Punjab Engineering College
(Deemed to be University)
Mid-Semester Examination

Programme: B.E
Year/Semester: 2018/1st
Course Name: Computer Programming (Object Oriented Programming)
Course Code: CSN104
Maximum Marks: 30
Time allowed: 90 mins

Notes:

- All questions are compulsory.
- Unless stated otherwise, the symbols have their usual meanings in context with subject. Assume suitably and state, additional data required, if any.
- The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right course code.
- Assume GCC compiler is used for the execution of the code.

Ques1. [2 + 2 + 2 = 6 marks]

Write a program using C++ which reads **non-negative integers** from the user and then display the following (include necessary test conditions and use of array is not allowed):

a. Total number of values entered by the user.
b. The minimum and maximum value entered.
c. The average of all the numbers entered by the user.

Ques2. [4 + 2 + 2 = 8 marks]

a. Draw a flowchart that computes sum of all the even numbers entered by the user. (Use bitwise operators to test if a number is even or odd).
b. What will be the output of following program?

I.

```
#include<iostream>
using namespace std;
int main() {
int x = 2;
(x & 1)? cout<<"true": cout<<"false";
return 0;
}
```

II.

```
#include<iostream>
using namespace std;
int main() {
int x = 0,y=0;
int z= y++?cout<<"Perfection!!": y==1 && x;
cout<<z;
return 0;
}
```

Ques3. [5 marks]

Using classes, write a program to create a class ***Fib*** which contains a function ***Fibonacci (int n)*** which accepts an integer value n and then returns the n^{th} term of the Fibonacci series. Then invokes another function ***isPrime(int n, int x)*** which accepts two inputs, i.e., the value of n entered by the users and the n^{th} term (denoted by x) of the Fibonacci series and tests if the values are prime or not. All the outputs displayed to the user should be from ***main()*** function.

Ques4. [2 + 3 = 5 marks]

Write a C++ program which reads a 2-D array (***arr[5][5]***) from the user and performs the following:

a. Display the sum of all the boundary elements and diagonal elements of the array.
b. Check if the matrix is scalar or not (A scalar matrix is one in which all the non-diagonal elements are zero and the diagonal elements are same).

Ques5. [6 marks]

Using C++, write a program to read the size/number of inputs (n) from the user. After reading the size of the input, read n inputs (i.e., real numbers) from the user and invoke the method ***runningSum()*** that outputs the running sum of the numbers followed by the maximum running sum.

In other words, the n^{th} number that you report should be the sum of the first n numbers and the maximum that you report should be the largest such value that you report.

Below is the sample output

Input size (n)	:	8						
Input	:	3.25	4.5	-8.25	7.25	3.5	4.25	-6.5	5.25
Output:								
Input numbers	:	3.25	4.5	-8.25	7.25	3.5	4.25	-6.5	5.25
Running sum	:	3.25	7.75	-0.5	6.75	10.25	14.5	8.0	13.25
Max sum	:	14.5						

The first number reported is the same as the first number in the input (3.25). The second number reported is the sum of the first two numbers in the input (3.25 + 4.5). The third number reported is the sum of the first three numbers (3.25 + 4.5 + -8.25). And so on. The maximum of these values is 14.5, which is reported on the second line of output. You may assume that there is at least one number to read.

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Punjab Engineering College (Deemed to be University), Chandigarh

End-Term Examination, Nov 2018

Programme: **B.Tech.** Year/Semester: **First Year**

Course Name: **Computer Programming** Course Code: **CSN104**

Maximum Marks: **75** Time allowed: **3 Hours**

Note:

1. All questions are compulsory.
2. The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and also ensure that they have been delivered the question paper of right course code.
3. Include necessary test cases for the given problems.

