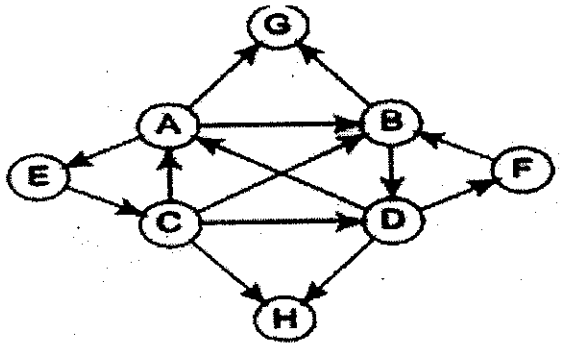
9. (a) What is an Adjacency matrix ? Generate the adjacency matrix for the following graph : 7



(b) Explain the difference between Depth First Search and Breadth First Search graph traversal with an example. Write one application of each. 7

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(T) Roll No. .....

PAPER ID—10709

B.Tech. EXAMINATION, 2026

(Second Semester)

COMPUTER SCIENCE AND ENGINEERING

(CYBER SECURITY)

Data Structures Using C

Time : 3 *Hours* *Maximum Marks* : 70

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. Attempt any *four* questions selecting *one* question from each Unit. All questions carry equal marks.

(Compulsory Question)

1. (a) What are the uses of Pointers ?

   (b) What are the advantages of dynamic memory allocation ?

   (c) Evaluate the postfix expression using stack :

   5 6 2 + * 12 4 / –

   (d) What is the difference between linear queue and circular queue ?

   (e) What are the advantages linked list over array ?

   (f) What is the difference between a binary tree and binary search tree ?

   (g) What is the degree of a node in a graph ? **7×2=14**

Unit I

2. (a) What are pointers ? Explain various operations that can be perfomed on a pointer variable. 7

   (b) What is a data structure ? Explain the different types of data structures with examples. 7

3. Write an algorithm to sort a set of 'N' numbers using quick sort. Use the algorithm to sort the following set of numbers : **14**

   88, 11, 22, 44, 66, 99, 32, 67, 54, 10.

Unit II

4. (a) What are the different operations that can be performed on a queue ? Write an algorithm to insert an element in a queue. 7

(b) Write an algorithm to convert infix expression to its postfix expression. Convert the following expression in postfix form : 7

$$A + B*(C - D)/(P - R)$$

5. (a) Explain row-major and column-major order storage of two-dimensional arrays. How is the address of an element A[i][j] in memory calculated ? 7

(b) Describe the representation of sparse matrices using the 3-tuple method. Write an algorithm to convert a standard matrix into its sparse matrix representation. 7

Unit III

6. Describe how linked lists can be used to implement a stack. Write algorithms for PUSH and POP operations using linked lists. 14

7. (a) Explain and write an algorithm to copy a linked list recursively. 7

(b) Define a doubly linked list. Write algorithms for insertion and deletion operations in a doubly linked list. 7

Unit IV

8. What are the different operations that can be performed on a binary tree ? Write the algorithms taking suitable example, for the traversal of a binary tree. 14