Question Paper

Exam Date & Time: 10-May-2018 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END-SEMESTER THEORY EXAMINATION- MAY 2018
I SEMESTER B.S.(ENGINEERING)
DATE:10.05.2018
TIME:09.30AM TO 12.30PM

Introduction to Computers and Programming [CS 111]

Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

Missing data, if any, may be suitably assumed.

1)	A)	i) Draw and explain the block diagram of a computer. ii) Draw a flowchart to find the Fibonacci series till term $\leq$ 1000. Write an algorithm to check whether the given number is strong number or not. (A number is called strong number if sum of the factorial of its digit is equal to number itself. For example: 145 since 1! + 4! + 5! = 1 + 24 + 120 = 145)	(10)
	B)	i) Explain the different memory classifications. ii) Define algorithm. What are the different properties of an algorithm? Write an algorithm to generate even numbers between 100 and 200 and print the numbers	(10)
2)	A) i	Explain the precedence and associativity of operators in C++ programming. Evaluate the following expression showing all intermediate steps	(3)
	ii	Explain the general form of if-else statement. Write a C++ program to read N positive integers without using arrays and functions to find the second largest number among them.	(3)
	iii	Explain break and continue statements. Write a C++ program to find the roots of a quadratic equation using switch-case statement. Roots of a quadratic equation ax^2+bx+c is $(-b +/- \sqrt{(b^2 - 4ac)})/2a$.	(4)
	B) i	Write a C++ program to find the grade of steel samples considering the following	(5)

conditions using if-else statements.

(i) Tensile strength >=700 kgf/cm^2

(ii) Rockwell hardness >=200

(iii) Carbon content <=6%

When condition (i), (ii) and (iii) are satisfied, grade is 'A'.
Condition (i), (ii) are satisfied, grade is 'B'.
Condition (i), and (iii) are satisfied, grade is 'C'.
Condition (ii) and (iii) are satisfied, grade is 'D'.
Condition (i), or (ii) or (iii) are satisfied, grade is 'E'.
otherwise grade is 'F'

ii Write and explain the general syntax of switch statement in C++. Write a C++ program using switch statement to check whether a character is VOWEL or CONSONANT. (5)

3) Write a C++ program to print all palindrome integer numbers between the input range p to q (3)

A) i

ii Write a C++ program to count frequency of each element in a given 1D array of size N. (4)

iii Write a C++ program to read a matrix of size MÃ—N. Invoke a function PeripheralSum(), which takes the matrix, row and column as parameters and returns the sum of the peripheral elements of the matrix. Print the sum in main program. (3)

Note: 1 2 7
4 8 9
3 7 0 sum of the peripheral elements of the matrix is : 33

B) i Differentiate between while and do-while statement. Write a C++ program to print the following pattern of numbers using nested for loop construct. (4)

1 2 3 4 5
1 2 3 4
1 2 3
1 2
1

ii What is an array? Write a single C++ program to read N integers into an array and to
i) Find the sum of all numbers divisible by 7
ii) Find the average of all numbers.
Output the results with appropriate headings. (3)

iii Write a single C++ program to perform the following operations. (3)

i) Read and display 2D matrix of order MxN.
ii) Check the presence of perfect numbers in the matrix.
[Hint: sum of all positive divisors of a given number excluding the given number is equal to the number]
Ex: 28=1+2+4+7+14=28
iii) Find the sum of all perfect numbers of the matrix and display the sum

4) Explain strlen() and strcpy() string handling functions. (3)

A) i Write a C++ program to read a sentence and replace all the alphabets in the input sentence with '#' whose ASCII value is even and with '%', whose ASCII value is odd. Display the resultant sentence.

ii Explain the following function categories with suitable example program code: (3)
i) Functions with argument(s) and no return value(s)
ii)Functions with no argument(s) but return a value

iii Using the concept of pointer to 1D array, write a C++ program to read an array of N integers, pass the array to function void Compute(int *, int, float &, float &); to compute the sum and average of N elements. Print sum and average in main program. (4)

B) i How strings are declared and initialized? Write a C++ program to modify a sentence by replacing every letter by the next letter in its alphabetical sequence. [Ex: every A will be replaced by B, every B is replaced by C and so on. Blanks are left unchanged.] (4)

ii What are actual and formal parameters? Illustrate with example. (3)

iii Write a single C++ program to. (3)
1.Read a matrix of order MxN and display the matrix.
2.Define a function which accepts 2D array and number of row and columns as parameters and compute the sum of elements of each column.
3.Display the result with appropriate message

5) Illustrate the working of bubble sort for the given set of numbers 16, 12, 67, 11. How many passes are required for the given set of elements? Show how the elements are getting sorted in each pass. (4)

A) i

ii Write a complete C++ program to read a matrix (m x n). Write a function **sum_of_factors**( ) which returns the sum of all the factors (except the number itself) for a given number . Find all the amicable pairs in the given (6)

matrix.Note: Amicable numbers are two different numbers such that the sum of proper divisors of each is equal to the other number. Eg. 220 and 284
Sum of factors of 220: 1 + 2+ 4+ 5+ 10+ 11+20 +22+44+55+110 = 284
Sum of factors of 284: 1 + 2+ 4+ 71+142 = 220

B) i. Distinguish actual and formal parameters with a suitable example program code? (4)

ii. Write a C++ program to accept 1D positive integer in main and pass it to IsPrime( ) to check if input numbers are prime numbers or not? Return only prime numbers to main ( ) for printing the output. (6)

6) Define recursive function. Write a C++ program to find sum of digits of a number using recursion. (5)

A) i

ii. Create an array of student structure **stud** to store the roll no., name and marks in 2 subjects. Write a C++ program to input details of 10 students into the structure, and compute and display the following. (5)
1) Roll number and highest mark in each subject
2) Name with highest total.

B) i. Write a note on following concepts. (5)
1.Data abstraction
2.Data encapsulationWrite a C++ program to read 'n' numbers in a 1D array and find the largest among the numbers in the array using pointers.

ii. Write a program to Sort an array using OOP. (5)

7) Write the Benefits of Object Oriented Programming. (4)

A) i

ii. Write a function CalculateSI() to calculate simple interest based on the input parameters principle, rate and time, with rate being the default argument having a default value of 10. Write a main() function to test the function. Include function calls to CalculateSI(), one with using the default value and the other with passing a value for rate. C++ Default Arguments (6)

B) i. Write a c++ program area() to compute the area of a square, rectangle and triangle using function overloading. Write a main() function to test the function. (5)

ii. What do you mean by inline function. Write an inline function Area() to compute the area of a cube. Write a main() function to test the function (5)

8) Explain the following Concepts of Object Oriented Programming. (16)

A)
i) Objects
ii) Classes
iii) Inheritance
iv) Polymorphism

B) With syntax Explain the General form of a class declaration. (4)

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