Exam Date & Time: 27-Dec-2022 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH END SEMESTER EXAMINATIONS (MAKE UP), ICE DEPARTMENT, DEC 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) Consider a class '**item**' with two member functions namely, **getdata()** that is used to supply values to the variables of the class and **putdata()** which is used to display the values of the variable. Write a program to illustrate how the member function is defined inside and outside the class. **(CO2, PO5, BL3)** (3)

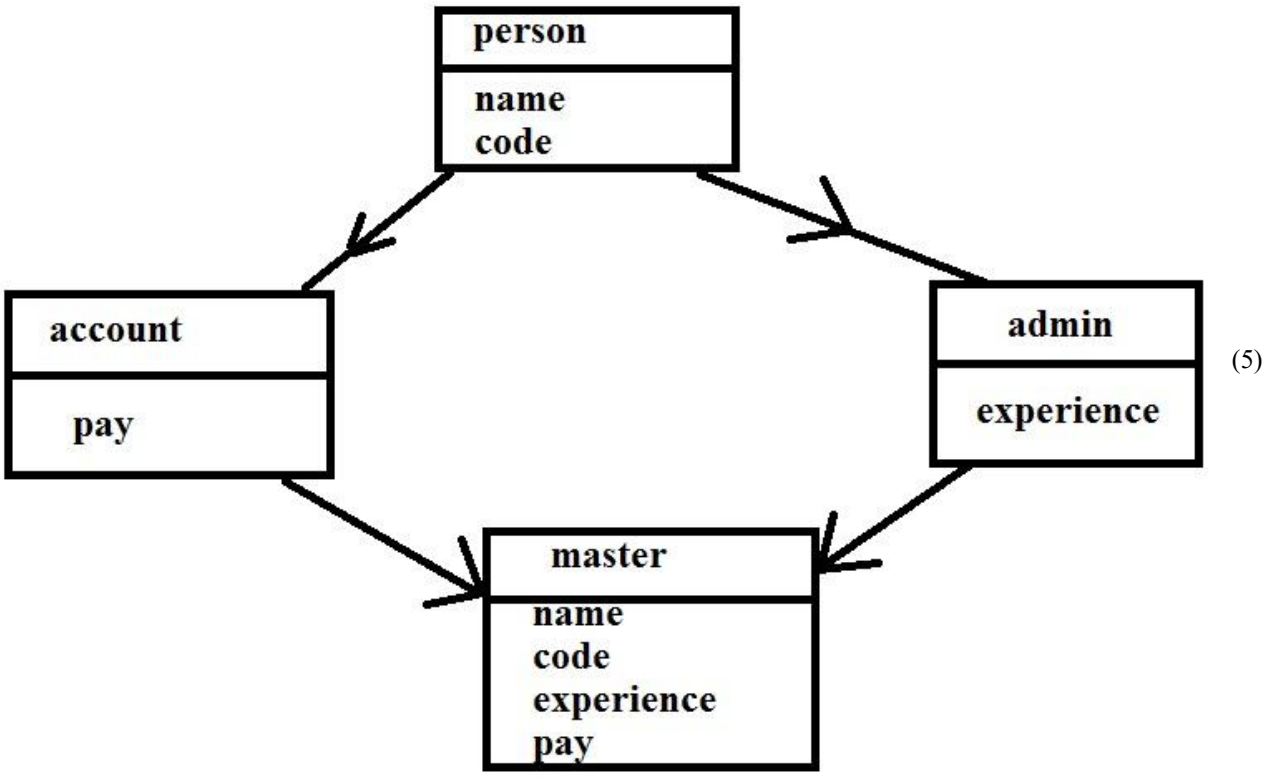
A)

B) Write a program to illustrate how constructors are implemented in derived classes. **(CO2, PO5, BL3)** (3)

C) Construct a binary search tree with the following data elements 57, 87, 35, 89, 22, 62, 24, 16. Find node 22 from the tree. Explain each step to find node 22. **(CO4, PO3, BL5)** (4)

2) Consider a class network shown in the figure. The class 'master' derives information from both 'account' and 'admin' classes which in turn derive information from the class 'person'. Define all the four classes. Write functions to create, update and display the information contained in 'master' objects. **(CO2, PO5, BL3)**

A)



(5)

B) What is the advantage of function template over function overloading? Illustrate with an example. **(CO2, PO1, BL3)** (2)

C) A linked list contains 4 nodes with 74, 13, 56, 24 as its respective data. Write a program to insert a new element 45 at the beginning of the list and print the data. **(CO3, PO5, BL3)** (3)

