

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: CS205

Course Name: DATA STRUCTURES (CS, IT)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks

Marks

- | | | |
|---|---|-----|
| 1 | Write an algorithm to perform backward traversal of a doubly linked list. | (3) |
| 2 | Define the following terms, with examples:
i) Header linked list ii) Circular linked list | (3) |
| 3 | What is the purpose of calculating frequency count? Compute the frequency count of the following code fragment.
<pre>for(i=0;i<n;i++) for(j=0;j<n;j++) printf("%d",a[i][j]);</pre> | (3) |
| 4 | What is stepwise refinement technique? | (3) |

PART B

Answer any two full questions, each carries 9 marks

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|---|--|-------|
| 5 | a) What is the difference between recursive and iterative algorithms? | (4.5) |
| | b) Write recursive and iterative algorithm to traverse a singly linked list. | (4.5) |
| 6 | a) Write an algorithm to add two polynomials. | (6) |
| | b) Write about top down and bottom up programming methodologies. | (3) |
| 7 | a) Write an algorithm to insert a node after a given node in a doubly linked list. | (4.5) |
| | b) What is asymptotic notation? Describe about Big O notation. | (4.5) |

PART C

Answer all questions, each carries 3 marks

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|----|--|-----|
| 8 | Write an algorithm to perform substring searching. | (3) |
| 9 | Evaluate the following expressions written in reverse polish notation. Assume single digit operands and ^ represents exponentiation operator
i) $123*+42/^$ ii) $63/45-*$ | (3) |
| 10 | Define the properties of circular queue. How will you check whether the circular queue is
i) Full ii) Empty | (3) |
| 11 | Write a recursive algorithm to perform preorder traversal. | (3) |

PART D

Answer any two full questions, each carries 9 marks

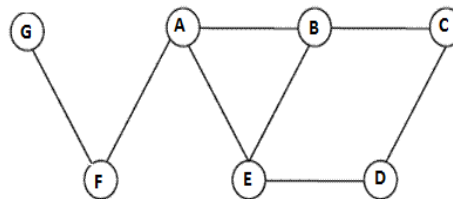
- | | | |
|----|---|-------|
| 12 | a) Write an algorithm to convert an infix expression to postfix. | (4.5) |
| | b) Show the structure of the binary search tree after adding each of the following values in that order: 10, 1, 3, 5, 15, 12, 16. What is the height of the created | (4.5) |

- binary search tree?
- 13 a) Given five memory partitions of 100Kb, 500Kb, 200Kb, 300Kb, 600Kb (in order), (4.5)
how would the first-fit and best-fit algorithms place processes of 212 Kb, 417 Kb,
112 Kb, and 426 Kb (in order)? Which algorithm makes the most efficient use of
memory?
- b) Develop an algorithm to add an element into a binary search tree. (4.5)
- 14 a) Write a C Program/algorithm to implement two stacks using a single array. (7)
- b) What are the applications of trees? (2)

PART E

Answer any four full questions, each carries 10 marks

- 15 Write an algorithm/ C program to perform merge sort. Given the following list of (10)
numbers: [21, 1, 26, 45, 29, 28, 2] find the output obtained after each recursive call
of merge sort algorithm.
- 16 Write C program/algorithm to perform linear search. Find the time complexity for (10)
best, worst and average case for a linear search in an array of n elements.
- 17 a) Write algorithm to perform Breadth First Search. Write one possible order of (5)
visiting the nodes of the following graph starting at vertex A.



- b) What is hash table? What are the properties of hash function? (5)
- 18 What is max heap? Write an algorithm to perform heap sort. Give example. (10)
- 19 Write C program/algorithm to perform selection sort. Perform selection sort on an (10)
array [5,3,1,7,9].
- 20 What is double hashing? Suppose size of the hash table is 11. Open addressing (10)
and double hashing is used to resolve collisions. The hash function used is $H(k) = k \text{ mod } 11$. The second hash function is $H_2(k) = 5 - (k \text{ mod } 5)$
What values will be in the hash table after the following sequence of insertions?
16, 23, 9, 34, 12, 56
