Registration No. : | | | | | | | | | | |

Total number of printed pages – 4

B. Tech
BE 2106

Second Semester Regular Examination – 2015

DATA STRUCTURE USING C

BRANCH(S) : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, EC, EEE, EIE, ELECTRICAL, ETC, FASHION, IT, MANUTECH, MECH, MINERAL, MINING, MM, MME, PLASTIC, TEXTILE

QUESTION CODE : J 146

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

(a) Whether Linked List is linear or Non-linear data structure from storage point of view ? Justify.

(b) Suppose int m[70][70] be an array with starting address 2000. Calculate the address of m[39][43] using row major ordering.

(c) Consider the following function to traverse a linked list.

```
void traverse(struct Node *head)
{
  while (head->next != NULL)
  {
     printf("%d  ", head->data);
     head = head->next;
  }
}
```

Find any error in the above code.

P.T.O.

(d) How many distinct binary search trees can be formed which contains the integers 1, 2, 3 ?

(e) What do you mean by Expression Tree? Give an example of it.

(f) Consider the following pseudo code that uses a stack

```
declare a stack of characters
while ( there are more characters in the word to read )
{
  read a character
  push the character on the stack
}
while ( the stack is not empty )
{
  pop a character off the stack
  write the character to the screen
}
```

What is output for input "DATA STRUCTURE" ?

(g) What do you mean by In-Degree, Out-Degree and Degree of a Node in Directed Graph as well as in Undirected Graph ?

(h) Can we apply binary search algorithm to a sorted linked list, why ? Justify your answer.

(i) How to find middle element of linked list in one pass ? Explain briefly.

(j) What do you mean by Garbage Collection and Compaction ?

2. (a) Write a complete program to create a singly linked list. Write functions to do the following operations 5

(i) Count the number of nodes

(ii) Add a new node at the end

(iii) Reverse the list.

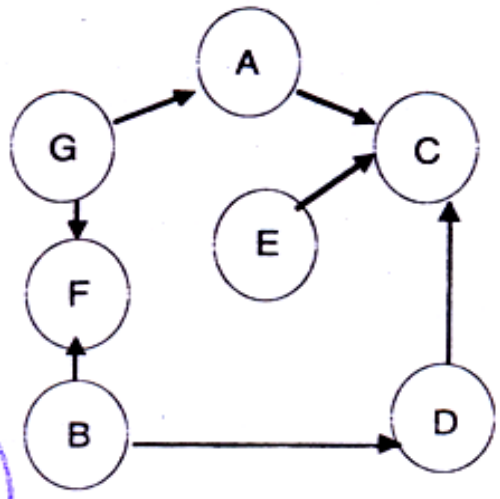
(b) Is it possible to create a doubly linked list using only one pointer with every node ? Explain with a detailed program in C. 5

3. (a) Develop the logic and write a C Program to Implement Queues using Stacks. 5

(b) Write C-Segments for array implementation of circular queue for insertion and deletion operation. 5

4. (a) Convert the given infix expression into postfix expression using the appropriate algorithm : (A+(B*C – (D/E^F)*G)*H) 5

(b) Write down the algorithm for Topological Sorting. Apply this algorithm to find out the traversal result for the given graph : 5



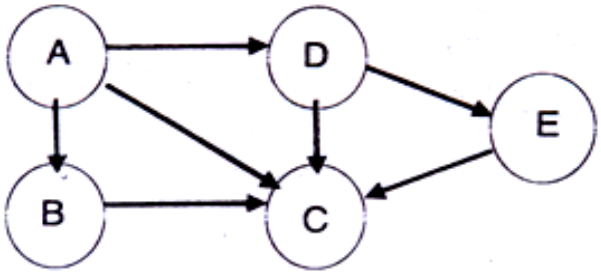
5. (a) Construct the Binary Tree from the given Traversal : 5

(i) Inorder-RQPADCEB, Preorder-APQRBCDE

(ii) Inorder-BGFCEDA, Postorder-GFEDCBA

(b) What is AVL Tree ? Construct the AVL Tree for the following node values : 25,45,50,55,60,65,75,85 5

6. (a) What is graph traversal ? Apply the BFS algorithm to find out the traversal result for the given graph where 'A' is the starting node : 5



(b) Explain in detail the Sequential representation of graph in memory. 5

7. (a) Give the algorithm of Binary Search Explain how it functions ? Devise a ternary search algorithm that first test the element at position n/3 for quality with value of x, and then checks the elements at 2n/3 and either discovers x or reduces the set size to one-third the size of the original. Compare this with binary search ? 5

(b) What do you mean by sorting? Apply the Radix Sort algorithm to sort the following elements in ascending order: 151,60,875,342,12,477,689,128,15 5

8. Write short notes on any **two** of the following: 5×2

(a) Priority Queue

(b) Hashing

(c) Warshall's algorithm

(d) B+tree.