



GENERAL INSTRUCTIONS TO THE CANDIDATES

- Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
- Candidates are strictly instructed not to write anything in the question paper other than their roll number.
- Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
- Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
- Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E/B.TECH DEGREE EXAMINATIONS: DEC 2015

(Regulation 2014)

Third Semester

INFORMATION TECHNOLOGY

U14ITT301: Data Structures and Algorithms

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

- The postfix form of the expression $(A + B) * (C * D - E) * F / G$ is CO₁ [K₂]
 - $AB + CD * E - FG / **$
 - $AB + CD * E - F ** G /$
 - $AB + CD * E - * F * G /$
 - $AB + CDE * - * F * G /$
- Assume that a stack contains the following elements 10, 20, 30, and 40 in that order and 40 is at the top of the stack. What will be the sequence in which the elements will be removed from the stack when three elements are popped? CO₁ [K₂]
 - 10,20,30
 - 30,20,10
 - 20,30,40
 - 40,30,20
- A binary heap in which the parent nodes are greater than its children nodes is _____ CO₂ [K₁]
 - Min heap
 - Max heap
 - Initial heap
 - Min-Max heap

4. The valid Traversals of the Binary search tree with the Key values 7, 4, 9, 3, 6, 11, 12, 5 CO₂ [K₂]
1. 7,4,9,3,6,11,12,5
 2. 3,4,5,6,7,9,11,12
 3. 3,5,6,4,11,12,9,7
 4. 7,4,3,6,5,9,11,12
- a) 1,2,3 b) 1,3,4
c) 2,3,4 d) 1,2,4
5. Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199, and 5382) and the hash function $x \bmod 10$, which of the following statements are true? CO₂ [K₃]
1. 9679, 1989, 4199 hash to the same value
 2. 1471, 6171 hash to the same value
 3. Each element hashes to a different value
 4. 4322, 5382 hash to the same value
- a) 1,2,3 b) 1,3,4
c) 2,3,4 d) 1,2,4
6. Assertion(A): Rotations are not performed in an AVL tree CO₂ [K₃]
Reason (R): Height difference between the left sub tree and the right sub tree in an AVL should be equal -1,0,+1
- a) Both A and R are individually true and R is the correct explanation of A b) Both A and R are individually true but R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true.
7. A graph may be represented as CO₂ [K₁]
- a) Adjacency matrix b) Adjacency list
c) Adjacency vertex d) Both a & b
8. A _____ graph is a graph in which there is an edge between every pair of vertices. CO₂ [K₁]
- a) Biconnected b) Complete
c) Connected d) Full
9. Assertion (A): large volume of data available in secondary storage can be sorted using internal sorting CO₄ [K₂]
Reason (R): Data available in the Magnetic tapes can also be sorted
- a) Both A and R are individually true and R is the correct explanation of A b) Both A and R are individually true but R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true.

10. The average time complexity is:

CO₂ [K₃]

List I		List II	
A. Bubble sort		i. $O(\log n)$	
B. Quick sort		ii. $O(n^2)$	
C. Binary search		iii. $O(n \log n)$	
D. Linear search		iv. $O(n)$	

	A	B	C	D
a)	3	4	2	1
b)	3	1	4	2
c)	4	1	3	2
d)	2	3	1	4

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Define Abstract Data Type.

CO₁ [K₁]

12. Design an algorithm to count the number of elements in a queue b/w front and rear.

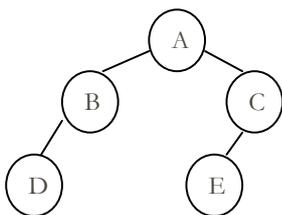
CO₁ [K₃]

13. Define Threaded Binary Tree.

CO₂ [K₂]

14. List the prefix, infix and postfix traversal for the given tree:

CO₂ [K₃]



15. Explain the zig zig and zig zag rotation of a Splay Tree.

CO₂ [K₁]

16. Describe separate chaining with a suitable example.

CO₂ [K₂]

17. List the Graph representation techniques with an suitable example.

CO₂ [K₁]

18. Justify the need for minimum spanning tree.

CO₂ [K₁]

19. Given the elements 10, 20, 30, 40, 50. Which searching technique will obtain the element to be found, faster? CO₃ [K₃]
20. Given the elements 20, 25, 10, 15, 5. Show the step-wise evaluation to obtain the ascending order using Insertion Sort technique. CO₃ [K₃]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Create a program to arrange the elements in ascending order using the Quick Sort algorithm. Show how the elements **8, 1, 4, 9, 0, 3, 5, 2, 7, 6** are sorted. CO₄ [K₃]
22. Write a routine to concatenate the two double linked list into a sorted list with necessary illustrations. CO₁ [K₃]
23. Evaluate the postfix expression **a b + c d * -** using a stack. Write and explain the program. CO₁ [K₃]
24. Explain with the routine by inserting **6, 1, 4, 3, 9, 2, 5, 7** into an initially empty binary search tree. Obtain the result by deleting the root and explain the rotations with routines. CO₂ [K₃]
25. Illustrate the result of inserting **2, 1, 4, 5, 9, 3, 6, 7** into an initially empty AVL tree. Obtain the result by deleting the root and explain the rotations with routines. CO₂ [K₃]
26. Describe the minimum cost spanning tree using Prim's Algorithm. Demonstrate how a minimum cost spanning tree is obtained with a suitable example. CO₂ [K₂]
