5 Years Integrated M.Sc.(IT)/B.Sc.(IT) – Semester 2

CS3021 Foundations of Object Oriented Programming

Practical No : 1	**Enrollment No:**
Practical Problems	Solve following problem.

1. Create a class to represent a bank account, including following members:

   Data Members:

   1. Account number
   2. Name of the depositor
   3. Type of account (i.e. Savings/Current)
   4. Balance amount in the account

   Member Functions:

   1. To assign initial value
   2. To deposit an amount
   3. To withdraw an amount after checking minimum balance (minimum balance is 500)
   4. To display the name and balance

2. Write a program that define class student, in which put fields like student id,name,semester and marks of minimum 5 subjects, and perform following operations:
   1. Insert values for five students through function. (Create 5 objects)
   2. Calculate percentage and grade, if student is fail in any subject then grade is F and if he/she is pass then criteria for grade is as follows:
      a. if per >=70 grade is A
      b. if per >=60 and <70 then grade is B
      c. if per >=50 and <60 then grade is C
      d. Otherwise D.
   3. Display student result in mark sheet like format.
3. Create a class called “Hotel” which contains the following:

   Private Data Members:

   1. Rno(Data member to store Room No)
   2. Name(Data member to store customer name)
   3. Tarrif(Data member to store per day charges)
   4. Days(Number of days of stay)

   Member Function:

   1. Calculate( ) // A function to calculate and return the amount
   2. Formula: days*tarrif.

   Public Members:

   1. Check-in () // A function to enter Rno, Name, tariff and days
   2. Display( ) // A function to display Rno, Name, Tarrif, days and
   3. Total amount as per the Calculate () function

   Instantiate the class and write the main function as needed.

4. Develop a C++ application for Railway Ticket Booking. Create a class Train and display the following details of train and perform the required task:
   - Train Number
   - Train Name
   - Train Source
   - Train Destination
   - Available Coach:
     1) S1 - First AC - Fair – 260 Rs.
     2) S2 - Chair Car – 180 Rs.
     3) S3 - Sleeper – 75 Rs.

   - Ask user the coach and number of seats required.
   - After taking the total number of seats, ask number of senior citizen and children under age of 5 years.
   - Do not consider any charges for children; and for senior citizen consider 50% of fair.

   Display the last payable amount.
5. Write a menu driven program that manages the functionalities of Library. Give choice to the user, to perform from following operation:
   1. Member Detail
   2. Book Detail
   3. Exit
   - Member Detail – Manages stuff related to members.
   - Book Detail – Manages stuff related to books.
   - Exit – to close application
6. Create two classes DM and DB which stores values of distances.
   DM stores distances in meters and centimeters. DB stores distances in feet and inches.

   Write a program that can read values for the class objects. Add one object of DM with another object of DB. Use friend function to carry out addition's operations. And display it result in meter and centimeter.
7. Create the classes named DATE and TIME. Create a friend function which can act as a bridge between both the classes for finding date and time.

   Make a proper method which can take seconds for finding Time and also day, month and year for finding Date.
8. Write a program by creating two classes named "Length" and "Distance" which can convert meter to kilometer using proper methods. [Take the use of friend class.]
9. Create a class called "counter" by using appropriate methods count number of objects using static data members and member function.

Objective(s)	Clear the concept of Class and Objects.

Pre-requisite	Usage of cout,cin, different looping constructs and conditional statements along with struct, class and object.
Duration for completion	4 Hours
PEO(s) to be achieved	PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem- solving, design and communication skill for life-long learning in chosen field. PEO2: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	PO1: Proficiency in and ability to apply knowledge of computer science and application and mathematics through different equations, probability and statistics. PO2: Ability to design and develop system, component or process as well as test and maintain it.
CO(s) to be achieved	CO1: Understand the basic concepts of programming. CO2: Solve technical problems through program development life cycle.
Solution must contain	Program and output
Nature of submission	Handwritten in A4 size blank papers. Write using pencil only.
Reference for solving the problem	
Post laboratory questions	1. Give two points of differences between structure and class 2. How one can execute the same program without creating object? 3. Which error shall be raised if we don't provide semicolon (;) at the end of class?

