(T) Roll No. .....

PAPER ID—16018

B.Tech. EXAMINATION, 2024

(Third Semester)

COMPUTER SCIENCE AND ENGINEERING

(Cyber Security)

Dsicrete Mathematics

Time : 3 *Hours* *Maximum Marks :* 70

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

1. (a) Find the power set of A = [{a, b}, {c}, {d, e, f}].

(b) Define Inverse function.

(c) Determine GCD (234, 42) by using Euclidean Algorithm.

(d) Define Existential Quantifier.

(e) Define algebraic structure "Monoid" with example.

(f) Define Bipartite graph with example.

(g) Define Isomorphic graph with example.

7×2=14

Unit I

2. (a) In a survey of 200 musicians, it was formed that 40 wore gloves on the left hand and 39 wore gloves on the right hand. If 160 wore no gloves at all, how

many wore a glove on only the right hand ? Only the left hand. On both hands. 7

(b) Define Equivalence relation. Show that the 'divides' relation is the set of positive integers are not an equivalence relation. 7

3. (a) Define Composition function and determine (i) gof (ii) fog of the following Let $X = \{x_1, x_2, x_3, x_4\}$, $Y = \{y_1, y_2, y_3, y_4\}$ and $Z = \{z_1, z_2, z_3\}$. Define $f : X \to Y$, $g : Y \to Z$ such that $f = \{(x_1, y_1), (x_2, y_3), (x_3, y_2), (x_4, y_2)\}$ and $g = \{(y_1, z_1), (y_2, z_3), (y_3, z_3), (y_4, z_3)\}$. 7

(b) Define Tautology and determine the following equivalence relation is a tautology or not $(p \leftrightarrow q) \cong (p \wedge q) \vee (\sim p \wedge q)$. 7

Unit II

4. (a) State and Prove Pigeonhole Principle with its applications. 7

(b) How many words can be used formed with the letters of the word EQUATION : 7

(i) The words begin with E

(ii) The words begin with E and end with N

(iii) The words begin and end with a consonant.

5. (a) Solve the difference equation $y_{k+4} + 4y_{k+3} + 8y_{k+2} + 8y_{k+1} + 4y_k = 0$. 7

(b) Solve the recurrence relation $a_r - 6a_{r-1} + 9a_{r-2} = 0$ by the method of generating function with the initial conditions $a_0 = 1$ and $a_1 = 6$. 7

Unit III

6. (a) Explain Group with properties and examples of finite groups and infinite groups. 7

(b) State and prove Lagrange's Theorem. 7