Register Number:……..

KUMARAGURU
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MCA DEGREE EXAMINATIONS: NOV/DEC 2018

(Regulation 2017)

Second Semester

MASTER OF COMPUTER APPLICATIONS

P17CAT2101: Data Structures

COURSE OUTCOMES

CO1: Understand the behavior of basic data structures.
CO2: Analyze time and space complexity of elementary algorithms.
CO3: Interpret a problem and determine the appropriate data structure for the problem.
CO4: Understand the efficient storage mechanism to facilitate easy data access.
CO5: Improves the logical thinking ability.

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match list I (Asymptotic notations) with list II (meaning) and select the correct answer using the codes given below. CO2 [K_2]

List I	List II
A. Big Oh	i. Not an asymptotic notation
B. Big Omega	ii. Same order of growth
C. Big Delta	iii. Larger or same order of growth
D. Big Theta	iv. Smaller or same order of growth

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

2. Assume that the following circular queue can accommodate maximum six elements with the following data: CO1 [K_4]

front = 2; rear = 4;

queue = _____; L, M, N, ___, ___

What will happen after ADD O operation takes place?

a) front = 2; rear = 5;
queue = _____; L, M, N, O, ___

b) front = 3; rear = 5;
queue = L, M, N, O, ___

c) front = 3; rear = 4;
queue = _____; L, M, N, O, ___

d) front = 2; rear = 4;
queue = L, M, N, O, ___

3. _____ is the time complexity to count the number of elements in the linked list. CO2 [K_4]

a) O(1)
b) O(n)
c) $O(n^2)$
d) O(log n)

4. Graphs can be implemented using _____. CO3 [K_2]

i) arrays ii) linked list iii) stack iv) queue

a) i and ii only
b) i only
c) i, ii and iv only
d) i, ii and iii only

5. The _____ should be the value of rear (end) if the queue is full (elements are completely occupied). CO1 [K_1]

a) MAX + 1
b) MAX - 1
c) 1
d) -1

6. _____ is the correct algorithmic sequence of an In - Order Traversal of a Binary Tree. CO1 [K_2]

i.) Visit the Root
ii.) Traverse Left Subtree
iii.) Traverse Right Subtree

a) i - ii - iii
b) iii - ii - i
c) i - iii - ii
d) ii - i - iii

7. The postfix form of the expression (A+B)*(C*D-E)*F/G is _____ . CO3 [K_3]

a) AB+ CD*E –FG/**
b) AB + CD* E − F **G /
c) AB + CD* E − *F *G /
d) AB + CDE * − * F *G /

8. An adjacency matrix representation of a graph cannot contain information about _____. CO5 [K_2]

a) nodes
b) edges
c) direction of edges
d) parallel edges

9. Assertion (A): Stack is a linear data structure. CO3 [K_4]

Reason (R): Linear data structures store data sequentially in memory.

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. In _____, the heights of the two child subtrees of any node differ by at most one. CO4 [K_1]

a) Binary Tree b) Binary Search Tree

c) AVL Tree d) Minimum Spanning Tree

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

11. Define ADT with example. CO1 [K_1]
12. State the advantages of linked lists over arrays. CO2 [K_2]
13. Consider an array A[1:20] with the base address α=1000, Compute the memory location of A[5]. CO4 [K_3]
14. Evaluate the postfix expression ABCD ^ * + for A = 5, B= -1, C = 2 and D = 3. CO3 [K_3]
15. List the applications of stack. CO4 [K_2]
16. Suppose you have the following series of queue operations: CO5 [K_3]

```
q = Queue()
q.enqueue('Welcome')
q.enqueue('to')
q.enqueue('KCT')
q.dequeue()
```

What are the items left in the queue?

17. Differentiate between AVL Tree and a Binary Search Tree. CO2 [K_4]
18. What is the maximum number of nodes in a binary tree of height 'h'? CO3 [K_2]
19. Define transitive closure. CO1 [K_1]
20. State the difference between Warshall's and Floyd's algorithm. CO3 [K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 350 words)

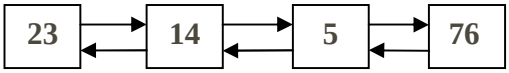
Q. No. 21 is Compulsory

21. a) Construct a binary search tree for the given data: 32, 44, 12, 35, 42, 8, 25, 11, 68, 56. (6) CO5 [K_5]

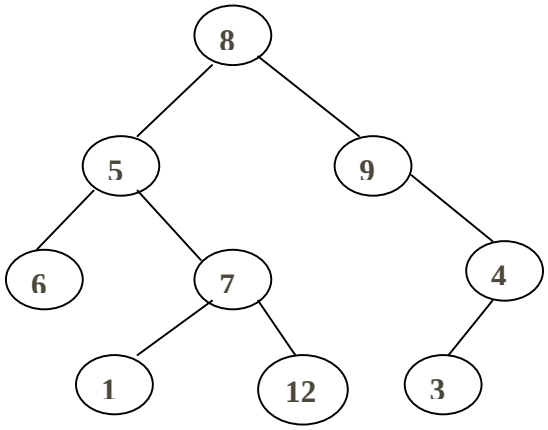
b) Explain Sparse Matrix and its representation with an example. (8) CO1 [K_2]

22. a) Explain the steps to reverse a singly linked list. (6) CO3 [K_2]

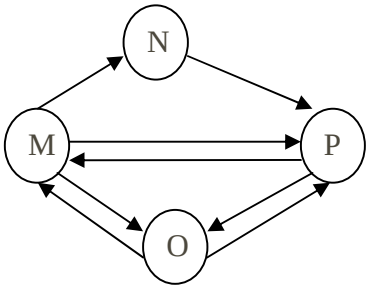
b) Write an algorithm to delete any middle element in the doubly linked list. Apply the algorithm to delete the element '5' in the doubly linked list given below & trace the steps. (8) CO4 [K_3]



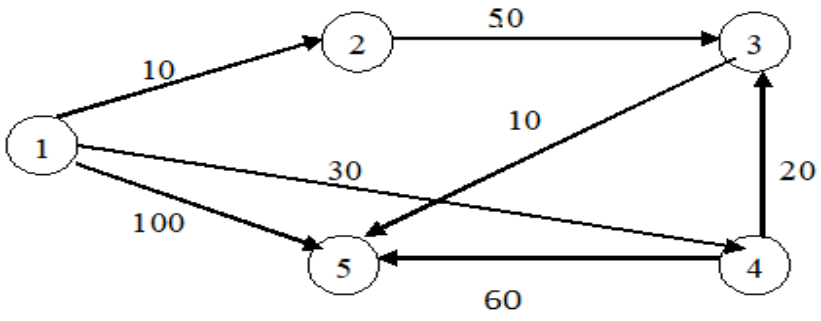
23.	a)	Write an algorithm for balancing parentheses in an expression using stack.	(6)	CO5	[K_2]
	b)	Explain the algorithm to implement a stack and its basic operations using linked list.	(8)	CO3	[K_2]
24.	a)	Write the algorithm to perform insert operation in a queue.	(6)	CO1	[K_2]
	b.)	Explain the types of queues using examples.	(8)	CO4	[K_2]
25.	a)	Write the algorithms for inorder, preorder and postorder traversals in a binary tree and implement it on the following tree:	(14)	CO5	[K_3]



26.	a)	Write the adjacency list and adjacency matrix representation for the following graph:	(6)	CO3	[K_3]



	b)	Apply Dijkstra's algorithm find the single source shortest path for the following graph (from node 1).	(8)	CO5	[K_3]



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