National University of Computer and Emerging Sciences

Laboratory Manual # 02
Object Oriented Programming

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Section	BCS-2B
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Instructions for lab submission:

You have to submit source code (.cpp) files along with a word document. In the word document you have to give the heading of each exercise/question, then paste your source code and output snippet. Save your word document in the following format: roll number-lab no-section i.e. 22l-0008-lab2-BCS2B.

Objectives:

In this lab students will practice:

- Pointers, reference and dereference operator
- Passing pointers to functions
- Accessing arrays by pointer notation and pointer arithmetic operations
- Creating and manipulating 1D dynamic arrays
- Allocating and deallocating memory to 1D arrays
- Passing dynamic arrays to functions

1. Exercise: Marks: 5 Following code has syntax errors. Provide the correct code and output:

```
int main()
{
    int *speed = new int;
    double *travelTime;
    double *distance;
    &speed = 65;
    *travelTime = 8.5;
    distance = new double;
    distance = (*speed)*(*travelTime);
    std::cout << *distance << std::endl;
     return 0;
}
```

2. Exercise: Marks: 10 Write a program to swap 2 variables using pointers and reference operators. You have to create 2 functions:

1. void swapUsingPointers(int *a, int *b)
2. void swapUsingReferences(int &a, int &b)

Implement these functions, call them from main() and display the values of variables before and after calling above functions.
i.e.

```
int main() {
    int num1 = 10;
    int num2 = 20;
```

```
    std::cout << "Before swapping: num1 = " << num1 << ", num2 = " << num2 << std::endl;

    // Call the swapUsingPointers function to swap num1 and num2 using pointers

    std::cout << "After pointer swapping: num1 = " << num1 << ", num2 = " << num2 << std::endl;

    // Reset values
    num1 = 10;
    num2 = 20;

    // Call the swapUsingReferences function to swap num1 and num2 using references

    std::cout << "After reference swapping: num1 = " << num1 << ", num2 = " << num2 << std::endl;

    return 0;
}
```

Explain the working of **swapUsingPointers** and **swapUsingReferences** functions.

3. Exercise: Accessing 1D arrays using pointers Marks: 10 Write a program to calculate the sum of elements of an array using pointer notation. (Instead of a subscript operator [], you have to use pointer notation to access array elements).

4. Exercise: Dynamic memory allocation Marks: 10 Write a program that searches for a specific element in an array using pointer notation. The program should prompt the user to enter the size of the array and its elements, as well as the element to search for.

Steps:

- Get the size of array by user
- Create a dynamic array of size (entered by user) // allocate memory using new operator

- Prompt the user to enter values in array
- Prompt the user to enter value to be searched
- Print if value exists in the array or not
- Use pointer notation to access array elements.
- Deallocate memory // using delete operator

5. Exercise: DMA and passing dynamic arrays to functions

Marks: 15

Write a program that reverses the elements of an array using pointer notation. The program should prompt the user to enter the size of the array and its elements.
Steps:

- Get the size of the array by user and create a dynamic array.
- Prompt the user to enter array elements
- Create a function `void reverseArray(int *arr, int size)` that will reverse the array elements by using pointers.
- Print the reversed array.
- Deallocate memory.