Exam Date & Time: 17-Nov-2022 (09:00 AM - 12:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, DEPARTMENT OF ICE, NOV 2022

Data Structures using C ++ [ICE 4065]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Missing data may be suitably assumed

1) Write a program to find the mean of two numbers using 'Friend' function.
(CO2, PO5, BT3) (2)

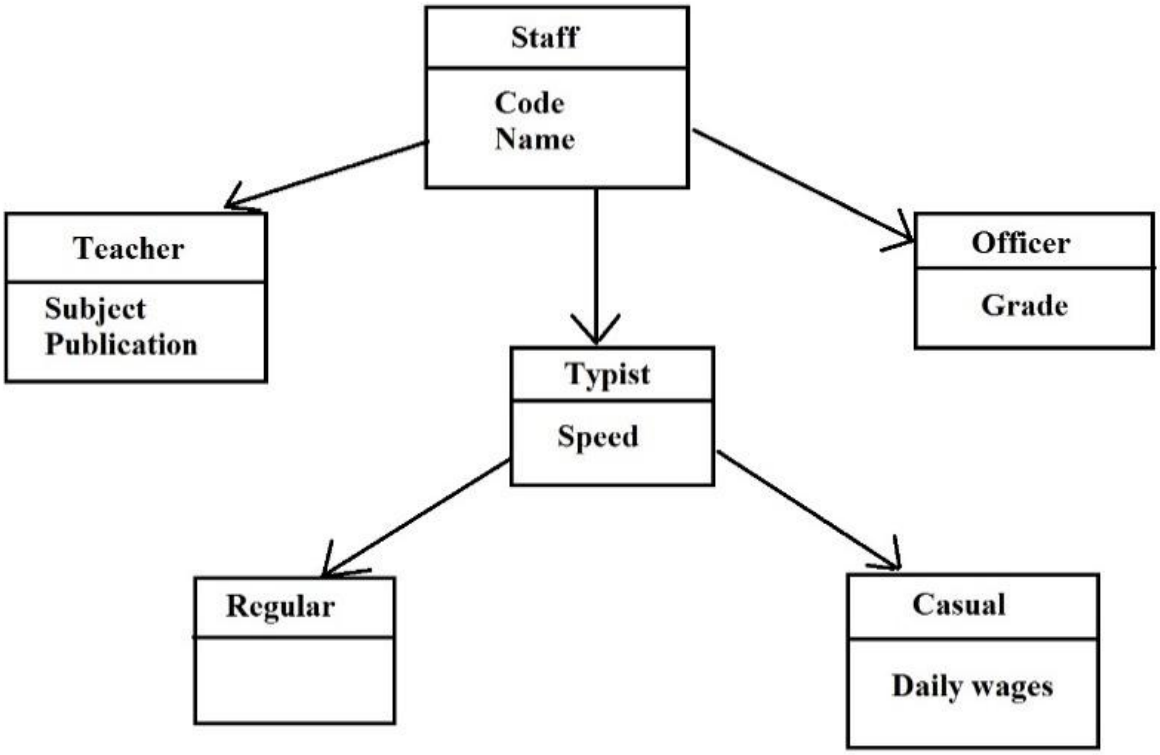
A)

B) Consider a class 'Complex'. Write a program to find the sum of two complex numbers. Illustrate the use of overloaded constructors.
(CO2, PO5, BT3) (4)

C) Construct a binary search tree with the following data elements 57, 87, 35, 89, 22, 62, 24, 16. Explain each step.
(CO4, PO3, BT5) (4)

2) An education institution wishes to maintain a database of its employees. The database is divided into a number of classes having hierarchical relationships is shown in the figure. The figure also shows the minimum information required for each class. Write a program to specify all the classes and define functions to create the database and retrieve two individual information.

