Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology
(Autonomous Institute Affiliated to Mumbai University)
[Knowledge is Nectar]

ACADEMIC YEAR 2023-24

Class: F.Y. B. Tech. Semester: II Course: PSOOP(Java) Course In charge: Nikahat Mulla

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List of Problems for practice-Set III-Encapsulation/Inheritance/Polymorphism: Strings, single, multilevel inheritance, method overriding

1. Your country is at war and your enemies are using a secret code to communicate with each other. You have managed to intercept a message that reads as follows:

:mmZ\dxZmx]Zpgy

The message is obviously encrypted using the enemy's secret code. You have just learned that their encryption method is based upon the ASCII code.

For example, the letter "A" is encoded using the number 65 and "B" is encoded using the number 66. Your enemy's secret code takes each letter of the message and encrypts it as follows:

If (OriginalChar + Key > 126) then
EncryptedChar = 32 + ((OriginalChar + Key) – 127)
Else
EncryptedChar = (OriginalChar + Key)

For example, if the enemy uses Key = 10 then the message "Hey" would be encrypted as:

Character ASCII code

H 72
e 101
y 121

Encrypted H = (72 + 10) = 82 = R in ASCII
Encrypted e = (101 + 10) = 111 = o in ASCII
Encrypted y = 32 + ((121 + 10) – 127) = 36 = $ in ASCII

Consequently, "Hey" would be transmitted as "Ro$."

Write a program that decrypts the intercepted message. You only know that the key used is a number between 1 and 100. Your program should try to decode the message using all possible keys between 1 and 100.

When you try the valid key, the message will make sense. For all other keys, the message will appear as gibberish.

Q1. Input a sentence . If that sentence contains " lock" this sub string 3 times then print message " welcome to group"
otherwise "you may leave"
Q2. Encrypt it using above given logic and display the same

2. Design three classes: STUDENT, EXAM and RESULT. The STUDENT class has data

members such as rollno, name. EXAM is created by inheriting STUDENT. EXAM class adds data members representing the marks scored in six subjects. Derive RESULT from EXAM and has its own data members such as totalmarks. Write a program to model this relationship.

3. Create a base class called Vehicle that has the manufacturer's name (type String), number of cylinders in the engine (type int), and owner (type String). Then create a class called Truck that is derived from Vehicle and has additional properties: the load capacity in tons (type double since it may contain a fractional part) and towing capacity in pounds (type int). Be sure your classes have a reasonable complement of constructors, accessor, and mutator member functions. Write a driver program that tests all your member functions.

4. Give the definition of two classes, Patient and Billing, whose objects are records for a clinic. Patient will be derived from the class Person. A Patient record has the patient's name (inherited from the class Person) and primary physician, of type Doctor. Doctor is another class derived from Person. A Billing object will contain a Patient object, a Doctor object, and an amount due of type double. Be sure your classes have a reasonable complement of constructors, accessor, and mutator member functions.. First write a driver program to test all your member functions, and then write a test program that creates at least two patients, at least two doctors, and at least two Billing records, then prints out the total income from the Billing records.

5. Taking person as base class: Attributes: Name,gender,age Method : get_data() Worker derived from person: Attributes: base_salary,shift(in hours) Method: Set_data() Manger derived from worker: Attributes: dept,no of people(subordinates or people working under him/her),bonus Method: display_payment(). Display the total payment. Total payment calculated as : TP=(base_salary*shift)+(no o people* bonus)

6. Mr John is given the contract to color the house. Write a Java program that implements multi- level inheritance in such a way that

- There must be 3 classes i.e. Exterior ,Paint ,Bill.
- The Class Bill inherits the Paint class which in turn inherits the Class Exterior ○ Class Exterior contains a function to find the area of the house
- Class Paint contains a function to select the paint type and brand
- Class Bill calculates the final cost of the painting by getting the house details and paint details.

Write a Tester class with the main() function to create appropriate objects and simulate the above scenario.

7. Create class person with attributes phone_number, name and a method read()for getting and setting the name and phone_number. Include a method show() to display the phone_number and name.

Derive class student from person with attributes roll_number ,course and method read to override that in base class person. In this read() method give a call to the base class read() and ask for setting roll_number and course. Here also include a method show() which initially calls the base class method show() and then displays the roll_number and course.