Q.No.	Question	Marks
1 a)	Assume that you are working on an International project where it is desired that the time should be displayed in both 24-hours and 12-hours format. Draw a flowchart and discuss the logic used to solve this problem such that given a time in any one of the formats, the time in other format is displayed to the user.	7
b)	Write an algorithm to print the number of times an element appears in an array. (Assume that there are 10 elements in the input array with variable name "INPUT" and the search terms is stored in variable "SEARCH")	5
	Create a base class `Shape`. Use this class to store two `double` type values that could be used to compute the area of figures. Derive two specific classes called `Triangle` and `Rectangle` from the base class `Shape`. Add to the base class, a member function `get_data()` to initialize base class data members and another member function `display_area()` to compute and display the area of figures. Make `display_area()` as a virtual function and redefine this function in the derived classes to suit the requirements of the derived classes. Design a program that will accept dimensions of a triangle or a rectangle based on the choice of the input, and display the area to the user. **Note:** The two values given as input will be treated as lengths of two sides in the case of rectangles and as base and height in case of triangles and used as follows: Area of rectangle= x*y, Area of triangle=1/2*x*y.	7

2 a)	Predict the output of the following program. (Show the steps to compute the results)
	I.
	`#include<iostream>`
	`using namespace std;`
	`int main(){`
	`int i=4, j=-1, k=0, w, x,y,z;`
	`w = i || j || k;`
	`x = i && j && k;`
	`y = i || j && k;`
	`z = i && j || k;`
	`cout<<w<<x<<y<<z;`
	`return 0; }`
	II.
	`#include <iostream>`
	`using namespace std;`
	`int main() {`
	`float abc[5] = {11.5, 20.0, 17.5, 95.6, 0.9};`
	`float *p1 = &abc[0];`
	`float *p2 = p1 + 3;`
	`cout<<*p2<<" "<<p2-p1;`
	`return 0;`
	`}`
		4 * 2 = 8

b)	A piece of code takes two objects of the same class, compare it and finds the larger value, returns the objects with a larger value. Also terminates if there is run-time error. Identify and elaborate the feature available in an object-oriented language (C++) which is used to perform the following:	4

	- Raise an error if both the objects contain the same value - To refer an object which has invoked the function	
c)	Write a program with function "CALCULATE" to take the coordinates (x,y) as the center of a circle and its radius r, and another point (a,b). Determine whether the point (a,b) lies insides the circle, on the circle or outside the circle.	5
3 a)	In the final round of a coding challenge, there was a tie among two candidates. To resolve it, a use case on a certain problem was given to them and the time taken by the candidates to solve the problem was taken as criteria to decide the winner. Assuming both of them start and finish at different times, write a C++ program to find out the winning candidate where the candidate taking minimum time is declared as a winner. Note: The start and finish times should be defined properly in terms of hours, minutes and seconds.	5
b)	Draw an inheritance hierarchy using a base class "Car" and its derived classes "MechanicalCar" and "ElectricCar". From these derived classes inherit a class HybridClass. Illustrate the invocation sequence of constructors and destructors in this case. Is this hierarchy prone to any ambiguity? If yes, how to resolve it? Justify.	7
c)	Create a classes dist1(meters, centimeters) and dist2(feet, inches). In main, accept two distances from the user, one in meter and centimeter and other in feet and inches and create the corresponding objects of the classes. Find the sum and differences of the two distances objects using friend function. (1 inch = 2.54 cm and 1 feet = 0.30 m).	7
4 a)	Write a program to read names of cities from a file called "CITIES.TXT". Display the names of only those cities which begin with letter 'A'.	5
b)	Write a C++ program to perform four arithmetic operations (+,-,*,/) on two numbers, where the operator and the two numbers are taken as input from the user. Throw an exception if the operator entered is not valid.	5
c)	Write a C++ program to i. Create a class FD a/c which contains member (fdno, name, amt, interest rate, maturity amt & No. of months) ii. Write parameterized constructor where interest rate should be a default argument with value equal to 8% iii. Create a member function calculate() to calculate maturity amount using compound interest formula iv. Create a member function display() to display all the details. In the main function, take the input of all the parameters and create the object of FD class using the parameterized constructor and calculate the maturity amount and display all the details using the same object. Note: Use Compound Interest = $P\,[1 + r/100]^t$ where P is the Principal, r is rate of interest and t is time	10