

# CBCS SCHEME

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15CS33

Third Semester B.E. Degree Examination, June/July 2019

## Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. What is a Pointer? How do you declare and initialize the pointer? How do you access the value pointed to by a pointer. (06 Marks)
- b. What is Self-referential structure? List the difference between structure and union. (06 Marks)
- c. What is String? Explain the following string functions with examples :  
i) STRTOK    ii) STRCAT    iii) SUBSTR. (04 Marks)

OR

- 2 a. Write appropriate structure definition and variable declarations to store following information about 50 students :  
Name , USN , GENDER , DOB and Marks in three subjects S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub> , Date of birth should be a structure containing fields day , month and year. (06 Marks)
- b. What is Dynamically allocated arrays? Explain with suitable example. (05 Marks)
- c. What is pointer to pointer? Give the following declaration.  
int a = 8 ;  
int b = 9 ;  
int \*b = &a ;  
int \*2 = &b ;  
What is the value of each of the following expression?  
i) ++ a    ii) ++(\*p)    iii) --(\*q)    iv) --b. (05 Marks)

### Module-2

- 3 a. Define Stack? List the operations of on stack. Write the C implementation of these operations. (08 Marks)
- b. Write an algorithm for evaluating a valid postfix expression. Trace the same on  
562 + \* 841 - (08 Marks)

OR

- 4 a. What is Recursion? Write a C implementation for Tower of Hanoi. (08 Marks)
- b. What is a Queue? List different types of Queue. Write C implementation for insertQ( ) and deleteq( ) operation. (08 Marks)

### Module-3

- 5 a. What is a linked list? List different types of linked list. Write a C function to count number of elements present in a singly linked list. (08 Marks)
- b. How can an ordinary queue be represented using a singly linked list? Write C functions for linked implementation of ordinary queue insertion and deletion. (08 Marks)

OR

- 6 a. What is doubly linked list? Write a C program to perform the following operations on doubly linked list i) Insert a node ii) Delete a node. (08 Marks)
- b. Explain the following with suitable example i) Circular linked list ii) Doubly linked list. (08 Marks)

#### Module-4

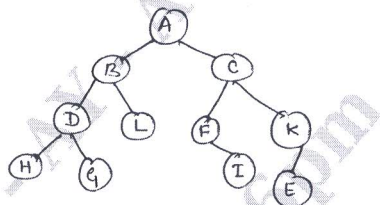
- 7 a. What is a Tree? List traversing Binary tree. Write algorithm for these tree traversal. (07 Marks)
- b. Construct a binary tree from the traversal order given below :

Preorder :	A	B	D	E	F	C	G	H	L	J	K
Inorder :	D	B	F	E	A	G	C	L	J	H	K

- c. What is Threaded Binary tree? Explain right in an left in threaded binary trees. (05 Marks)

OR

- 8 a. Construct a binary tree for given expression  $((6 + (3-2) * 5) ^ 2 + 3)$ . (06 Marks)
- b. Given the following graph, write inorder, preorder and postorder traversals. (04 Marks)



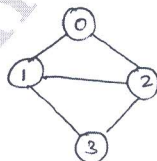
- c. Define the following : i) Binary tree ii) Complete binary tree iii) Almost complete binary tree iv) Binary search tree. (06 Marks)

#### Module-5

- 9 a. How an Insertion sort works? Suppose an array A contains 8 elements as follows : 77, 33, 44, 11, 88, 22, 66, 55. Trace insertion sort algorithm for sorting in ascending order. (06 Marks)
- b. What is Hashing? Explain with example hash following hashing function :  
i) Division method ii) Midsquare method iii) Folding method. (06 Marks)
- c. Define following terms : i) Graph ii) Multigraph iii) Graph with self edge iv) Subgraph. (04 Marks)

OR

- 10 a. Define Adjacency matrix and Adjacency list. Also show the adjacency matrix and adjacency List for the given graph. (08 Marks)



- b. Consider the following 4 – digit employee number 9614 , 5882 , 6713 , 4409 , 1825. Find the 2 – digit hash address of each number using  
i) The division method with = 97.  
ii) The midsquare method.  
iii) The folding method without reversing.  
iv) The folding method with reversing. (08 Marks)

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