राष्ट्रीय प्रौद्योगिकी संस्थान जमशेदपुर

NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR

(An Institution of National Importance under MHRD, Government of India)

Department of Computer Science and Engineering

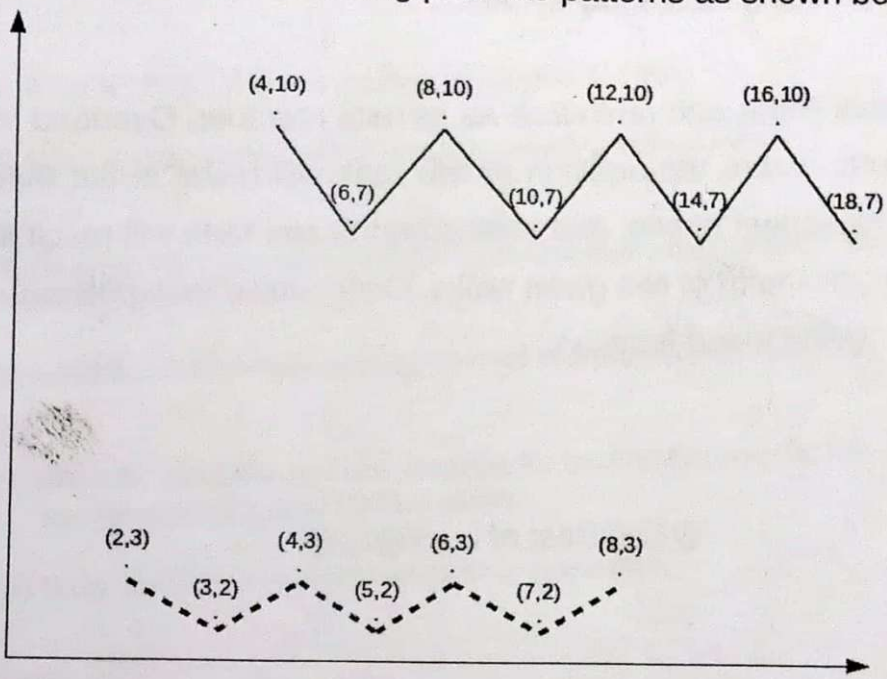
SEMESTER : Spring 2022-23	**EXAMINATION** : Mid-semester
COURSE TITLE : OOP using C++	**COURSE CODE** : CA3201
DATE : 21/02/2023	**FACULTY NAME** : Dr. Alekha Kumar Mishra
DURATION : 2 Hours	**FULLMARKS** : 30

i. Answer all the questions

ii. Answer all parts of a question at one place for faster evaluation process

iii. The plagiarism of the answers shall be punished with negative marks.

1. A sequence of cordinates is considered as a snake-path sequence when they form a snake crawling path like patterns as shown below. **(10)**



Define a class for two dimensional coordinates. Define a parameterized constructor to create 2D coordinate objects. Define a function to input an array of 'N' 2D coordinates sequence as argument along with the value of 'N' and return whether the cordinates sequence is snake-path sequence.

2. Define a class **CharStack** with necessary constructors and standard member functions (push and pop etc.) operated on it. Implement a member function that takes two non-empty stacks as arguments **(10)**

consists of Gold and Silver coins. The task of the function is to verify whether two given stacks contain equal number of Gold and Silver coins. The restrictions are : you can neither use index value to traverse over the stack (only push and pop operations to access the elements) nor any additonal counter variables to count coins). However, you may use addtional number of stacks if required.

3. a) MyClass &ob2 = ob1 ; Does ob2 occupies memory for the data members of MyClass? Justify your answer. **(2+2+2+4)**

b) How a single defined constructor in the class can behave as both default and parameterized constructor?

c) Show the difference between pointer to a function and pointer to a member function using necessary syntax.

d) Define a class Rank with rankvalue as its data member. Overload '+' and '-' operators, where the addition of two rank will result in the third rank equal to maximum of two, and subtraction of two rank will result in a rank equal to minimum of two given ranks. Overload '+' using member function and '-' using friend function.

@@@Best of Luck@@@

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Department of Computer Science and Engineering

SEMESTER : Spring 2021-22	**EXAMINATION** : End-semester
COURSE TITLE : OOP using C++	**COURSE CODE** : CA3201
DATE : 05/05/2022	**FACULTY NAME** : Dr. Alekha Kumar Mishra
DURATION : 3 Hours	**FULLMARKS** : 50

i. Answer all the questions

ii. Answer all parts of a question at one place for faster evaluation process

1. a) Two TTs in train check ticket at the rate of x and y person per minute. Given no. of coach, no. of passengers in each coach of a train (varies from coach to coach), x, and y, write a program in C++ to print the meeting coach and time of both TTs if TT1 start from first coach and TT2 starts from last coach. **(5+5)**

   b) Write a program an n X n square matrix and check whether it is skey-symmetric matrix. A matrix is skew-symmetric matrix if its transpose is equal to its negative value, $A^T = -A$

2. Write a program in C++ to define a class SetInteger having a set of ordered integers. Define a parameterized constructor, overload and demonstrate the following operators with the given functionality. **(10)**

   obj1 + obj2 : returns an integer set with each element is generated by all possible combined addition of elements (without repetition) of both objects obj1 and obj2.
   Example : { 4, 5, 7, 9} + { 6, 11, 13 } = { 10, 11, 13, 15, 16, 17, 18, 20, 22}
   obj1 - obj2 : returns an integer set with each element is generated by all possible combined subtraction of elements (without repetition) of both objects obj1 and obj2.
   Example : { 4, 5, 7, 9} - { 6, 11, 13 } = { -9, -8, -7, -6, -4, -2, -1, 1, 3}
   obj1 * obj2 : returns an integer set with each element is generated by all possible combined multiplication of elements (without repetition) of both objects obj1 and obj2.
   Example : { 4, 5, 7, 9} - { 6, 11, 13 } = { 24, 30, 42, 44, 52, 54, 55, 65, 77, 91, 99, 117}

3. a) Write a program in C++ to implement the following hierarchy. Define the member functions for all classes. Use a base class pointer to point to derived class in order to invoke the derived class area() function. Raise and catch an exception in area() of the derived class if the side of the traingle and square is not same. **(7+3)**

END SEM - 2022

Class : Equilateral Triangle

Members: side_t

Member Functions:

i) Parameterized Constructor

ii) area() - a virtual function

Class : Square

Members: side_s

Member Functions:

i) Parameterized Constructor

ii) area() - a virtual function

Class : ComposedPentagon (inherits Equilateral Traingle and Square)

Member Functions:

i) Parameterized Constructor

ii) area() - a virtual function

b) What is the benefit of declareing vitrual destructors? Explain with an example why constructors are not declared as vitual in a class hierarchy.

4. a) Implement a function template for set intersection operation over two arrays of integer, float, and char type. **(5+5)**

b) Write a function to input an array of integers and handle following exceptions

i) raise and catch an exception when the elements of the array are not is strictly increasing order.

ii) raise and catch an exception when the sum of the elements of the array is a negative number.

5. Differential between the following terms: **(2X5)**

i) catch vs. catch all

ii) abstract class vs. abstract base class

iii) seekg() vs seekp()

iv) virtual function vs. virtual table

@@@Best of Luck@@@

END SEM - 2022