Objectives	Solution achieves the desire the desired objective(s)	Signature
To be able to write basic algorithms		
To be able to draw basic flowcharts		
To be able to compile, run and build basic program		
Able to work with class and object		
To be able to do critical analysis		

Practical No : 2	**Enrollment No:**
Practical Problems	Solve following problem.

1. Write a Java program to calculate strike rate of the cricketer as well as allocate and display player category based on strike rate.
   Create a class called Cricketer by considering cricketer id, cricketer name, specialization and score of last five tournaments out of 100.
   Perform following operations to allocate category
   1. Get the values from user
   2. Display all the platinum cricketer data
   3. Calculate strike rate using (Total score of 5 tournaments *100/500)
   4. Allocate category based on following criteria

If strike rate> 90 then category = Platinum
If strike rate> 70 then category = Gold
If strike rate> 60 then category = Silver

5. Identify all the instance method
6. Implement the concept of array of object

Note: Add if you need extra instance variables

2. Write a Java program to calculate average purchase of the customer as well as calculate and display discount earned by the customer.Create a class called Customer by considering customer id, customer name, city, contact no and last five purchases from the store.
   Perform following operations to calculate discount:
   1. Get the values from user
   2. Display the customer data
   3. Calculate average purchase using (Total purchase/ 5)
   4. Calculate discount based on following criteria
      If average purchase > 50000 then discount = 5000
      If average purchase > 35000 then discount = 3500
      If average purchase > 20000 then discount = 2000
      If average purchase < 20000 then discount = 0
   5. Identify all the instance method

   Note: Add if you need extra instance variables

3. BMIIT has organized youth festival with various competitions. Students are allowed to participate in maximum five competitions. Based on competition result, credit point will be calculated for institute.
   Create a class called Participant with instance variable like, participant id, participant name, participant city, contact number, score of five events institute id, name of institute, and credit point.
   Write a Java program to calculate credit point for each institute.
   Perform following operations to calculate discount
   1. Get the values from user
   2. Display the institute data
   3. Calculate credit point which is average of five events score
   4. Allocate rank to the institute based on following criteria
      If credit point > 90 than category= Winner
      If credit point > 70 than category= Runners up
      If credit point > 90 than category= Looser
   5. Identify all the instance method
   6. Create array of object
   7. Use static variable and method wherever it is needed

   Note: Add if you need extra instance variables

4. A book shop maintains the inventory of books that are been sold at the shop. The list includes the details such as BookTitle, Author, Price, Publisher & Stock position.

Whenever a customer wants to purchase a book, the sales person inputs the title and author to the system and the system searches the list & display whether it is available or not. If it is not, an appropriate message is displayed. If it is, then the system displays the book detail and request 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 members and member functions & constructors. Use **new** operator in constructors to allocate memory space required.

5. Define a class baby with the following attributes.
   1. Name
   2. Date of Birth
   3. Date on which bcg injection has to be given(60 days from date of birth)
   4. Date on which polio drops to be given.(45 days from date of birth)

   Write a constructor to construct the baby object. The constructor must find out bcg and polio drops dates from the date of birth. In the main function define a baby and display its details.

6. Create a class **Counted** that contains an int id. There should be default constructor in class Counted. It should print its id and message like "It is being created", when an object is being created using **new** operator. It should also print its id and message like "It is being destroyed", when object is destroyed using **delete** operator.

