Roll No. | | | | | | | | | | |

B.E / B.Tech (Full Time) ARREAR EXAMINATIONS, APR/MAY 2019

Information Technology

Semester II

IT8202 & Programming and Data Structures I

(Regulation 2012)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Differentiate between the local variable and global variable in C?
2. How do you declare a variable that will hold string values and to read character by character? Write the snippet code.
3. Consider the following C declaration,

```
int main()
{
struct {
   short s[5];
   union {
      float y;
      long z;
   }u;
} t;
```

What is the memory requirement for variable t, ignoring alignment considerations?

4. How memory allocation or reallocation can be done at run time in C? List the functions in C by which we can create amount of required memory.
5. What are the various operations that can be performed on different data structures?
6. What are the key differences between array and linked list.
7. What are expression trees? Represent the following expression using a tree.
   (a-b) / ((c*d)+e).
8. What is extendible hashing? What is the need for it?
9. When is a binary search best applied? Simulate with an example and compare it with linear search.
10. How does selection sort work? Simulate with an example.

Part – B (5 x 16 = 80 marks)

11.i) Illustrate Call by Value and Call by Reference with a program to swap two numbers. (10)

ii) Write a C program to print numbers between 1 and 100 which are multiple of 3 using do while loop. (6)

12. a) i) Write a C program to read and print **Student** details using structure pointer. Include a **Read()** function, **Print()** function and a **main()** to test this code. (10)

a) ii) How will you declare an array of pointers. Demonstrate with an example. (6)

(OR)

12. b) i) Why files are needed? What are the types of file supported in C. Write the respective functions used to work with each type of file with example code. (10)

b) ii) Differentiate between function pointer and pointer to a function and explain with its syntax and snippet code. (6)

13. a) i) Formulate an ADT to implement a Stack using arrays. (10)

a) ii) Write the pseudo code for evaluating any postfix expression.
Simulate how the following postfix expression with single digit operands is evaluated using a stack. (6)

8 2 3 ^ / 2 3 * + 5 1 * -

(OR)

13. b) i) Write routines to insert a node and to remove a node from a singly linked list. (10)

b) ii) Write the following routines performed on the queue Q. (6)
isEmpty (Q) — returns true if the queue is empty, false otherwise.
ii. delete (Q) — deletes the element at the front of the queue and returns its value.
iii. insert (Q, i) — inserts the integer i at the rear of the queue.

14. a) i) Write the algorithm to insert and delete in a Binary Search Tree. (10)

a) ii) The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree. Traverse the obtained tree in preorder and postorder. (6)

(OR)

14. b) i) Explain the following collision resolving methods in Hashing and demonstrate with suitable example.

i. Open addressing schemes

ii. Rehashing (10)

b) ii) What is the advantage of Separate chaining over Open addressing? Demonstrate the insertion of keys 5, 28, 19, 15, 20, 33, 12, 17, 10 into a hash table with collisions resolved by chaining. Let the hash table have 7 slots, and let the hash function be h(k) = k mod 7. Draw the hash table after each insertion. (6)

15. a) i) Write the algorithm to sort an array of integers using Quicksort. (10)

a) ii) Sort the given set of values using Insertion sort.
4, 3, 2, 10, 12, 1, 5, 6. (6)

(OR)

15. b) i) Write the algorithm to sort using Shell sort. (10)

b) ii) What is Binary Heap? What representation is used for storing Binary Heap? Apply Heap sort for the elements 12, 11, 13, 5, 6, 7. (6)