent if its degree is
a) 0 b) 1 c) 2 d) 3
5. The length of the string $w = 01212$ is _____.
a) 2 b) 3 c) 4 d) 5

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.

(K2)

6. Explain the generating function of the sequence S_0, S_1, S_2, \dots
7. What is tautology?
8. Define partially ordered set.
9. Define simple graph.
10. Explain the term vocabulary of language.

SECTION – B

(5 X 5 = 25 MARKS)

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

- 11.a) Find the recurrence relation for the Fibonacci sequence.

(OR)

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

(CONTD.....2)

12.a) Find a conjunctive normal form of $(p \vee \neg(q \vee r)) \vee ((p \wedge q) \vee \neg r) \wedge p$.

(OR)

b) Find a disjunctive normal form of $(q \vee (p \wedge r)) \wedge \neg((p \vee r) \wedge q)$.

13.a) Prove that every chain is a lattice.

(OR)

b) Show that a lattice L is distributive if and only if for all a, b, c in L,
 $(a \vee b) \wedge c \leq a \vee (b \wedge c)$.

14.a) (i) Draw the complete graphs k_5 and k_6 .

(ii) Find the number of edges in the graphs k_{12} and k_{15} .

(OR)

b) Define (i) complete graph (ii) regular graph (iii) complemented graph
 (iv) Bipartite graph (v) Isomorphic graphs

15.a) State the algorithm to convert NFA to DFA.

(OR)

b) Let $V = \{S, C\}$, $\Sigma = \{a, b\}$, $P = \{S \rightarrow aCa, C \rightarrow aCa, C \rightarrow b\}$. Find $L(G)$.

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. Solve the recurrence relation $S(n) = S(n-1) + 2(n-1)$ with $S(0) = 3$, $S(1) = 1$ by finding its generating function.

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

18. Find the PDNF and PCNF for $(P \wedge Q) \vee (\neg P \wedge Q) \vee (Q \wedge R)$.

19. Prove that (LXM, \wedge, \vee) is a lattice.

20. State and Prove Euler theorem.

21. Discuss about all types of Grammers with examples.
