Graphic Era
HILL UNIVERSITY

End Term (Odd) Semester Examination November 2025

Roll no.

B.Tech (CSE) III Semester
Data Structure with 'C' language.
Paper Code: TCS 302

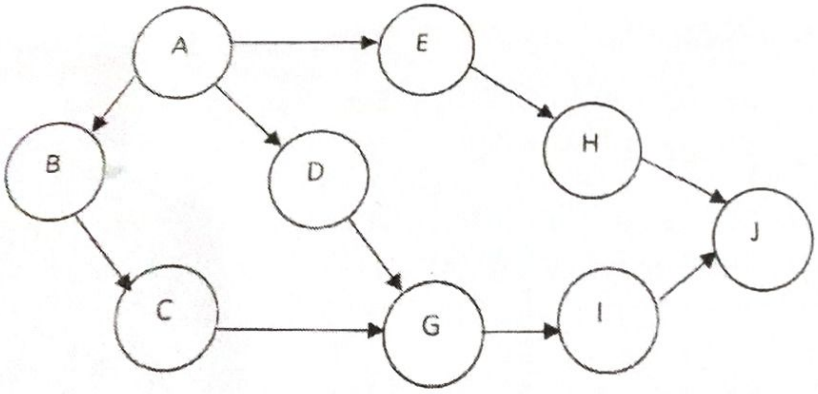
Time: 3 hours | Maximum Marks: 100

Note:
(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks) (CO1, CO2, CO5)

a. Evaluate the following postfix expression using stack (show all the steps).
4,3, *,6,4, -, *,5, /,3,2, ^, + (Here comma is used as separator only).

b. Give name and apply the graph traversal technique on the given graph, to find a path from A to J with minimum number of nodes in between. (Show all steps)



c. Assume that you have a single linked list with pointer P pointing to the first node of the linked list. Write a C function to rearrange the list so that all even-positioned nodes are stored first and then all odd position nodes. (Maintain relative order)
Example: 1→2→3→4→5
Output: 1→3→5→2→4

Q2. (2X10=20 Marks) (CO2, CO4, CO5)

a. Consider a single linked list with a pointer pointing to its head. Write a 'C' function to insert two nodes, one before the first node and one before the last node of the linked list.

b. Explain hash collision with an example. Consider a hash table of size (m) 12. Using linear probing technique with remainder division method (h(key) = key mod table size), insert following keys: 24,17,19,12,81,29,92,15, and 41 into the hash table.

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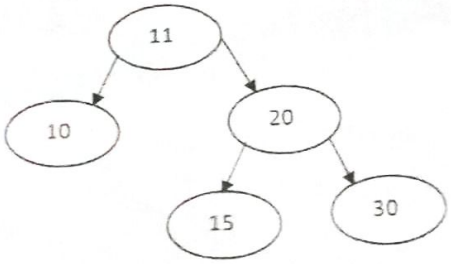
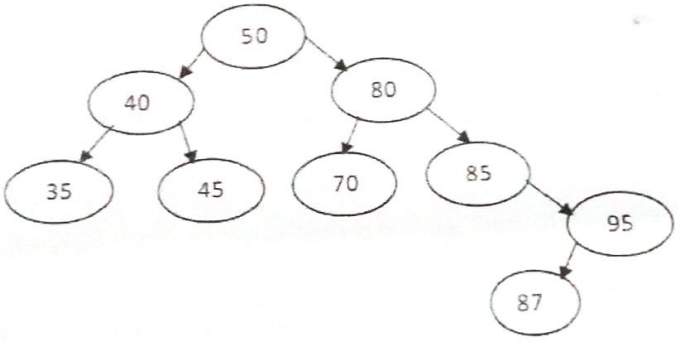
c. i) Consider following height balance tree. Insert 18 and redraw the tree.



ii) Consider following binary search tree and delete 80 and redraw the tree.



Q3. (2X10=20 Marks) (CO2, CO4, CO5)

a. Assume that you have two sorted singly linked lists. Pointers P and Q are pointing to the first nodes of these linked lists respectively. Write a C function to merge the given linked lists by creating third linked list.

b. Construct a balanced multi-way search tree of order 3. Insert the following keys in the given order: 20,10,30,5,40,50,15,18,2,60,70.

b. Write a C function to split a circular linked list into two halves as per user's choice (User choice is data of a node). Ensure both resulting lists are circular.

Q4. (2X10=20 Marks) (CO3, CO4, CO5)

a. Which algorithm would you use to compress following data.
eacdefefeabbcdbdd.
Generate binary code for each character.

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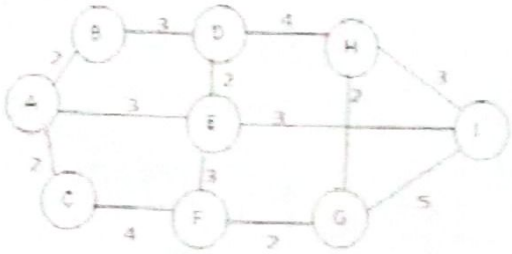
b. Name and apply the algorithm on the following connected weighted graph to find the shortest path from source vertex A to all vertices in the (Show all steps).

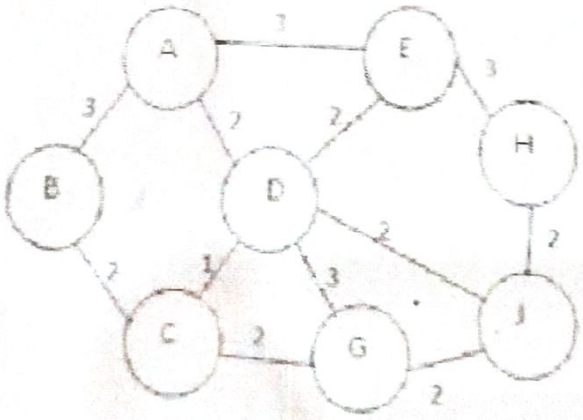


c. Write a C function to create a min heap with one key at time. Also give its worst case complexity.

Q5. (2X10=20 Marks) (CO3, CO4, CO5)

a. Write a C program to create a weighted graph with the help of node pointers and linked list of edges.

b. You have a weighted graph for the following situation: A telecommunications company needs to lay fiber optic cables to connect multiple offices in a region. The cost of laying a cable between any two offices is assigned as weight of the edge. Name and apply an algorithm to find a network that connects all offices with the minimum total cable cost.



c. The following list is to be sorted using Merge sort: 5, 10, 15, 28, 32, 46, 17, 40, 44, Show the sorting process by indicating how the data would appear in intermediate steps (do not write code).