

## School of Computing Science and Engineering

Bachelor of Computer Applications  
Mid Term Examination - Nov 2023

Duration : 90 Minutes  
Max Marks : 50

### Sem I - E1UA101T - Discrete Mathematics

General Instructions

*Answer to the specific question asked*

*Draw neat, labelled diagrams wherever necessary*

*Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Identify the set  $R = \{(1,2), (2,3), (3,4)\}$  (a) Identify reflexive closure of R. (b) Identify the symmetric closure of R. (c) Identify the transitive closure of R. K2 (2)
- 2) State that  $p \rightarrow (q \rightarrow p)$  is a Tautology or not. K1 (3)
- 3) Let  $A = \{1, 2, 3, \dots, 10\}$ . Let  $R = \{(1, 2), (1, 4), (1, 6), (1, 8), (1, 10), (3, 5), (3, 7), (4, 6), (6, 8), (7, 10)\}$  be a relation on A. Let  $S = \{(2, 4), (3, 6), (5, 7), (7, 9), (8, 10), (8, 9), (8, 8), (9, 9), (3, 8), (4, 9)\}$  be a second relation on A. : (a) Explain  $R \circ S$  (b) Explain  $S \circ R$  K2 (4)
- 4) If X and y are the two finite sets, such that  $n(X \cup Y) = 36$ ,  $n(X) = 20$ ,  $n(Y) = 28$ , then Explain  $n(X \cap Y)$ . K2 (6)
- 5) Let  $X = \{1, 2, 3, 4, 5, 6\}$  then / is a partial order relation on x. Sketch the hasse daigram of  $(X, /)$ . K3 (6)
- 6) Illustrate a truth table to show that  $(p \wedge q) \rightarrow p$  is a tautology. K3 (9)
- 7) Examine a set of 7 distinct books (X, Y, Z, P, Q, R, S) and a library shelf with 5 slots. a) In how many ways can the books be arranged on the shelf? b) If you want to select 3 books from the set for a reading group, how many ways can you do this? c) If you need to arrange the selected 3 books from part (b) on a table, in how many ways can you arrange them? K4 (8)
- 8) Consider a group consisting of 4 letters (A, B, C, D), 3 men (M1, M2, M3), and 3 women (W1, W2, W3). a) Identify the ways can you arrange the letters if the vowels (A) must always be together? b) If you want to form a committee of 4 people including at least 2 men and 2 women, identify the ways can you do this? c) If each letter can be repeated, Identify the 5-letter words can be formed using the letters A, B, C, D, M, W? K4 (12)

**OR**

- Consider a group of 10 people, each having a birthday in one of the 12 months of the year. Answer the following questions: a) Explain that there must be at least two people with birthdays in the same month. b) If 5 of the people are born in January, Explain that there is at least one month in which no one from this group was born. K4 (12)