A) (CO2, PO5, BT3)



(5)

B) What is the advantage of function template over function overloading? Illustrate with an example. (CO2, PO1, BT2) (2)

C) A linked list contains 4 nodes with 34, 25, 77, 12 as its respective data. Write a program to traverse through the list and print the data. (CO3, PO5, BT3) (3)

3) Write a program to convert a 4-bit binary number into its equivalent Gray Code using recursion. (CO3, PO5, BT3) (3)

A)

B) Define any four types of graphs with one example for each type. (CO4, PO1, BT2) (2)

C) Define non-increasing and non-decreasing order in sorting. (CO5, PO1, BT2) (2)

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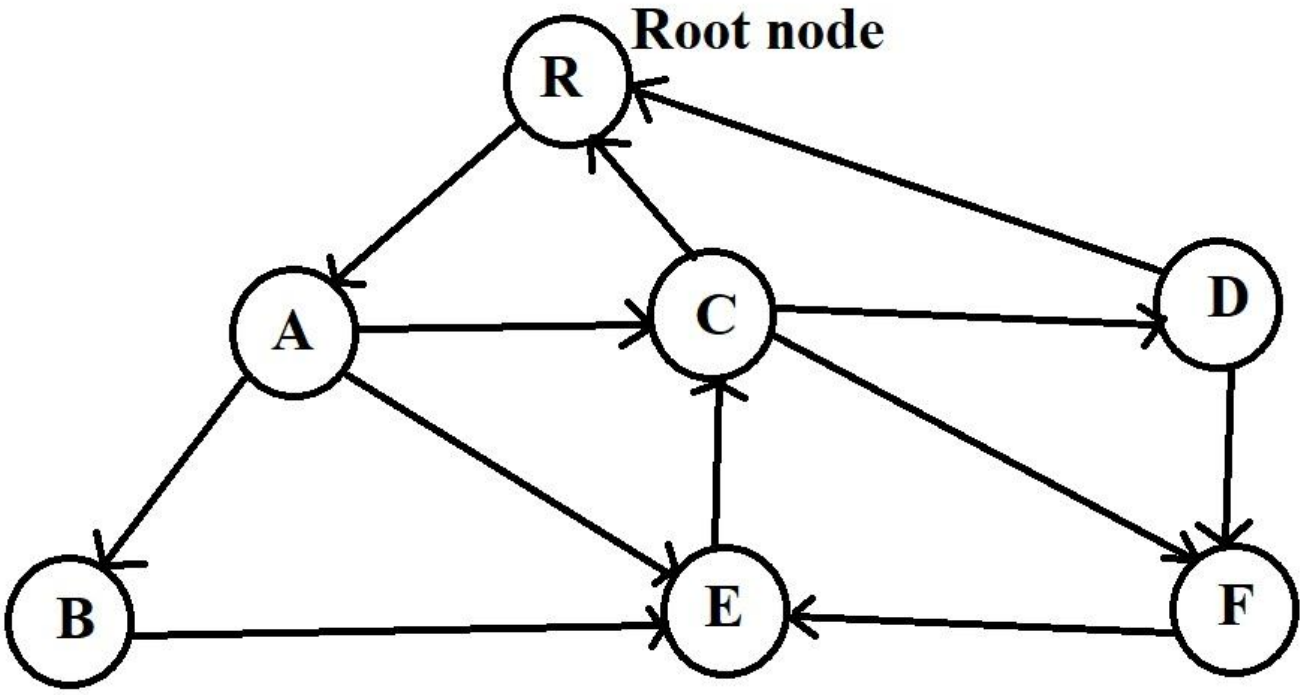
ii Sort the given array [40, 12, 67, 34, 98, 56, 15, 9, 45, 75] using heap sort algorithm. Show all the steps. (CO5, PO3, BT3) (3)

4) Calculate the order to print all the nodes of the graph starting from the root node using Depth first search algorithm. (CO4, PO3, BT4)

A)



(4)

B) If there are 8 nodes in a binary tree, calculate its minimum and maximum height. (CO4, PO3, BT4) (2)

C) With suitable example, explain the enqueue and dequeue operation in queues. (CO4, PO1, BT2) (4)

5) Locate 23 in the array 2, 5, 8, 12, 16, 23, 38, 56, 72, 91 using binary search algorithm. Write the algorithm for the same. (CO5, PO3, BT4) (3)

A)

B) (4)

When does collision occur in hashing? Mention all the techniques used to resolve it? Explain any one technique to resolve collision with an example.
(CO5, PO1, BT2)

C) Consider an unsorted array of integers: 389, 541, 232, 60, 8, 34, 76, 125, 15. Sort the given array using Radix sort method. Show all the steps.
(CO5, PO3, BT4) (3)

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