

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

- Q.1(a) Compare Pseudocode with an algorithm for the Program Factorial of a Number. [2] CO BL
- Q.1(b) Write a C program to convert a decimal number into an equivalent binary number using bitwise operators. [3] CO2 BL4  
CO1, BL3  
CO4
- 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. [2] CO1, BL3,  
CO4 BL4
- 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  
 $1 + 2 + 4 + 71 + 142 = 220$
- Write a C program to check that the input pair of numbers is amicable.
- Q.2(b) (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? [2+1=3] CO1, BL2,  
CO3 BL3
- (II) Given  $a=10$ ,  $b=5$  and  $c=6$ , evaluate the following logical expression:  
 $d = ((a < b) \& \& (b > c)) \mid \mid (a > c)$
- Q.3(a) How many lines of output does the following 'C' code produce? [2] CO3 BL4
- ```
#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);
}
}
```
- Q.3(b) Write a program in C to check whether a number can be expressed as the sum of two prime. [3] CO1, BL3,  
CO4 BL4  
CO5
- Test Data:  
Input a positive integer: 16  
Expected Output:  
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

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]

.....30/05/2023.....M