Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Fourth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U15ITT410 : Data Structures using C

COURSE OUTCOMES

CO1: Explain the basic data structures and its operations (K2).
CO2: Identify an appropriate data structure for a given problem (K3).
CO3: Make use of basic data structures to solve problems (K3).
CO4: Explain various searching and sorting algorithms (K2).

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match list 1 with list 2 and choose the correct answer using the codes given below CO1 [K_1]

List 1	List 2
A. Linked list	1. Undo and redo operation in Microsoft word
B. Doubly linked list	2. Multiple documents waiting to be printed in a printer
C. Stack	3. Polynomial Arithmetic
D. Queue	4. Scrolling a word document containing several pages

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	i	ii
c)	ii	iv	iii	i
d)	iii	i	ii	iv

2. Arrange the following steps in respect with the creation of a single node [K2, CO1] CO1 [K_2]

1. Allocate the memory required for the node
2. Assign the value to the node
3. Specify the definition of the structure of the node
4. Link the node

a) 1 – 3 – 4 – 2 b) 2 – 4 – 3 – 1

c) 3 – 1 – 2 – 4 d) 3 – 2 – 1 – 4

3. We are given a set of n distinct elements and an unlabeled binary tree with n nodes. In how many ways can we populate the tree with the given set so that it becomes a binary search tree? CO2 [K_2]

a) (n+1)! b) n!

c) 0 d) 1

4. Which of the following statements about AVL tree are true? COL [K_L]

i. It is a binary search tree.
ii. Left node and right node differs in height by at most 1
iii. Worst case time complexity for insertion is O(log n)
iv. Worst case time complexity for deletion is O(n)

a) i, ii, iv b) i, ii, iii

c) i, ii, d) i, ii, iii, iv

5. Consider a hash table with 9 slots. The hash function is h(k) = k mod 9. The collisions are resolved by chaining. The following 9 keys are inserted in the order: 5, 28, 19, 15, 20, 33, 12, 17, 10. The maximum, minimum, and average chain lengths in the hash table, respectively, are CO3 [K_3]

a) 3, 0, and 1 b) 3, 3, and 3

c) 4, 0, and 1 d) 3, 0, and 2

6. A priority queue can be efficiently implemented using which of the following data structures? CO2 [K_2]

a) Array b) Queue

c) Binary Heap d) Linked List

7. Assertion (A): For a given graph with all edges having different weights there is a unique minimum spanning tree. CO3 [K_3]

Reason (R): The given graph is general there can be more than one spanning tree.

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

8. Assertion (A): Dijkstra's algorithm cannot be applied for a graph with negative edges costs. CO3 [K_3]

Reason (R): Negative edge costs are reported in negative path calculation.

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

9. Which of the following technique is deployed in Binary Search? CO4 [K_1]

a) Dynamic Programming b) Brute Force

c) Divide and Conquer d) Back Tracking

10. Which of the following sorting algorithms gives best performance when applied on an array which is sorted or almost sorted (maximum 1 or 2 elements are misplaced)? CO4 [K_1]

a) Merge Sort b) Quick Sort

c) Insertion Sort d) Heap Sort

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Outline the procedure for insertion in queue. CO1 [K_1]
12. Define Abstract Data Type. CO1 [K_1]
13. List the tree traversals with a suitable example. CO2 [K_1]
14. What are threaded binary trees? CO1 [K_1]
15. List the properties of B-trees. CO3 [K_1]
16. What is the drawback of separate chaining? How it has been overcome in open addressing? CO3 [K_1]
17. Define minimum spanning tree. CO3 [K_1]
18. What are articulation points? CO3 [K_1]
19. Differentiate linear search and binary search. CO4 [K_2]
20. Outline the procedure for insertion sort. CO4 [K_1]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Explain with appropriate procedures for creation, insertion and deletion in a singly linked list with suitable diagrams. CO1 [K_2]

22. Write subroutines to implement the basic operations of stack ADT. CO1 [K_2]

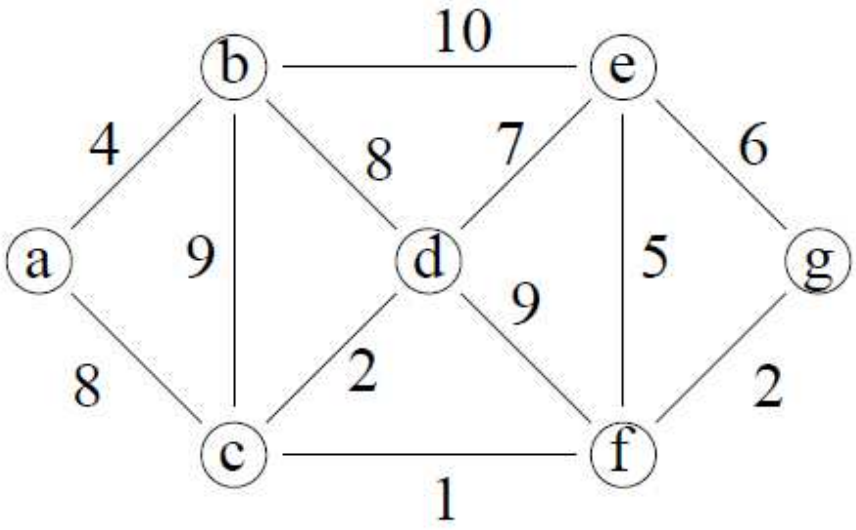
23. Insert the following values 10, 12, 1, 14, 6, 5, 8, 15, 3, 9, 7, 4, 11, 23, 2 into an initially empty binary heap and perform two *DeleteMin* operations. CO3 [K_3]

24. Write routines to explain the basic operations in a binary search tree. CO2 [K_2]

25. i. Insert the following keys 76, 93, 40, 47, 10, 55 into a hash table of size 7 using linear probing to avoid collision. (7) CO3 [K_3]

ii. Explain single rotation in an AVL tree with suitable examples. (7)

26. Find the minimum spanning tree for the following graph using Prim's algorithm. CO3 [K_3]



27. Explain the basic algorithm for quicksort and show how quicksort processes the input 142, 543, 123, 65, 453, 879, 572, 434, 111, 242. CO4 [K_1]

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