

Reg No.: _____

Name: _____

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

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|---|---|-----|
| 1 | Write a recursive function to find the fibonacci series | (3) |
| 2 | Draw a circular doubly linked list. Give an advantage of circular doubly linked list. | (3) |
| 3 | Check whether the following is true or not.
2^{n+1} is in $O(2^n)$. Give reason. | (3) |
| 4 | How will you represent a polynomial $3x^2 + 2xy^2 + 5y^3 + 7yz$ using singly linked list? | (3) |

PART B

Answer any two full questions, each carries 9 marks.

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|---|--|-----|
| 5 | a) Explain the Big O asymptotic notation used for specifying the growth rate of functions. | (3) |
| | b) Given a doubly linked list, write an algorithm that removes a node with a particular value from the list and inserts it in the front. | (6) |
| 6 | a) What is an algorithm? How is its complexity analysed? | (3) |
| | b) What is the complexity of finding maximum and minimum value from an array of n values? Explain the steps of deriving complexity. | (6) |
| 7 | a) Give any three applications of linked list. | (3) |
| | b) Let L1 be a singly linked list in memory. Write an algorithm | (6) |
| | i) Finds the number of non zero elements in L1 | |
| | ii) Adds a given value K to each element in L1 | |

PART C

Answer all questions, each carries 3 marks.

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|----|---|-----|
| 8 | Write an algorithm to find a substring in a given string. | (3) |
| 9 | With the help of an example, explain how a binary tree can be represented using an array. | (3) |
| 10 | How can you reverse a string using stack? Give one example and show how you can reverse a given string using stack. | (3) |
| 11 | Write a recursive algorithm for pre-order traversal in a binary tree. | (3) |

PART D

Answer any two full questions, each carries 9 marks.

- 12 a) Illustrate the result of each operation in the sequence PUSH(S,4), PUSH(S,1), PUSH(S,3), POP(S), PUSH(S,8) and POP(S) on an initially empty stack S stored in array S[1..6] (3)
- b) Write an algorithm to insert an element into a binary search tree. (6)
- 13 a) Convert the following infix expression into prefix expression (A-B/C) * (D*E-F) (3)
- b) Write an algorithm to evaluate a postfix expression. (6)
- 14 a) In a complete binary tree of depth d (complete including last level), give an expression to find the number of leaf nodes in the binary tree. (3)
- b) Given five memory partitions of 300Kb, 700Kb, 400Kb, 500Kb, 800Kb (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 412 Kb, 617 Kb, 112 Kb, and 626 Kb (in order)? (6)

PART E

Answer any four full questions, each carries 10 marks.

- 15 a) What are the characteristics of a good hash function? (4)
- b) Demonstrate the insertion of the keys 5, 28, 15, 20, 33, 12, 17, 32 into a hash table with collisions resolved by linear probing. Let the table have 9 slots, with the starting index 0. Let the hash function be $h(k) = k \bmod 9$ (6)
- 16 a) Give the heap sort algorithm. Write the complexity of your algorithm. (4)
- b) Using the above heap sort algorithm sort the input file [35 15 40 1 60]. (6)
- 17 a) What is Primary Clustering? (4)
- b) Given input keys {1, 3, 23, 9, 4, 29, 19} and a hash function $h(X) = X \bmod \text{tablesize}$. The initial hash table contains 10 slots, with starting index 0. Show the resulting table after rehashing when the load factor= 0.5, using linear probing (6)
- 18 a) Give a non recursive algorithm for binary search. (4)
- b) Suppose an array contains elements {10, 13, 21, 32, 35, 44, 55}. Give the steps to find an element "35" using i) linear search ii) binary search (6)
- 19 a) Give two different types of representation for graphs. (4)
- b) Write a procedure to do DFS in a graph. (6)
- 20 a) Write an algorithm to perform selection sort in an array. (4)
- b) Using the above selection sort algorithm, sort the input file [25, 7, 46, 11, 85]. (6)
