[2CEIT5PE5:MOBILE APPLICATION DEVELOPMENT]

Practical: 1

AIM: Basics of Kotlin

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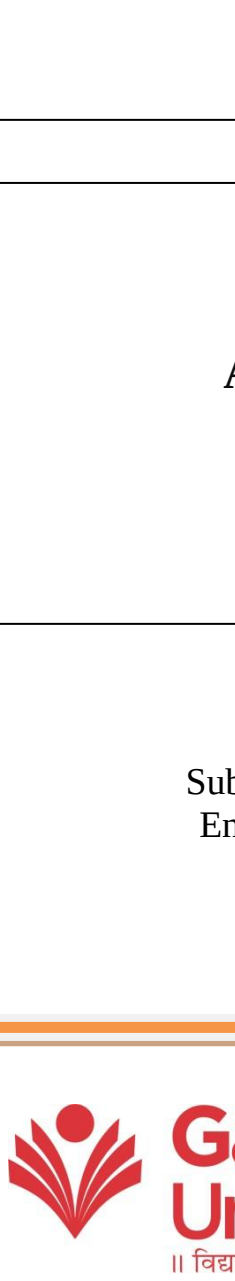

Department of Computer Engineering/Information Technology

1.1 Store & Display values in different variable of different type (Integer, Double, Float, Long, Short, Byte, Char, Boolean, String)

Answer:

```
fun main()
{
    var int:Int=10
    var doub:Double=20.0
    var ft:Float=30.0F
    var lg:Long=45112225
    var srt:Short=1
    var byte:Byte=12
    var char:Char='D'
    var bool:Boolean=true
    var string:String="PKU"

    println("Integer: $int")
    println("Double: $doub")
    println("Float: $ft")
    println("Long: $lg")
    println("Short: $srt")
    println("Byte: $byte")
    println("Char: $char")
    println("Boolean: $bool")
    println("String: $string")
}
```

Output:

```
Integer: 10
Double: 20.0
Float: 30.0
Long: 45112225
Short: 1
Byte: 12
Char: D
Boolean: true
String: PKU
```

1.2 Type conversion: Integer to Double, String to Integer, String to Double.

Answer:

```
fun main()
{
    var int:Int=10
    var double:Double=10.2
    var str:String="120"
    println("Integer: $int")
    println("Double: $double")
    println("String: $str")
    double = int.toDouble()
    println("Integer To Double: $double")
    int = str.toInt()
    println("String to Integer: $int")
    double = str.toDouble()
    println("String to Double: $double")
}
```

Output:

```
Integer: 10
Double: 10.2
String: 120
Integer To Double: 10.0
String to Integer: 120
String to Double: 120.0
```

1.3 Scan student's information and display all the data.

Answer:

```
fun main()
{
    print("Student Enrollment: ")
    var enr:Long= readLine()!!.toLong()
    print("Student Name: ")
    var name:String= readLine()!!.toString()
    print("Student Branch: ")
    var branch:String= readLine()!!.toString()
    print("Student Class: ")
    var class_name:String= readLine()!!.toString()
    print("Student Batch: ")
    var batch:String= readLine()!!.toString()
    print("Student College Name: ")
    var college_name:String= readLine()!!.toString()
    print("Student uni Name: ")
    var uni_name:String= readLine()!!.toString()
    print("Student Age: ")
    var age:Int= readLine()!!.toInt()
    println("================================")
    println("Enrollment: $enr")
    println("Name: $name")
    println("Branch: $branch")
    println("Class: $class_name")
    println("Batch: $batch")
    println("College Name: $college_name")
    println("Uni Name: $uni_name")
    println("Age: $age")
}
```

Output:

```
Student Enrolment: 21548872
Student Name: DHJ
Student Branch: IT
Student Class: CEIT-C
Student Batch: AB10
Student Collage Name: UVPCE
Student uni Name: GNU
Student Age: 21
================================
Enrolment: 21548872
Name: DHJ
Branch: IT
Class: CEIT-C
Batch: AB10
Collage Name: UVPCE
Uni Name: GNU
Age: 21
```

1.4 Find the number is odd or even by using Control Flow inside println() method.

Answer:

```
fun main()
{
    print("Enter Number: ")
    var num:Int= readLine()!!.toInt()
    println(if(num%2==0) "Num is Even" else "Num is Odd")
}
```

