

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP2023)**

CLASS: B. TECH / IMSC.
BRANCH: CSE/AI&ML/ECE/EEE/MATHS & COMP.

SEMESTER: II
SESSION: SP/2023

SUBJECT: CS101 PROGRAMMING FOR PROBLEM SOLVING

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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			CO	BL
Q.1(a)	Compare Pseudocode with an algorithm for the Program Factorial of a Number.	[2]	CO2	BL4
Q.1(b)	Write a C program to convert a decimal number into an equivalent binary number using bitwise operators.	[3]	CO1, CO4	BL3
Q.2(a)	Amicable numbers are found in pairs. A given pair of numbers is Amicable if the sum of the proper divisors (not including itself) of one number is equal to the other number and vice-versa. For example, 220 & 284 are amicable numbers. First, we find the proper divisors of 220: 220:1, 2, 4, 5, 10, 11, 20, 22, 44, 55, 110 1+ 2 + 4 + 5 + 10 + 11 + 20 + 22 + 44 + 55 + 110 = 284 Now, 284: 1, 2, 4, 71, 142 1 + 2 + 4 + 71 + 142 = 220	[2]	CO1, CO4	BL3, BL4
Q.2(b)	Write a C program to check that the input pair of numbers is amicable. (I) Explain the differences between the source program, the object program, and an executable program. Which do you create, and which does the compiler create? Which does the linker or loader create? (II) Given a= 10, b=5 and c=6, evaluate the following logical expression: d= ((a < b) & & (b > c)) (a > c)	[2+1=3]	CO1, CO3	BL2, BL3
Q.3(a)	How many lines of output does the following 'C' code produce? #include<stdio.h> float i=2.0; float j=1.0; float sum = 0.0; main () { while (i/j > 0.001) { j+=j; sum=sum+(i/j); printf("%f\n", sum); } }	[2]	CO3	BL4
Q.3(b)	Write a program in C to check whether a number can be expressed as the sum of two prime. Test Data: Input a positive integer: 16 <i>Expected Output:</i> 16=1+15 // both are not prime 16=2+14 //2 is prime but 14 is not 16 = 3 + 13 // both are prime (ANS.) 16=4+12 //both are not prime 16 = 5 + 11 // both are prime (ANS.) 16=6+10 // both are not prime 16=7+9 // 7 is prime but 9 is not	[3]	CO1, CO4, CO5	BL3, BL4

PTO

Q.4(a) Write a C program to implement password registration, that accepts a string as password if it is at least 8 characters in length, has at least one capital letter, small letter, digit, and a special character. [2] CO4, BL3, CO5 BL4, BL6

Q.4(b) Write a C program to search a name in a list using binary search techniques. [3] CO5 BL3, BL4

Q.5(a) Find the total number of swaps that take place when sorting the following set of numbers using bubble sort. Show the passes in individual steps. [2] CO4 BL4

Location	1	2	3	4	5	6
Elements	33	77	46	99	12	56

For example, if the positions of 33 and 12 are interchanged, it is called one swap.

** Note: No program is required to be written for this question.

Q.5(b) Write a C program that takes 2 integer sets A [] and b [] as input and prints the union between the two sets. [3] CO4, BL3, CO5 BL4, BL6
Note- All the elements in the output set should be unique.
Input: A= [2,5,8], B= [8,8,3],
Output: C= [2,3,5,8]

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