SE320

Total No. of Printed Pages: 02

S.E. Computer (Sem-III) (Revised Course 2016-2017)
EXAMINATION Nov/Dec 2019
Data Structures And Algorithms -I

[Duration : Three Hours] **[Total Marks : 100]**

N.B
1. Answer **ANY TWO**questions from Part-**A** (**20** marks each)
2. Answer **ANY TWO** questions from Part-**B** (**20** marks each)
3. Answer **ANY ONE** questions from Part-**C** (**20** marks each)
4. **Make** suitable assumptions and **state** those assumptions, if any.

PART- A

Q.1 (a) Define a data structure and give the classification of different data structure. Also state what are primitive data structures? **03**

(b) Write an algorithm to implement singly linked list. Prompt the user to insert the elements in the linked list at the end and display elements in the position multiple of 3 from the linked list as output. **06**

(c) Explain the concept of passing the pointer to a structure as function parameter with help of 'C' program. **05**

(d) Differentiate between the following **06**
- i. Linear queue and Deque
- ii. Circular linked list and doubly linked list
- iii. Self-referential structured and nested structure

Q.2 (a) Write an algorithm to insert and delete an element from the circular singly linked list. **06**

(b) Write a C program using array of structures to store the following personal details (Name, Age, Gender, Monthly salary, Address) of 5 employees and display only those employee details whose gender is female, Annual income is ranges from 5 Lakhs to 10 Lakhs and also live in ponda. **06**

(c) Explain how Queue can be implemented using two stacks. Give algorithm to enqueue and dequeue operations. **08**

Q.3 (a) Write a C program to create two separate linked list and merge the two linked into third one and sort the resulting linked list into descending order and hence display the result. **[8]**

(b) How will you detect the empty and full status for the following data structures while programming. **[5]**
- i. i. Linear stack
- ii. Circular Queue
- iii. Linear Queue
- iv. Linked List with Header node
- v. Deque

(c) What is Deque? Write the significance of Deque? Write down the algorithm for insertion and deletion operations performed on the Deque? **[7]**

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PART-B

Q.4

(a) Write the algorithm to convert the given Infix expression into equivalent postfix form and use it to convert the following expression to postfix form. **[8]**
[Note:$ is exponential operator]
(A+B)* C-(D*E)/E*F$G

(b) What are the criteria for choosing a good hash function? Explain techniques for making hash functions. **[4]**

(c) Write a C function that will add 2 polynomials that are represented as linked list. **[5]**

(d) Differentiate between conventional recursive call and tail recursive call. **[3]**

Q.5

(a) Write a C function to search an element from the open addressed hash table structure. Let the function return the index of the Hash table where the sky was found or return- 1 otherwise. **[5]**

(b) Explain how queue data structure is used in round robin scheduling algorithm with suitable example. **[4]**

(c) Write short notes on the following:
(i) In –place sorting algorithm
(ii) Sort order and sort stability **[6]**

(d) Write a C program to perform recursive Binary search in an array. Illustrate your program using the following data set: 10, 30, 50, 17, 19, 32, 23 with key to find=23. Also state the number of recursive calls consumed.

Q.6

(a) Sort the list suing Radix sort : 99, 231, 490, 50,682,5,27,45,83,721 **[5]**

(b) Explain how separate chaining is implemented to resolve the hash collisions with suitable example. **[6]**

(c) Write a C program to compare if two linked list are same or not using recursion. Print the result accordingly. **[5]**

(d) Write the function to implement the quick sort technique. **[4]**

PART-C

Q.7

(a) Write a C program using recursion to reverse a singly linked list and print it. **[6]**

(b) Write the algorithm to evaluate the postfix expression using stack and hence evaluate the following expression using stack **[8]**

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(c) Illustrate iterative bottom up merge sort technique on the following list of elements 56, 21, 14, 64, 80, 92, 30, 80, 5, 18 **[6]**

Q.8

(a) Write a C program using stack data structure to validate if a string is a palindrome string or Not. **[6]**

(b) Explain how towers of Hanoi problem are solved using recursion. **[4]**

(c) Explain the flow of control of a recursive function involving winding and unwinding phase. **[4]**

(d) Write a C program to implement insertion sort technique **[6]**