Output:

```
Enter Number: 47
Num is Odd
```

1.5 Display month name using 'when'

Answer:

```
fun main()
{
    print("Enter Month Number: ")
    var mon:Int= readLine()!!.toInt()
    when(mon){
        1->println("Jan")
        2->println("Feb")
        3->println("March")
        4->println("Apr")
        5->println("May")
        6->println("Jun")
        7->println("Jul")
        8->println("Aug")
        9->println("Sep")
        10->println("Oct")
        11->println("Nov")
        12->println("Dec")
        else->print("Enter valid Month")
    }
}
```

Output:

```
Enter Month Number: 1
Jan
```

```
Enter Month Number: 14
Enter valid Month
Process finished with exit code 0
```

1.6 By using a user defined function perform all arithmetic operations.

Answer:

```
fun main()
{
    println("Addition of: 111,2222,-222 is: ${operations('+',111,2222,-222)}")
    println("Subtraction of: 111,2222,-222 is: ${operations('-',111,2222,-222)}")
    println("Multiplication of: 111,2222,-222 is: ${operations('*',111,2222,-222)}")
    println("Division of: 2222,111 is: ${operations('/',2222,111)}")
}
fun operations(op:Char,vararg numArr:Int):Int{
    var result:Int=0
    when(op)
    {

        '+'->{
            for(num in numArr)
            {
                result+=num
            }

        }
        '-'->{
            result=numArr[0]
            for (num in 1 until numArr.size)
            {
                result-=numArr[num]
            }
        }
        '*'->{
            result=1
            for(num in numArr)
            {
                result*=num
            }
        }
        '/'->{
            result=numArr[0]
            for (num in 1 until numArr.size)
            {
                result/=numArr[num]
            }
        }
        else->return -1
    }
    return result
}
```

Output:

```
Addition of: 111,2222,-222 is: 2111
Subtraction of: 111,2222,-222 is: -1889
Multiplication of: 111,2222,-222 is: -54754524
Division of: 2222,111 is: 20
```

1.7 Find the factorial of number by recursion. Explain "tailrec" keyword.

Answer:

```
import java.math.BigInteger

fun main()
{
    print("Enter Number: ")
    var num:BigInteger = readLine()!!.toBigInteger()
    println("Factorial is: ${fact2(num)}")
    println("With using tailrec Factorial is: ${fact(num)}")
}
tailrec fun fact(n: BigInteger, temp: BigInteger = BigInteger("1")): BigInteger {
    return if (n == BigInteger("1")){
        temp
    } else {
        fact(n-BigInteger("1"), temp*n)
    }
}
fun fact2(n: BigInteger, temp: BigInteger = BigInteger("1")): BigInteger {
    return if (n == BigInteger("1")){
        temp
    } else {
        fact(n-BigInteger("1"), temp*n)
    }
}
```

Output:

```
Enter Number: 10
Factorial is: 3628800
With using tailrec Factorial is: 3628800
```

1.8 Create different types of Array as shown in image. Explore Arrays.deepToString(), contentDeepToString() methods, IntArray variable .joinToString() and use in program to print Array. Explore range, downTo, until etc. for loop and use in this program. Sort Array of Integer data type without using inbuilt function & with using inbuilt function.

Answer:

```
fun main()
{
    println("Create Array-1 by using arrayof () method:")
    var arr1 = arrayOf(1,2,3,4,5)
    //joinToString
    println(arr1.joinToString())

    println("Create Array-2 by using Array<>():")
    var arr2 = arrayOf<String>("D","K")
    //contentDeepToString
    println(arr2.contentDeepToString())

    println("Create Array-3 by using Array<>() and lambda function:")
    var arr3 = Array(8){i:Int->i}
    println("*************Before Sorting Without Built-in Function***************")
    println(arr3.joinToString())
    for(i in 0 until arr3.size)
    {
        for(j in i+1 until arr3.size)
        {
            if(arr3[i]<arr3[j])
            {
                arr3[j]=arr3[j]+arr3[i]
                arr3[i]=arr3[j]-arr3[i]
                arr3[j]=arr3[j]-arr3[i]
            }
        }
    }
    println("*************After Sorting Without Built-in Function***************")
    println(arr3.joinToString())

    println("Create Array-4 by using IntArray ():")
    var arr4 = IntArray(3)
    //until
    for(i in 0 until arr4.size)
    {
        print("a[$i]: ")
        arr4[i]= readLine()!!.toInt()
    }


    println("Create Array-5 by using intArrayof () :")
    var arr5 = intArrayOf(25,90,10,35)
    println("*************Before Sorting With Built-in Function***************")
    println(arr5.joinToString())
    //Sort
    arr5.sort()
```

```
    println("*************After Sorting With Built-in Function***************")
    println(arr5.joinToString())

    println("Create 20 Array-6 by using arrayof () and intArrayof() :")
    var arr6 = arrayOf(intArrayOf(1,2), intArrayOf(3,4,3))
    for(i in 0 until arr6.size)
    {
        for(j in 0 until arr6[i].size)
        {
            print(arr6[i][j])
        }
        println()
    }

    //Range
    val num = 10
    println("*************Use In Range***************")
    if (num in 5..10) {
        println("in range")
    }
    println("*************Use Notin Range***************")
    if(num !in 5 .. 9)
    {
        println("not in range")
    }

    //step
    println("*************Use Step***************")
    for (x in 1..10 step 2) {
        print("$x ")
    }
    println()

    //downTo
    println("*************Use downTo***************")
    for (x in 9 downTo 0 step 3) {
        print("$x ")
    }
    println()
}
```

