ASSIGNMENT 2

INVENTORY OF BOOKS

Problem Statement :-

A book shop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position.
Whenever a customer wants a book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is, then the system displays the book details and requests for the number of copies required. If the requested copies book details and requests for the number of copies required. If the requested copies are available, the total cost of the requested copies is displayed; otherwise the message “Required copies not in stock” is displayed.
Design a system using a class called books with suitable member functions and Constructors. Use new operator in constructors to allocate memory space required.
Implement C++ program for the system.

Learning Objectives :-

i. Constructor
ii. new operator
iii. Array of objects
Etc.,

Theory :-

Constructor :-

A class constructor is a special member function of a class that is executed whenever we create new objects of that class.
A constructor will have exact same name as the class and it does not have any return type at all, not even void. Constructors can be very useful for setting initial values for certain member variables.

Syntax of constructor :-

If you do not define any constructor in your class, then system provides it.
It has no body but you can define it as well. It is called as default constructor or it is also known as no argument constructor.

For example,
1] Default Constructor :-

```
class_name
{
        //body of the constructor
}
```

2] Parameterized Constructor :-

```
class_name(parameters list)
{
        //body of the constructor
}
```

new operator :-
There is following generic syntax to use new operator to allocate memory dynamically for any data-type.

```
        new data_type;
```

Here, data-type could be any built-in data type including an array or any user defined data types include class or structure. Let us start with built-in data types. For example we can define a pointer to type double and then request that the memory be allocated at execution time. We can do this using the new operator with the following statements:

```
        double* pvalue = NULL;      // Pointer initialized with null
        pvalue = new double;        // Request memory for the variable
```

The memory may not have been allocated successfully, if the free store had been used up. So it is good practice to check if new operator is returning NULL pointer and take appropriate action as below:

```
double* pvalue = NULL;
if(!(pvalue = new double))
{
        cout<<"Error: out of memory."<<endl;
        exit(1);
}
```

The malloc() function from C, still exists in C++, but it is recommended to avoid using malloc() function. The main advantage of new over malloc() is that new doesn't just allocate memory, it constructs objects which is prime purpose of C++.
At any point, when you feel a variable that has been dynamically allocated is not anymore required, you can free up the memory that it occupies in the free store with the delete operator as follows:

```
        delete pvalue;
```

Array of objects :-
The idea of an array is not restricted only for built-in data types. But it can be extended and used with user defined data types.
Thus, C++ supports arrays of any data type, including class type. So, we can call array having class type elements as array of objects.
Syntax :-

```
Class_name Object_name[dimension];
```

For example,

```
ABC obj[3];
```

Here is declared array of three objects of class ABC.

Related Mathematics :-

//Input :-

Bi = { i, t, a, p, v, s }

The set B represents a particular book in the books` shop.

The parameters which are included in the set Bi are as follows :

i :- ISBN code for a book

t :- title of the book

a :- Author of the book

p :- Publisher of the book

v :- Price or value of the book

s :- Stock position of the book

//Output :-

S = { B1, B2, B3, …….., Bn }

The set S represents books' shop and B1, B2, B3, ……..,Bn represents books in the shop.

If we want to search a book from the shop

I] Consider,

Ai = { i }

A B i.e. A is a subset of B.

A is a singleton set which includes ISBN code for a book.

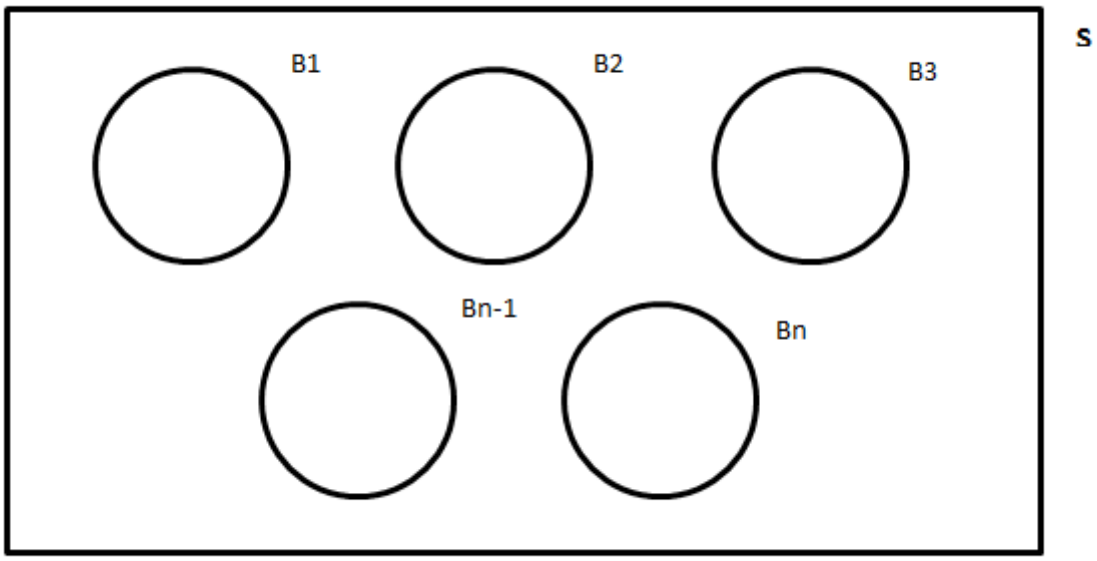
ISBN code is different for different book.

II] Consider,

Ai = { t, a }

A B i.e. A is a subset of B.

The title of the book and its author represents unique book.



Where, S represents the shop and B1, B2, B3, ……,Bn-1,Bn represents book.

Algorithm :-

1. START
2. Create class named books
3. Declare data members as follows:

   isbn, title, author, publisher as char type.

   price and stock as int type.
4. Write constructor for books class in which allocate memory for isbn.
5. Write getdata() function to accept book`s details from user.
6. Write putdata() function to display book`s details record.
7. Write main() function.
8. Create an object array of books class
9. Display the menu as follows :
   i. Input data
   ii. Add new book
   iii. Add stock to book

iv. Change in the price

v. Display

vi. Search book

vii. Purchase

viii. Exit

First four options are only used for office.

10. If first option is selected, then call getdata() function and after completion, go to step 9

11. If second option is selected, then call getdata() function for one time and after completion, go to step 9

12. If third option is selected, then the price of the book is edited. The price is the private member. So, price can be set by set_price() function which is already defined in class books and go to step 9

13. If fourth option is selected, then add books to the current stock.

    The same rule is applicable for accessing price data member.

    Finally, go to step 9

14. If fifth option is selected, the display books records one by one and go to step 9.

15. If sixth option is selected, then search the book in the array. If the book is not found, then display message “Book is not available.” And go to step 9.

16. If seventh option selected, then find required book from array and display total price of the book. If book is not available, then display message “Book is not available.” And go to step 9

17. If eighth option is selected, then exit from the loop.

18. STOP

Conclusion :-
Using the new operator, we have studied that to allocate memory for class member.