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Course code and Name: 2CS302 Object Oriented Programming

Practical No. - 4(A)

Aim: Write a Java program to decide the following information based on Body Mass Index. Let the user enter height in feet and inch and weight in pounds (lb). (Hint: 1 feet = 12 inches). Based on BMI computed, print relevant message i.e if BMI is 18.5 & < 24.9 print "Person is having Normal BMI" & if BMI is >25 & 30 print "Person Is Obese".

Methodology Followed:

```
import java.util.Scanner;
public class Main{
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);

        System.out.print("Enter height in feet and inch: ");
        //height variables
        double hf = sc.nextInt();
        double hi = sc.nextInt();
        double h = hi +(hf*12);
        System.out.print("Enter weight in pounds: ");
        //weight variables
        double w=sc.nextDouble();
        //calculating BMI
        double bmi=w/(h*h)*703.0;
        //conditions according to BMI standards
        if(bmi<=18.5)
            System.out.println("Person is Under-weight.");
        else if(bmi>18.5 && bmi<=24.9)
            System.out.println("Person is having normal BMI.");
        else if(bmi>25 && bmi<=29.9)
            System.out.println("Person is Over-weight.");
        else if(bmi>=30)
            System.out.println("Person is Obese.");
        }
    }
}
```

Theoretical Principles used: In this practical we input height in feet and inches and weight in pounds. Then total height is converted into inches and using formula $BMI = (\text{weight in pounds} / (\text{height in inch})^2) * 703$. We calculate the BMI (Body Mass Index). The according to range of BMI we get to know person is Under-Weight, Normal-Weight, Over-Weight or Obese.

Input/Output:

Enter height in feet and inch: 5 7
Enter weight in pounds: 104
Person is Under-weight.

Practical No. - 4(B)

Aim: Write a Java program to find all even numbers between 1 and a given number given as input by user.

Methodology Followed:

```
import java.util.Scanner;
public class Main {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter a number: ");
        //range of number
        int n=sc.nextInt();
        //for loop to print even numbers
        for(int i=1;i<=n;i++){
            if(i%2==0)
                System.out.println(i);
        }
    }
}
```

Theoretical Principles used: In this practical we calculate the even number between 1 and the number given by user. By using the logic that if $n\%2$ is 0 then it is even number, we calculate the even numbers.

Input:

Enter a number: 44

Output:

2

4

6

8

10

12

14

16

18

20

22

24

26

28

30

32

34

36

38

40

42

44

Practical No. – 4C (i)

Aim: Check whether a number is odd or even (using if – else statement)

Methodology Followed:

```
import java.util.Scanner;
public class Main {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n=sc.nextInt();
        //if/else condition for finding even/odd number
        if(n%2==0)
            System.out.println("It is an even number.");
        else
            System.out.println("It is an odd number.");
    }
}
```

Theoretical Principles used: In this practical we decide the given by user is odd or even by using the logic that if $n\%2$ is 0 then n is even if $n\%2$ is not 0 then n is odd.

Input:

Enter a number: 44

Output:

It is an even number.

Practical No. – 4C(ii)

Aim: Check the category of a given character. (using if...else...if ladder)

Methodology Followed:

```
import java.util.Scanner;
public class Main {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter a character: ");
        char n=sc.next().charAt(0);
        //conditions according to ascii value of character
        if(n>='a' && n<='z')
```

```

        System.out.println("Lower case character.");
        else if(n>='A' && n<='Z')
        System.out.println("Upper case character.");
        else if(n>='0' && n<='9')
        System.out.println("A digit.");
        else if(((int)n>=33 && (int)n<=48) || n == '@')
        System.out.println("A special character.");
    }
}

```

Theoretical Principles used: In this practical we decide the type of the character given by the user, using the ASCII Value of the characters and then by the range of ASCII Value we decide the given character is Digit, Upper- or Lower-Case Alphabet and Special Character.

Input:

Enter a character: @

Output:

A special character.

