

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

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

SEMESTER: II
SESSION: SP/2023

SUBJECT: CS101 PROGRAMMING FOR PROBLEM SOLVING

TIME: 3 Hrs

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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	Marks	CO	BL
Q.1 Explain the following (<u>any five</u>):		1,2,4	3,4,5
a) Given $x=4$, $y=20$ and $z=5$, evaluate the value of the following arithmetic expressions: $x * y / z + (x * z + y)$	[5x2=10]		
b) WAP to check if a number is even or odd using bitwise operators.			
c) Write an algorithm to find distance between two points.			
d) Given $a= 10$, $b=5$ and $c=6$, evaluate the following logical expression: $d= ((a < b) \& \& (b > c)) \mid \mid (a > c)$			
e) Write a pseudocode to delete all duplicate elements from array.			
f) Write a program to find the largest of three numbers using ternary operators.			
g) Explain briefly about post increment and decrement and prefix increment and decrement with the help of program.			
Q.2(a) (I) What is the difference between conditional structure, branching structure and looping structure?	[2+3=5]	3	3,4
(II) Write a program to convert a month name to a number of days.			
<u>Expected Output:</u>			
List of months: January, February, March, April, May, June, July, August, September, October, November, December Input the name of Month: February No. of days: 28/29 days			
Q.2(b) (I) Write a C program to find prime factor of a number. If a factor of a number is prime number then it is its prime factor.	[2.5+2.5=5]	3,5	4,5,6
(II) write a menu-driven program to implement the Voting System. The program must contain the following properties:			
<ul style="list-style-type: none">• Cast votes.• Display the count of votes of each candidate.• Display the name of the candidate who has the most votes.			
Approach: Follow the steps below to solve the problem:			
1. Provide the following options to the person who is accessing as shown below:			
<ul style="list-style-type: none">• Vote for your favourite Candidate.• Check the number of votes of each Candidate.• Check the candidate who is leading and then <u>Exit</u>.			
2. The user chooses one of the options.			
3. If the user chooses 1, then the list of candidates is displayed and the user can now choose from this list of candidates.			
4. If the user chooses 2, then the list of candidates along with their current number of votes is displayed.			
5. If the user chooses 3, the name of the candidate with the maximum number of votes is displayed. If there is more than one candidate with maximum votes, display an error message stating "No winner".			
6. This program continues until the user chooses 0 to exit ().			

- Q.3(a) Suppose a teacher at your department needs help in grading a True/False test. Write a C program that ask a user to enter option either True (T), False (F) or blank space for each question as shown below (a sample copy) [5] 3 4,5

T	T	F	T		T	F	T	F	T
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T represents the answer is correct, F represents the answer is wrong and blank space represents the student did not answer the question. Each correct answer is awarded two points, each wrong answer gets one point deducted, and no answer gets zero points.

- Q.3(b) Write the algorithm for finding the k closest elements to a key element in an array. The key element can be taken as a user input. [5] 3 4,5
 Input: [2,5,7,9,8,10,12,15], Key element: 8, $k=3$.
 Output: [7,9,10].

- Q.4(a) (I) Can recursion be used to solve all iterative programs and vice versa? If you answered no, explain why; if you answered yes, explain the differences between iterative and recursive programs. [2x2.5=5] 3 3,4,5

(II) Write a program in C to compute the Fibonacci series using recursion. The series is defined on whole numbers like fib(0), fib(1),..... fib(N) as follows: fib(0) = 0, fib(1) = 1, fib(n) = fib(n-1) + fib(n-2), for $n \geq 2$.

Sample input-: Enter N=8

- Q.4(b) Write a C program to find the median element in an array. [5] 3 3,4,5

Sample Output: 0, 1, 1, 2, 3, 5, 8, 13, 21
 Median: takes an int array and the array's size as arguments. It should return the median value of the array elements, as a double. If the values are sorted, the median is the middle value. If the set contains an even number of values, the median is the average of the two middle values. Assume the values in the array is already sorted. Do not use square brackets anywhere in the function, not even the parameter list (use pointers instead).

Testing Median

Case 1

Input: 1 2 3 4 5 6 7 8 9

Output: 5

Case 2

Input: 1 2 3 4 5 6 7 8

Output: 4.5

- Q.5(a) What do you mean by structure? How do you declare self-referential structure? Explain call by reference with the help of program. [1+1+3=5] 5 1

- Q.5(b) What do you mean by opening a data file? [1+1+3=5] 5 2
 What is the primary advantage to using a data file?
 Write a program to copy the content of one into another file using file concept.

:::::21/07/2023:::::