



Final Assessment Test (FAT) – June 2022

Programme	B.Tech	Semester	Winter Semester 2021-22
Course Title	STRUCTURED AND OBJECT-ORIENTED PROGRAMMING	Course Code	BCSE102L
Faculty Name	Prof. Dr.Suganeshwari G	Slot	C1
Time	3 Hours	Class Nbr	CH2021222300391
		Max. Marks	100

PART A (4 X 5 Marks)

Answer All questions

1. Consider the following code snippets and write the expected outputs with appropriate reasoning. [3+2]

[5]

i)

```
void increment(int n)
{
    static int d=2;
    printf("%d", n);
    printf("%d", d);
    ++d;
    if (n>1) increment(n-1);
    printf("%d", d);
}
int main()
{
    increment(3);
    return 0;
}
```

ii)

```
#include <stdio.h>
int main()
{
    char c[] = "BCSE2022";
    char *p = c;
    printf("%s", p+(p[3]-p[1])+2);
    return 0;
}
```

2. Write the definition of following function,

[5]

```
int product_sum(int *a, int *b, int n)
```

'a' and 'b' point to arrays with n elements. The function should find and return the sum of elements as mentioned below; Use pointer arithmetic, not the array subscripting to access the array elements.

```
a[0]*b[0]+a[0]*b[1]+...+a[0]*b[n-1]+a[1]*b[0]+a[1]*b[1]+...+a[1]*b[n-1]+...+a[n-1]*b[0]+a[n-1]*b[1]+...+a[n-1]*b[n-1]
```

3. Assume that you are planning to host a techfest at VIT. The techfest has many events and registration fee for each event is different. The event heads are expected to update you with the number of participants and registration fee for a single registration. Write a C++ program with a **Class Registration** that has members such as total participant count, registration amount. Your program should have member function to find the consolidated participants count and total amount collected through registration. [5]

4. Create a class named "cuboid" with three data members such as length, width and height and a member function to calculate the volume which is 'length*width*height'. Assume that all three data members can be initialized to 0 or pass two values: one value for length and width and another value for height or pass three values for length, width and height respectively. Write a C++ program to create objects of all three types and find the volume of second and third type objects. [5]

PART B (8 X 10 Marks)

Answer All questions

5. The class teacher wants to check the IQ of the students in the class. She is conducting a logical reasoning, verbal reasoning, arithmetic ability and puzzle logic test. Each of which carries 50 marks. Those who secured 180 and above marks are eligible for taking genius-level test. Those who secured below 180 marks are rejected for genius-level test. There are two levels of the genius test - genius level 1 & genius level 2. Those who secured above 80% marks for all test are eligible for taking genius level 1 and for the remaining students genius level 2 will be conducted. [10]

Write a C program to read the marks scored in 4 tests and output whether the student is eligible for genius level test or not. If the student is eligible for genius level test, find whether he/she is qualified to attend genius level 1.

6. Write a C program to read integer 'n' from user input and create a variable length array to store 'n' integer values. Your program should implement a function "int* divisible (int *a, int k, int n)" to check whether the elements in the array is divisible by 'k'. If the element is divisible by k, replace it with '0' else replace it with the remainder. The function should return the pointer to the updated array. Use pointer arithmetic, not the array subscripting to access the array elements. [10]

7. Write a C program which includes a function "void reverse_name(char *name)" to read the name in "firstName, lastName" order and output it in "lastName, firstName" order. The function expects 'name' to point to a string that has first name followed by last name. It modifies in such a way that last name comes first, and then the first name. (Input string will have a space between first and last name). Test your function in main() and draw the series of pictures to show string's characters positions in memory, during the reversing process. [10]

8. Assume that 'n' inputs are read from the user, where each input consist of a customer name followed by transaction amounts of last 10 purchases. Based on the transaction amount create a list with 'n' values indicating the discount he/she has got on each purchase (in percentages) as per the criteria mentioned in the table. Data input is terminated by the name "END". Using structures, write a C program to read 'n' input data and rank the customers based on the average amount spent (Total money spent - Discount) / 10. [10]

Purchase Amount	Discount (%)
<500	5
500 to 999	10
1000 to 1999	15
>=2000	20

9. Mr. Henry runs a book shop and he maintains the inventory of books that are being sold in his shop. The list includes details such as author, title, price, publisher, and stock position. Whenever a customer wants a book, the salesperson inputs the title and author and the system searches the list and displays whether it is available or not. If it is not available, an appropriate message is displayed. If the book is available, then the system displays the book details and requests the number of copies required. If the required number of copies is available, the total cost of the requested copies is displayed; otherwise the message "Required number of copies is not in stock" is displayed. Write a C++ program using a class called "books" with suitable members, constructors and other member functions to implement the functionality described above. [10]

10. Assume that if a person wants to play online games, he/she is asked to enter 'n', which represents the number of times he/she wants to play the game. Permit him/her to play the game till the count exceeds. Two types of games can be played namely 'Game 1' and 'Game 2'. Write a menu-driven C++ program. Create a base class Game. From class, 'Game', two classes 'Game 1' and 'Game 2' can be derived. Each time the player plays the game a unique integer id is created for each match and score for the respective match is read from the user ($0 \leq \text{score} \leq 50$). Since the Game 2 is considerably tougher than Game 1, If the player selects Game 2 and scores at least 100, he/she will get an extra credit. Your program should calculate the total score and find credits earned based on the following criteria. [10]

Total Score	Credits
<100	1
100 to 150	2
150 to 200	3
200 to 250	4

11. Write a C++ program to implement the admission fee payment process in a school. Assume that few students have received scholarships and they don't need to pay the fees. The students who have not received scholarships are expected to pay the fee. Implement fee payment functionality by creating class 'Admission' and function overloading. Use the constructor for initializing the number of students and the total cash collected. You are expected to read installment number, class category and assign the fee as per the table given below. The cash is collected based on the following criteria: [10]

Class Category/Installment	Class 1 to 5 (Rs.)	Class 6 to 8 (Rs.)	Class 9,10 (Rs.)	Class 11,12 (Rs.)
Installment 1	10000	12000	15000	20000
Installment 2	12000	14000	16000	18000
Installment 3	10000	12000	15000	20000

12. i) Write a function template that can be used to search an element from an array of any type and returns the index of the element, if found. Give both the function prototype and the function definition for the template. [5 Marks] [10]
 ii) Write a function template for the function Power () which takes base and exp as parameters and returns base^{exp} . The type of base is the parameter to the template and exp is int. If exp is negative, then it must be converted to its positive equivalent. For example, both 2^3 and 2^{-3} are expected to return 8. [5 Marks]