Practical No. – 4C(iii)

Aim: Check whether a number is prime or not. (using for loop)

Methodology Followed:

```

import java.util.Scanner;
public class Main {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n=sc.nextInt(),i,c=0;
//using for loop and if/else to find prime number
        if(n==2)
            System.out.println("It is a prime number.");
        else{
            for(i=2;i<n/2;i++){

```

```

        if(n%i==0){
            System.out.println("It is not a prime number.");
            c=1;
        }
    }
    if(c==0)
        System.out.println("It is a prime number.");
    }
}
}

```

Theoretical Principles used: In this practical we determine whether the number given by user is prime or not. A prime number is that number which has only 2 divisors i.e 1 and the number itself. Since 1 is divisor for every number, so we start a for loop from 2 to given number(excluding the number) and if any number between this range divides n then it is not prime number else it is prime number.

Input:

Enter a number: 17

Output:

It is a prime number.

Practical No. – 4C(iv)

Aim: Display reverse of a number and check whether it is palindrome or not. (using while/do while loop)

Methodology Followed:

```

import java.util.Scanner;
public class Main {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter a number: ");
        int n=sc.nextInt(),temp=n,r,rev=0;
        //while loop to reverse the number
        while(n!=0){
            r=n%10;
            rev=rev*10+r;
            n=n/10;
        }
    }
}

```

```

    }
    System.out.println("Reversed number is: "+rev);
    if(temp==rev)
        System.out.println("It is a palindrome.");
    else
        System.out.println("It is not a palindrome.");
    }
}

```

Theoretical Principles used: In this practical we determine the number given by user is palindrome or not that is the number in it's reverse form is equal to it's actual form. We use the logic to reverse the number and then compare the reversed value to the actual value if both value are same then number is palindrome else it is not palindrome.

Input:

Enter a number: 121

Output:

Reversed number is: 121

It is a palindrome.

Practical No. – 4C(v)

Aim: Perform arithmetic operations of a calculator. (using switch case)

Methodology Followed:

```

import java.util.Scanner;
public class Main {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        char ch;
        do{
            System.out.print("Enter two operand: ");
            int a=sc.nextInt(), b=sc.nextInt();
            System.out.print("Enter an operator: ");
            char c=sc.next().charAt(0);
        }
        //calculator using switch case
    }
}

```

```

switch(c){
    case '+':
        System.out.println(a+" "+b+"="+ (a+b));
        break;
    case '-':
        System.out.println(a+" "+b+"="+ (a-b));
        break;
    case '*':
        System.out.println(a+" "+b+"="+ (a*b));
        break;
    case '/':
        System.out.println(a+" "+b+"="+ ((float)a/(float)b));
        break;
    case '%':
        System.out.println(a+" "+b+"="+ (a%b));
        break;
}
System.out.println("Want to perform again? Then enter y otherwise n: ");
ch=sc.next().charAt(0);
}while(ch!='n');
}
}

```

Theoretical Principles used: In this practical we create calculator with arithmetic operations in which we give two integer input and one String input which is operator. Then according to operator, the result is calculated and that result is print on the output window. And if we want to continue, we simply type “y” and again number and operator is taken from user and if we don’t want to continue we simply type “n”.

Input/Output:

```

Enter two operand: 5 7
Enter an operator: /
5/7=0.71428573
Want to perform again? Then enter y otherwise n
n

```

Practical No. – 4C(vi)

Aim: Pattern printing. (using nested loops)

Methodology Followed:

```
import java.util.Scanner;
public class Main {
    public static void main(String[] args){
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter number of rows: ");
        int n=sc.nextInt();
        //nested for loop to print the pattern
        for(int i=0;i<n;i++){
            for(int j=0;j<n-i-1;j++){
                System.out.print(" ");
            }
            for(int k=0;k<i+1;k++){
                System.out.print(k+1);
            }
            System.out.println();
        }
    }
}
```

Theoretical Principles used: In this practical we print the pattern in which number of rows are taken by user. In this pattern there is 2 pattern, One consist of space and other of numbers.

Input:

Enter the no. of rows: 5

Output:

```
1
12
123
1234
12345
```

Conclusion: Through this practical we have learnt to build logic for various problems like finding even/odd number, prime number, palindrome number, printing patterns, etc. using while and for loop and if/else or if/elseif ladder or nested if/else.