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U-18-2051

**DATA AND FILE STRUCTURES-122**

Time Allowed : Three Hours]

[Maximum Marks : 80

**Note :—** Candidates are required to attempt *one* question each from Section A, B, C and Section D and the entire Section E. All questions carry equal marks.

**SECTION—A**

1. Define sparse matrices. What are its advantages and disadvantages ? What are the various methods of storing sparse matrices ? Explain. 16
2. What do you mean by stack ? What are various operations that can be performed on stack ? Discuss the use of stacks in converting the infix notation to postfix notation. 16

**SECTION—B**

3. What do you mean by a linked list ? What are its advantages ? Write an algorithm to insert and delete a node from a linked list when the information of the node is given. 16
4. What is binary search tree ? How it is different from binary tree ? Write an algorithm to delete a node from a binary search tree. 16

### SECTION—C

5. What do you mean by graph ? Discuss various ways of representing graph in memory. Give the merits and demerits of each way. 16
6. What do you mean by heap ? How a heap is different from a tree ? Write an algorithm to implement heap sort. 16

### SECTION—D

7. What do you mean by Direct Access Storage Device (DASD) ? List various DASD devices you are familiar with and explain the working of any one in detail. 16
8. Explain the sequential file organization in detail. 16

### SECTION—E

9. Write short notes on :
- (a) How a two dimensional array is stored in memory ?
  - (b) Write short notes on recursion.
  - (c) Difference between linear queue and circular queue.
  - (d) What do you mean by heap ?
  - (e) What is complete binary tree ?
  - (f) Write short note on circular linked list.
  - (g) What is hashing ? What are its advantages ?
  - (h) What are the advantages and disadvantages of sequential access storage devices ?
- 2×8=16

**DATA AND FILE STRUCTURES-122**

**SEMESTER-II**

Time Allowed : Three Hours]

[Maximum Marks : 80

**Note :—** Candidates are required to attempt *one* question each from Sections A, B, C and D and the entire Section E.

**SECTION—A**

1. Write a program to create a stack and use it for evaluating expressions given in postfix notation. 16
2. Define a queue data structure. How a linear queue is different from circular queue ? Write an algorithm to insert and delete an element from a circular queue. 16

**SECTION—B**

3. Define a linked list. What are its advantages and disadvantages ? Write an algorithm to invert a given linked list. 16
4. Write short notes on the following :
  - (a) Complete binary tree 4
  - (b) Threaded binary tree 4

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- (d) Differentiate between binary tree and binary search tree.
- (e) What do you mean by double linked list ? How it is different from linear linked list ?
- (f) Discuss any *one* method of representing graph in memory.
- (g) Which data structure is best suited for insertion sort and why ?
- (h) What are the advantages of direct access storage devices ?

8×2=16

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U-17/2053

**DATA AND FILE STRUCTURES-122****SEMESTER-II**

Time Allowed : Three Hours]

[Maximum Marks : 80

**Note:—** Candidates are required to attempt *one* question each from Section A, B, C and Section D and the entire Section E.

**SECTION—A**

1. What is the relevance of efficient algorithms in an era where speed of computers has increased tremendously ? Explain. 16
2. What do you mean by a queue data structure ? How a linear queue is different from a circular queue ? Write an algorithm to insert and delete a node in a circular queue. 16

**SECTION—B**

3. Write an algorithm to create a linked list of names in such a way that after every insertion the list is always in sorted order. 16
4. What is a height balanced tree ? How rotations are performed on height balanced tree ? Explain. 16



### SECTION—C

5. Elaborate with an example the working of Heap sort method. 16
6. What do you mean by hashing ? Discuss briefly various hashing technique. What are various applications of hashing ? Discuss any one in detail.

16

### SECTION—D

7. Differentiate between Sequential Access Storage Device (SASD) and Direct Access Storage Device (DASD). Discuss the working of any one DASD device. 16
8. Explain the sequential file organization in detail giving its merits and demerits. 16

### SECTION—E

9. Write brief notes on the following :
  - (a) What are the advantages and disadvantages of arrays ?
  - (b) What do you mean by row major and column major order ?
  - (c) Compare linked list with stacks and queue data structures.
  - (d) Differentiate between binary tree and binary search tree.
  - (e) What is adjacency matrix ?
  - (f) Differentiate between BFS and DFS of graphs.
  - (g) What are the disadvantages of Direct File Organization ?
  - (h) What do you mean by IRG (Inter Record Gap) ?

8×2=16

**K-14/2055****DATA & FILE STRUCTURES – 122****Semester-II****(Syllabus May, 2014)****Time : Three Hours]****[Maximum Marks : 80**

**Note :** Attempt *one* question each from Section A, B, C, and D carrying 16 marks each. Section E consisting of 8 short answer type questions carrying 2 marks each is compulsory. Use of scientific calculator is allowed.