7. Consider the shopping cart class with all the data members related to cart. If user shops for the first time item count should be zero initially. If user adds items to the cart, item should be added to the item list. At the end generate the bill and display total number of item purchased till date. (Use constructor and static variable)

Objective(s)	Clear the concept of constructors, Destructor, Garbage Collector, Array of Object, new and delete operators.
Pre-requisite	Usage of class and object.
Duration for completion	6 Hours
PEO(s) to be achieved	PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem- solving, design and communication skill for life-long learning in chosen field. PEO2: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	PO1: Proficiency in and ability to apply knowledge of computer science and application and mathematics through different equations, probability and statistics. PO2: Ability to design and develop system, component or process as well as test and maintain it.
CO(s) to be achieved	
Solution must contain	Program and output
Nature of submission	Handwritten in A4 size blank papers. Write using pencil only.
Reference for solving	

the problem	
Post laboratory questions	1. Give two points of differences between new and constructor. 2. How one can free the resources which have been allocated during the program execution? 3. What changes should be made in the logic so we can allocate memory without using new operator? 4. What will happen if we don't free the resources that have been allocated during the program execution?

Objectives	Solution achieves the desire the desired objective(s)	Signature
To be able to write basic algorithms		
To be able to draw basic flowcharts		
To be able to compile, run and build basic program		
Able to work with constructor		
To be able to implement array of object		

Practical No : 3	**Enrollment No:**
Practical Problems	Solve following problem.

1. Define a class called UserAccount with Data member: username, emailId, password
   Method: Constructor, getter and setter method.
   Define another class called Yahoo which inherits from UserAccount class with Data member: securityQuestion, securityAnswer
   Method: Constructor, getter and setter method.
   Define another class called Twitter which inherits from UserAccounr class with Data Member: Actype (Private or Public), TwitMsg.
   Create object of class yahoo and twitter and display all the user of yahoo and twitter with all detail.

2. Uka Tarsadia University awards some grace marks to students who participate in the national games. Therefore, total marks awarded = Exam_Marks + Sports_Grace_Marks. If total marks scored are greater than maximum marks, then the final marks awarded will be equal to the maximum marks. An OO-based implementation will contain a class called Results, which inherits a class called Exam, which itself inherits a class called Student. It will also contain class called Sports, which is inherited by the Results class. The Results class will be responsible for computing the final marks scored by students. Write c++ program to implement given scenario.
3. Assume that a bank maintains two kinds of accounts for customers, one called as savings accounts and the other as current accounts. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holder should also maintain a minimum balance and if the balance falls below the service charge is

imposed.

Create a class account that stores customer name, account number and type of account. From this derive the classes CurrentAccount and SavingsAccount to make them more specific to their requirements. In main create object of current & savings accounts and perform following operation on both objects:

I. Accept deposit from the customer and update the balance.
II. Calculate interest.

Write a program to implement given scenario.

4. Create a class inventory that contains data members like item id, item name, price, stock. Create two more classes which is inherit from inventory class namely purchase and sales. Upon purchase and selling of the items stock should be updated. Implement the functionality of a re-order level while selling of an items (Message should be displayed if item reaches to re-order level) as well as it stock should be checked before selling otherwise proper message should be displayed. More than one item should be sale at a time.

Objective(s)	Clear the concept of Inheritance and reusability
Pre-requisite	Usage of class, constructor and object.
Duration for completion	6 Hours
PEO(s) to be achieved	PEO1: To provide sound foundation in the fundamentals of computer application along with analytical, problem- solving, design and communication skill for life-long learning in chosen field. PEO2: To provide quality practical skill of tools and technologies to solve industry problems.
PO(s) to be achieved	PO1: Proficiency in and ability to apply knowledge of computer science and application and mathematics through different equations, probability and statistics. PO2: Ability to design and develop system, component or process as well as test and maintain it.
CO(s) to be achieved	
Solution must contain	Program and output
Nature of submission	Handwritten in A4 size blank papers. Write using pencil only.
Reference for solving the problem	
Post laboratory questions	*5.* Give two points of differences between new and constructor. *6.* How one can free the resources which have been allocated during the program execution? *7.* What changes should be made in the logic so we can allocate memory without using new operator? *8.* What will happen if we don't free the resources that have been allocated during the program execution?

Objectives	Solution achieves the desire the desired objective(s)	Signature
To be able to write basic algorithms		
To be able to draw basic flowcharts		

To be able to compile, run and build basic program		
Able to work with constructor		
To be able to implement array of object		