

NGM COLLEGE (AUTONOMOUS) POLLACHI

END-OF-SEMESTER EXAMINATIONS: JULY- 2022

B. Sc-Computer Science (Aided & SF)

MAXIMUM MARKS: 70

II SEMESTER

TIME: 3 HOURS

PART III

DISCRETE MATHEMATICS (LEVEL I)

SECTION – A

(10 X1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS

MULTIPLE CHOICE QUESTIONS

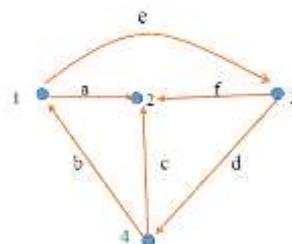
(K1)

- Which of the following propositions is tautology? _____
(a) $(p \vee q) \rightarrow q$ (b) $p \vee (q \rightarrow p)$ (c) $p \vee (p \rightarrow q)$ (d) Both (b) & (c)
- If $u(u(a,b),c) = u(a,u(b,c))$, then u is said to be _____
(a) commutative (b) monotonic (c) associative (d) idempotent
- A function $f : A \rightarrow B$ is _____ if distinct elements in A have distinct images in B under f .
(a) injective (b) surjective (c) bijective (d) None of the above
- The set of positive integers (excluding zero) with multiplication operation is a _____
(a) semigroup (b) Monoid (c) group (d) abelian group
- The sum of the degrees of the points of a graph G is _____ the number of lines
(a) equal (b) twice (c) thrice (d) four times

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

- Define Free and Bound variables.
- Give an example of Fuzzy complement that is continuous but not involutive.
- Define Inverse Functions.
- What is Phrase structure grammar?
- Write the incidence matrix for the graph given below



(CONTD 2)

SECTION – B

(5 X 4 = 20 MARKS)

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

11. a) Show that $(p \Rightarrow q) \Leftrightarrow (\neg q \Rightarrow \neg p)$ is a tautology.

(OR)

b) Obtain disjunctive normal forms of $\neg(p \vee q) \Leftrightarrow p \wedge q$ 12. a) Let $P = \{2, 3, 4, 5\}$. Consider the relation R and S on P defined by $R = \{(2, 2), (2, 3), (2, 4), (2, 5), (3, 4), (3, 5), (4, 5), (5, 3)\}$ $S = \{(2, 3), (2, 5), (3, 4), (3, 5), (4, 2), (4, 3), (4, 5), (5, 2), (5, 5)\}$. Find the matrices of the above relations. Use matrices to find the following composition of the relation R and S. (i)RoS (ii)RoR (iii)SoR

(OR)

b) If N is a set of Natural numbers, show that the relation R defined by $(a,b) R (c,d) \Rightarrow a + d = b + c ; (a,b), (c,d) \in N \times N$, is an equivalence relation.13. a) Let $S = \{a, b, c\}$. Draw the diagram of $(P(S), \subseteq)$

(OR)

b) If $f(x) = x^2$ and $g(x) = 2x + 1$, verify whether $(f \circ g)(x)$ and $(g \circ f)(x)$ are equal or not?14. a) Prove that For any commutative monoid $(M, *, e)$, the set of idempotent elements of M form a submonoid.

(OR)

b) Construct a phrase structure grammar to generate the set of bit strings that start with 0 and end with 1.

15. a) Prove that there is no 3-connected graph with 7 edges.

(OR)

b) Explain Konigsberg bridge problem. Represent the problem by means of graph. Does the problem have a solution?

SECTION - C

(4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.

(16TH QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Q.NO: 17 TO 21)

(K4) OR (K5)

16. Obtain PDFN of $(p \wedge q) \vee (\neg p \wedge r) \vee (q \wedge r)$. Also find PCNF.17. Show that the following is an implication. $(p \rightarrow (q \rightarrow r)) \Rightarrow (p \rightarrow q) \rightarrow (p \rightarrow r)$ 18. Prove that $\lim_{w \rightarrow \infty} \min[1, (a^w + b^w)^{1/w}] = \max(a, b)$

19. Show that the operation of meet and join on a lattice are associative.

20. Prove that the set of all n^{th} roots of unity with usual multiplication is a group.

21. Explain Dijkstra's algorithm with examples.