3) Given a number ‘n’, write a program to check whether ‘n’ is aprime numberor not using recursion. **(CO3, PO5, BL3)** (3)

A)

B) Define the basic functions used in sets. **(CO4, PO1, BL2)** (2)

C) Define non-increasing and non-decreasing order in sorting. **(CO5, PO1, BL2)** (2)

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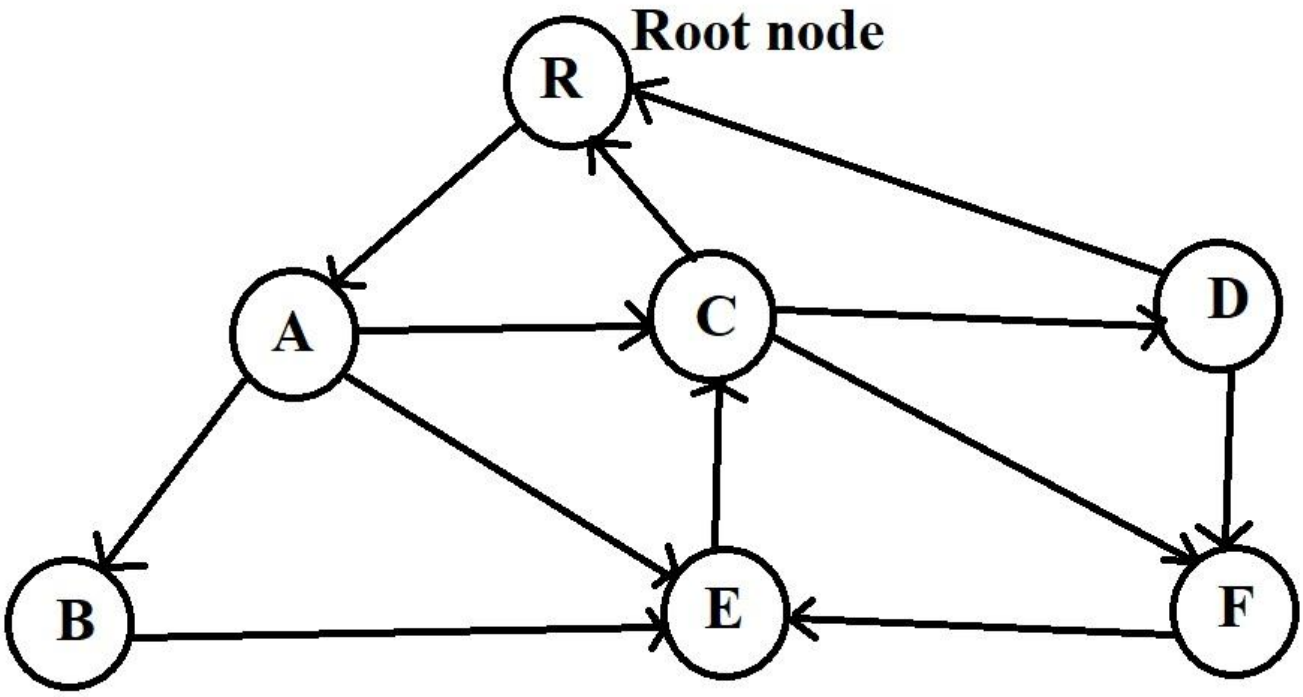
ii Sort the given array [40, 12, 67, 34, 98] using bubble sort algorithm. Show all the steps. **(CO5, PO3, BL3)** (3)

4) Calculate the minimum path ‘P’ from node R to node F of the graph using Breadth first search algorithm. **(CO4, PO3, BL4)**

A)



(4)

B) If there are 10 nodes in a binary tree, calculate its minimum and maximum height. **(CO4, PO3, BL4)** (2)

C) With suitable example, explain the enqueue and dequeue operation in circular queues. **(CO4, PO1, BL3)** (4)

5) Locate 20 in the array 10, 50, 30, 70, 80, 60, 90, 20, 40, 70 using linear search algorithm. Show all the steps. Write the algorithm for the same. **(CO5, PO3, BL4)** (3)

A)

B) When does collision occur in hashing? Mention all the techniques used to resolve it? Explain the quadratic probing method to resolve collision with an example. **(CO5, PO1, BL3)** (4)

C) Consider an unsorted array of integers: 780, 901, 333, 82, 3, 424, 517, 125, 809. Sort the given array using Radix sort method. Show all the steps. **(CO5, PO3, BL4)** (3)

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