

### 3<sup>RD</sup> SEM./ AI & ML / CS & E/ IT/ 2023(W)NEW

#### TH-2 DATA STRUCTURE

**Full Marks: 80**

**Time- 3 Hrs**

**Answer any five Questions including Q No.1& 2  
Figures in the right hand margin indicates marks**

1. Answer **All** questions 2 x 10
  - a. Define Abstract Datatype. Give two examples of Abstract Data type.
  - b. What is the need of time space trade off in algorithm design?
  - c. `char str1[]="Data";`  
`printf("%d%d", sizeof(str1), strlen(str1));`  
Considering the above instructions, determine the output of the above code?
  - d. Give an example of sparse matrix.
  - e. Define Recursion.
  - f. Write at least four applications of priority queue.
  - g. Given an expression:  
 $(a+b)*(c-d)$   
Convert the above expression in postfix and prefix expressions.
  - h. Design a binary tree by taking the following item:  
52, 12, 56, 78, 9, 67, 10
  - i. Give examples of a Weighted and a complete graph.
  - j. What do you mean by hashing and hash function?
2. Answer **Any Six** Questions 6 x 5
  - a. Explain the allocation of memory of a 2D array in row major order with suitable example.
  - b. Write the algorithm of pop operation of stack data structure.
  - c. Analyse the advantages of circular queue over queue.
  - d. Illustrate the insert operation in a single linked list with a suitable example.
  - e. How to search an element in BST.
  - f. Explain the adjacency and path matrix of a graph by taking an example.
  - g. Discuss different file access methods.
3. Describe at least five string library functions with suitable examples. 10
4. Write a program to calculate the sum of all even numbers between 1 to 100 using array. 10
5. Discuss the insert and delete operation of queue with suitable example. 10
6. Explain bubble sort algorithm to sort the following items: 10  
23, 3, 5, 78, 54, 23
7. Write short notes on (any two): 10
  - i) Operator Precedence
  - ii) Polish Notation
  - iii) Garbage Collection
  - iv) Non-linear data structure