

MCA (LATERAL) (Sample Paper-1)  
(SEM II) THEORY EXAMINATION  
FUNDAMENTAL OF DATA STRUCTURE,  
NUMERICAL & COMPUTATIONAL THEORY  
(RCA-A02)

Time: 3 Hours

Total Marks: 70

SECTION-A

- Q-1) Attempt all questions in brief:  $2 \times 7 = 14$
- What is regular expression?
  - What is difference between Array & Queue?
  - Which sorting method is slowest? Why?
  - What is difference between curve fitting and interpolation?
  - What is regression?
  - Which language is accepted by finite automata?
  - Why NFA is more powerful than DFA?

SECTION-B

- Q-2) Attempt any three of following:  $7 \times 3 = 21$
- What is Linked List in Data structures?
  - Explain Quick Sort algorithm with help of example.
  - State the difference between Linear Regression & Multiple Regression.
  - Construct NFA for Regular Expression  $(a+b)^*ab$ .
  - Discuss closure properties of context free languages.

## SECTION - C

- Q-(3) Attempt any one part of following:  $7 \times 1 = 7$
- (a.) What is Data Structure & its types?
- (b.) Define Insertion Sort & apply on 8, 1, 4, 1, 5, 9, 2, 6, 5.
- Q-(4) Attempt any one part of following:  $7 \times 1 = 7$
- (a.) How are Linked Lists better than arrays?
- (b.) If regression co-efficients are 0.12 and 0.3, what would be value of co-efficients of correlation?
- Q-(5) Attempt any one part of following:  $7 \times 1 = 7$
- (a.) Find straight line that best fits following data using least squares method

X	1	2	3	4	5
Y	2	5	3	8	7

- (b.) What is T-test? Explain its significance.
- Q-(6) Attempt any one part of following:  $7 \times 1 = 7$
- (a.) Show that  $L = \{a^p \mid p \text{ is prime number}\}$
- (b.) Define Turing Machine with an example.
- Q-(7) Attempt any one part of following:  $7 \times 1 = 7$
- (a.) Define PDA using diagram & example.
- (b.) State difference between Ambiguous and Unambiguous grammar.