**SECTION-A****(Attempt any *one* question)**

- I. (a) Give the algorithm of Tower of Hanoi problem with  $n$  disks. Derive the total number of moves in this problem. (8)
- (b) Discuss the following :
- (i) Rate of growth of algorithm.
  - (ii) Underflow and Overflow.
  - (iii) Time space trade-off.
  - (iv) Garbage collection. (8)
- II. (a) Give the logic/algorithm for implementing the concept of circular queue using array by writing the steps to insert and delete an element from circular queue. (8)



- (b) Define Row major order and Column major order. Consider the 2-D integer array say A of size  $7 \times 4$  in C language. Let 1000 be the base address of A and integer taking 4 byte each. Find the address of A [4] [2] using the formulas if the array is stored as (1) Column major order, and (2) Row major order. (8)

### SECTION-B

(Attempt any one question)

- III. (a) Write an algorithm to delete all the occurrences of an element say 'n' from given linear linked list. (8)
- (b) Define B tree. Draw the B tree of order 5 of the following data :  
92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78. (8)
- IV. (a) Write the algorithm to insert an element at  $n$ th location in doubly linked list. (8)
- (b) What are Binary search trees ? Give various applications of binary search trees. (8)

### SECTION-C

(Attempt any one question)

- V. (a) Explain the adjacency list and matrix representation of graph with suitable example. (8)
- (b) Write the algorithm for selection sort. Derive the worst case complexity of selection sort. (8)

- VI. (a) Explain in brief BPS and DFS traversals of graph. (8)
- (b) What is Heap sort ? Write the algorithm and find its complexity. (8)

### SECTION-D

(Attempt any one question)

- VII. (a) What is Sequential file organization. Mention its advantages and disadvantages. (8)
- (b) How Indexed sequential files are processed ? Compare the Indexed file organization with Direct file organization. (8)
- VIII. (a) Explain various operations on sequential files. (8)
- (b) What is Direct access and Sequential access storage device ? (8)

### SECTION-E

(Compulsory Question)

- IX. Attempt all the following :

- (a) How multidimensional arrays are stored in memory ?
- (b) Find the running time and Big O of the following code :

```
for((i=1; i <=n-1; i++)
```

```
for(j=i+1; j<=n; j++)
```

```
for(k=1; k<=j; k++)
```

```
//statements
```

- (c) Give any *two* applications of stack.
  - (d) What is the use of priority queue data structure ?
  - (e) Compare Doubly with Circular linked list.
  - (f) What are the advantages of Threaded binary trees ?
  - (g) Write any *two* applications of graph.
  - (h) What is meant by File organization ? (2×8=16)
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**L-19/2056****DATA AND FILE STRUCTURE—122****Semester—II**

Time Allowed : Three Hours]

[Maximum Marks : 75

**Note :—** The candidates are required to attempt *one* question each from Sections A, B, C and D carrying 15 marks each and the entire Section E consisting of *eight* short answer type questions carrying 2 and 1 marks each.

**SECTION—A**

1. (a) What are arrays ? Discuss implementation of sparse arrays and sparse matrix. 7½
- (b) What are priority queues ? Explain with examples. 7½
2. (a) What are stacks ? Discuss various operations which can be performed on stacks. 7½
- (b) Explain the following : 7½
  - (i) Big —O Notation
  - (ii) Memory Representation of Queues.

**SECTION—B**

3. (a) What are Binary trees ? Explain, its important properties, with example. 7½
- (b) Explain Header Linked List with example. 7½
4. (a) What are B-trees ? Explain, its important properties, with example. 7½
- (b) Compare and contrast Circular link list and doubly link list with examples. 7½

**SECTION—C**

5. (a) Explain any two collision resolution techniques in hashing. 7

- (b) Explain the following with example : 8
- (i) Quick Sort
- (ii) Selection Sort.
6. (a) Explain the following with example : 8
- (i) Insertion Sort
- (ii) Bucket Sort.
- (b) Explain the following with examples : 7
- (i) Adjacency Matrix
- (ii) Adjacency List.

### SECTION—D

7. (a) Explain the following : 10
- (i) Sequential Access Storage Devices
- (ii) Direct Access Storage Devices.
- (b) Give advantages and disadvantages of direct file organization. 5
8. (a) Explain the following along with advantages and disadvantages : 10
- (i) Sequential File Organization
- (ii) Indexed Sequential File Organization.
- (b) Discuss processing of direct file organization. 5

### SECTION—E

9. (i) What are circular queues ? 2
- (ii) What are graphs ? 2
- (iii) What are infix and postfix notations ? 2
- (iv) Give any two applications of linked list. 2
- (v) What is recursion ? 2
- (vi) Give two applications of heaps. 2
- (vii) Name any two direct access storage devices. 2
- (viii) What is hashing ? 1

**6702/M**

**L-19/2057**

**DATA AND FILE STRUCTURES-122**

**(Semester-II)**

Time Allowed : 3 Hours]

[Maximum Marks : 70

**Note :** The candidates are required to attempt **two** questions each from Sections A and B carrying  $10\frac{1}{2}$  marks each and the entire Section C consisting of 7 short answer type questions carrying 4 marks each.

**SECTION—A**

1. Discuss in brief the uses of data structures. Differentiate between linear and non-linear data structures. Discuss in brief the concept of algorithmic complexity and time space trade off.
2. Define Sparse arrays. What are the various methods of storing sparse arrays? Explain. Give the merits and demerits of sparse arrays.

6702/M/360/W/4010

[P. T. O.]



3. What do you mean by linear queue? How it is different from circular queue? Write an algorithm to perform insertion and deletion in a linear queue.
4. What do you mean by doubly linked list? What are its advantages and disadvantages? How doubly linked lists are different from circular list? Explain with an example.

### SECTION—B

5. What do you mean by a graph? Discuss the sequential and linked representation of a graph giving merits and demerits of each.
6. What do you mean by hashing? What are its advantages? What are various hash functions? Explain three hash functions.
7. Differentiate between sequential access storage devices and direct access storage devices. Discuss the working of any one sequential access storage device in detail.
8. Explain the index sequential file organization in detail.

## SECTION—C

9. Write brief answers :

1. Differentiate between row major order and column major order.
2. Write short note on recursion.
3. What do you mean by balanced tree?
4. What are the advantages of quick sort over other sorting methods?
5. What is a heap? How it is different from a binary tree?
6. What are the advantages and disadvantages of direct files?
7. What do you mean by collision? List various collision resolution techniques.