Output:

```
Create Array-1 by using arrayof () method:
1, 2, 3, 4, 5
Create Array-2 by using Array<>():
[D, K]
Create Array-3 by using Array<>() and lambda function:
*************Before Sorting Without Built-in Function***************
0, 1, 2, 3, 4, 5, 6, 7
*************After Sorting Without Built-in Function***************
7, 6, 5, 4, 3, 2, 1, 0
Create Array-4 by using IntArray ():
a[0]: 14
a[1]: 54
a[2]: 68
Create Array-5 by using intArrayof () :
*************Before Sorting With Built-in Function***************
25, 90, 10, 35
*************After Sorting With Built-in Function***************
10, 25, 35, 90
Create 20 Array-6 by using arrayof () and intArrayof() :
12
343
*************Use In Range***************
in range
*************Use Notin Range***************
not in range
*************Use Step***************
1 3 5 7 9
*************Use downTo***************
9 6 3 0
```

1.9 Find the max number from ArrayList.

Answer:

```
fun main() {
    var arrlist = ArrayList<Int>()
    for(i in 0..5)
    {
        print("arr[$i]: ")
        arrlist.add(readLine()!!.toInt())
    }
    var maxNum:Int
    maxNum=arrlist[0]
    for (i in arrlist) {
        if(maxNum<i)
        {
            maxNum=i
        }
    }
    println("Max number is: $maxNum")
}
```

Output:

```
arr[0]: 15
arr[1]: 81
arr[2]: 1
arr[3]: 65
arr[4]: 2
arr[5]: 87
Max number is: 87
```

1.10 Write Different types of Class & Constructor. Create a class Car and set various members like type, model, price, owner, milesDrive. add the function getCarPrice in it. Create an object of Car class and access property of it. (getCarInformation(), getOriginalCarPrice(), getCurrentCarPrice(), displayCarInfo() etc.)

Constructor:

A constructor is a concise way to initialize class properties.

In is a special member function that is called when an object is instantiated (created).

In Kotlin, there are two type of constructor.

1. Primary constructor
2. Secondary constructor

Class:

Objects are created from classes. A class is a blueprint for an object; it shares common properties and behavior in form of members and member functions.

- simple class
- empty class
- primary constructor
- open class
- data class
- nested class
- inner class
- abstract class
- sealed class

Answer:

```
class Car(info:String,Owner:String,miles:Int,OGPrice:Double,currentPrice:Double){
    lateinit var info:String
    lateinit var Owner:String
    var miles:Int
    var OGPrice:Double
    var currentPrice:Double

    init{
        println("Object of class is created and Init is called")
        this.info = info
        this.Owner = Owner
        this.miles = miles
        this.OGPrice = OGPrice
        this.currentPrice = currentPrice
    }
    fun getCarInformation(): String {
        return info
    }
    fun getOriginalCarPrice(): Double {
        return OGPrice
```

```
    }
    fun getCurrentCarPrice(): Double {
        return currentPrice
    }

    fun displayCarInfo(){
        println("----------")
        println("Car Information: ${getCarInformation()}")
        println("Car Owner: $Owner")
        println("Miles Drive: $miles")
        println("Original Car Price: ${getOriginalCarPrice()}")
        println("Current Car Price: ${getCurrentCarPrice()}")
        println("----------\n")
    }

}



fun main() {
    println("Creating Car Class Object car1 in next line")
    val car1 = Car("BMW, 2018","Aman",105, 10000.0,98950.0)
    car1.displayCarInfo()
    println("Creating Car Class Object car2 in next line")
    val car2 = Car("BMW, 2019","Karan",20, 400000.0,399800.0)
    car2.displayCarInfo()
    println("\n********** ArrayList of Car **********")
    val carlist = ArrayList<Car>()
    carlist.add(Car("Toyota, 2017","KJS",100,1080000.0,1079000.0))
    carlist.add(Car("Maruti, 2020","NPP",200,4000000.0,3998000.0))
    carlist[0].displayCarInfo()
    carlist[1].displayCarInfo()
}
```

