

Enrollment No.....



Faculty of Engineering
End Sem (Odd) Examination Dec-2017
CS3CO01 Data Structure

Programme: B.Tech.

Branch/Specialisation: CS

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. There are 4 different algorithms A1, A2, A3, A4 to solve a given problem with the order $\log(n)$, $\log(\log(n))$, $n\log(n)$, $n/\log(n)$ respectively. Which is the best algorithm? **1**
(a) A1 (b) A4 (c) A2 (d) A3
- ii. What are the advantages of arrays? **1**
(a) Easier to store elements of same data type
(b) Used to implement other data structures like stack and queue
(c) Convenient way to represent matrices as a 2D array
(d) All of these
- iii. Which of the following is useful in traversing a given graph by breadth first search? **1**
(a) Stacks (b) Set (c) List (d) Queue
- iv. The maximum degree of any vertex in a simple graph with n vertices is **1**
(a) n (b) n-1 (c) n+1 (d) 2n-1
- v. Why to prefer splay trees? **1**
(a) Easier to program
(b) Space efficiency
(c) Easier to program and faster access to recently accessed items
(d) Quick searching
- vi. A balance factor in AVL tree is used to check **1**
(a) What rotation to make.
(b) If all child nodes are at same level.
(c) When the last rotation occurred.
(d) If the tree is unbalanced.

[2]

- vii. The inorder traversal of tree will yield a sorted listing of elements of tree in **1**
(a) Binary Trees (b) Binary Search Trees
(c) Heaps (d) Binary Heaps
- viii. Which of the following is not a stable sorting algorithm: **1**
(a) Insertion sort (b) Selection sort
(c) Bubble sort (d) Merge sort
- ix. If several elements are competing for same bucket in the hash table, what is it called? **1**
(a) Diffusion (b) Replication (c) Confusion (d) None of these
- x. A B-tree of order 4 is built from scratch by 10 successive insertions. What is the maximum number of node splitting operations that may take place? **1**
(a) 3 (b) 4 (c) 5 (d) 6

- Q.2 Attempt any two:
- i. Briefly describe different Asymptotic Notations. **5**
- ii. Write algorithm for PUSH and POP operations on stack. **5**
- iii. With an example explain how to perform addition of two polynomials using linked list. **5**

- Q.3 i. Write the various ways for the representation of graph. **2**
- ii. Write a short note on Threaded Binary Tree. **3**
- iii. Create a Binary Tree when the following traversal of it are given as :- **5**

Postorder Traversal - I,E,D,B,F,H,G,C,A

Inorder Traversal - B,E,I,D,A,F,C,H,G

- OR iv. Explain Breadth First Search Traversing in a graph. Also write its algorithm. **5**

- Q.4 Attempt any two:
- i. Discuss and compare Binary Heap and Leftist Heap. **5**
- ii. Construct an AVL Tree by inserting numbers from 1 to 8. **5**
- iii. Define Balanced Tree? Write the importance of rotations to balance a Binary Tree. **5**

[3]

- Q.5 Attempt any two:
- i. Explain Insertion sort with the help of an example. Also write down its algorithm. **5**
- ii. What is heap? Show the procedure to create a Max Heap with an example. **5**
- iii. Write a short note on k-way merge sort. **5**
- Q.6 Attempt any two:
- i. Explain Binary Search Method. Also write its algorithm. **5**
- ii. What is Hashing? Write its problem and solutions. **5**
- iii. Discuss the applications of searching and indexing in computer field. **5**

CS3CO01 Data Structure
Marking Scheme

Q.1	i.	(c) A2	1
	ii.	(d) All of these	1
	iii.	(d) Queue	1
	iv.	(b) n-1	1
	v.	(c) Easier to program and faster access to recently accessed items	1
	vi.	(d) If the tree is unbalanced.	1
	vii.	(b) Binary Search Trees	1
	viii.	(b) Selection sort	1
	ix.	(d) None of these	1
	x.	(c) 5	1
Q.2		Attempt any two:	
	i.	Type of Notation 0.5 marks For description with graph.	5
	ii.	PUSH algorithm - 2.5 marks POP algorithm – 2.5 marks	5
	iii.	Polynomials representation – 1 mark Procedure for addition – 2 marks Example – 2 marks	5
Q.3	i.	Minimum two representation of graph. 1 mark each	2
	ii.	Definition 2 marks example 1 mark	3
	iii.	Create a Binary Tree	5
OR	iv.	Explanation - 2 marks Example – 1 marks Algorithma – 2 marks	5
Q.4		Attempt any two:	
	i.	Definition of Binary Heap 1 mark Definition of Leftist Heap 1 mark. Difference 3 marks (minimum 3 points)	5
	ii.	AVL Tree by inserting numbers from 1 to 8	5
	iii.	Definition 2 marks Importance of rotations 3 marks	5

Q.5		Attempt any two:	
	i.	Explanation Insertion sort 1 mark Example with passes – 2 marks Algorithm of insertion sort – 2 marks	5
	ii.	Definition heap with types 3 marks Procedure to create a Max Heap with an example 2 marks	5
	iii.	Explanation 3 marks Example 2 marks	5
Q.6		Attempt any two:	
	i.	Definition Binary Search Method 2 marks Algorithm of Binary Search 3 marks	5
	ii.	Definition Hashing 2 marks Example 1 mark Problem of hashing 1 mark Solution of hashing 1 mark	5
	iii.	Applications of searching (minimum 3 application) 2.5 marks Applications of indexing (minimum 3 application) 2.5 marks	5