Output:

```
Creating Car Class Object car1 in next line
Object of class is created and Init is called
----------
Car Information: BMW, 2018
Car Owner: Aman
Miles Drive: 105
Original Car Price: 10000.0
Current Car Price: 98950.0
----------

Creating Car Class Object car2 in next line
Object of class is created and Init is called
----------
Car Information: BMW, 2019
Car Owner: Karan
Miles Drive: 20
Original Car Price: 400000.0
Current Car Price: 399800.0
----------

********** ArrayList of Car **********
Object of class is created and Init is called
Object of class is created and Init is called
----------
Car Information: Toyota, 2017
Car Owner: KJS
Miles Drive: 100
Original Car Price: 1080000.0
Current Car Price: 1079000.0
----------

----------
Car Information: Maruti, 2020
Car Owner: NPP
Miles Drive: 200
Original Car Price: 4000000.0
Current Car Price: 3998000.0
----------
```

1.11 Write about Operator Overloading. Perform Matrix Addition, Subtraction & Multiplication using Class Matrix & operator overloading. Overload toString() function in Matrix class.

Operator Overloading

- Operator overloading gives the ability to use the same operator to do various operations**.**

Answer:

```
fun main() {
    val firstMatrix = Matrix(arrayOf(intArrayOf(3,-2,5), intArrayOf(3,0,4)),2,3)
    val secondMatrix = Matrix(arrayOf(intArrayOf(2,3),intArrayOf(-9,0),
    intArrayOf(0,4)),3,2)
    val secondMatrix1 = Matrix(arrayOf(intArrayOf(6,3), intArrayOf(9,0),
    intArrayOf(5,4)),3,2)


    println("********** Addition **********")
    println("Matrix:1 ")
    print(secondMatrix1.toString())
    println("Matrix:2 ")
    print(secondMatrix.toString())
    val thirdMatrix = secondMatrix1 + secondMatrix
    println("Addition: \n$thirdMatrix")

    println("********** Subtraction **********")
    println("Matrix:1 ")
    print(secondMatrix1)
    println("Matrix:2 ")
    print(secondMatrix)
    val subtractMatrix = secondMatrix1 - secondMatrix
    println("Subtraction: \n$subtractMatrix")

    println("********** Multiplication **********")
    println("Matrix:1 ")
    print(secondMatrix1.toString())
    println("Matrix:2 ")
    print(secondMatrix.toString())
    val multiplication = firstMatrix * secondMatrix
    println("Multiplication: \n$multiplication")

}

class Matrix(matrix: Array<IntArray>,i:Int,j:Int){
    var i:Int
    var j:Int
    lateinit var matrix : Array<IntArray>
    init{
        this.i = i
        this.j = j
        this.matrix = matrix
    }
    operator fun plus(p: Matrix) : Matrix {
        val result = Array(i){IntArray(j)}
        for(row in 0 until i){
```

```
            for(column in 0 until j){
                result[row][column] = matrix[row][column] + p.matrix[row][column]
            }
        }
        return Matrix(result,i,j)
    }

    operator fun minus(p:Matrix):Matrix{
        val result = Array(i){IntArray(j)}
        for(row in 0 until i){
            for(column in 0 until j){
                result[row][column] = matrix[row][column] - p.matrix[row][column]
            }
        }
        return Matrix(result,i,j)
    }

    operator fun times(p:Matrix):Matrix{
        val result = Array(i){IntArray(i)}
        for(row in 0 until i){
            for(column in 0 until i){
                for(k in 0 until j){
                    result[row][column] += matrix[row][k] * p.matrix[k][column]
                }
            }
        }
        return Matrix(result,i,i)
    }

    override fun toString(): String {
        var msg : String = ""

        for(row in matrix.indices){
            for(column in 0 until matrix[row].size){
                msg += "${matrix[row][column]}   "
            }
            msg += "\n"
        }
        return msg
    }

}
```

Output:

```
********** Addition **********
Matrix:1
6   3
9   0
5   4
Matrix:2
2   3
-9   0
0   4
Addition:
8   6
0   0
5   8
```

```
********** Subtraction **********
Matrix:1
6   3
9   0
5   4
Matrix:2
2   3
-9   0
0   4
Subtraction:
4   0
18   0
5   0
```

```
********** Multiplication **********
Matrix:1
6   3
9   0
5   4
Matrix:2
2   3
-9   0
0   4
Multiplication:
24   29
6   25
```