جامعة الملك سعود King Saud University	**King Saud University** **College of Computer and Information Sciences** **Computer Science Department**

Duration	180 min
Course Code:	CSC 111
Course Title:	Introduction to Programming
Semester:	Fall 2018-19
Exercises Cover Sheet:	Final Exam (B)

Student Name:	
Student ID:	
Student Section No.	

Tick the Relevant	Computer Science B.Sc. Program ABET Student Outcomes	Question No. Relevant Is Hyperlinked	Covering %
✓	**a) Apply knowledge of computing and mathematics appropriate to the discipline;**	**1,2**	**50%**
	b) Analyze a problem, and identify and define the computing requirements appropriate to its solution		
✓	**c) Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;**	**3,4,5**	**50%**
	d) Function effectively on teams to accomplish a common goal;		
	e) Understanding of professional, ethical, legal, security, and social issues and responsibilities;		
	f) Communicate effectively with a range of audiences;		
	g) Analyze the local and global impact of computing on individuals, organizations and society;		
	h) Recognition of the need for, and an ability to engage in, continuing professional development;		
	i) Use current techniques, skills, and tools necessary for computing practices.		
	j) Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;		
	k) Apply design and development principles in the construction of software systems of varying complexity;		

Question 1. (10 Marks)
Put your answers of the question 1 (**multiple choice questions**) in the following table:

Question	Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

1) What, if any, is the output of this program?

```
class SDF {
      public int s=5;
}
```

```
public class sdfTest {
      public static void main(String args[])
      {
            SDF o1=new SDF(),o2=o1;
            o1.s+=10;
            System.out.println(o2.s);
      }
}
```

a) 5
b) 10
c) 15
d) Compilation error

2) What, if any, is the output of the following program?

```
public class AClass {
      public static void main(String[] args) {
            String a = "FinalExam";
            String b = "FinalExam 2018";
            b = a;
            a = null;
            System.out.println(b.length());
      } }
```

a) 14
b) 9
c) 0
d) Compilation error

3) What, if any, is the output of the following program?

```
public class AClass {
      public static int halve1(int x) {
            return x/2;
      }
      public static void halve2(int[] a) {
```

```
                for(int i=0; i < a.length; i++)
                        a[i] = halve1(a[i]);
                a = null;
        }
        public static void main(String[] args) {
                int a [] = {8, 16, 32, 48};
                halve2(a);
                for(int i=0; i < a.length; i++)
                        System.out.print(a[i] + " ");
        }}
```

a) 4 8 16 24
b) 8 16 32 48
c) 0 0 0 0
d) Compilation error

4) Which two of the following cause a compiler error?

1. `double[] a1 = new double(3);`
2. `double a2[] = new double[];`
3. `double[]a3 = new double[3];`
4. `double a4[] = new double[3];`
5. `double a5[] = {1.0, 2.0, 2.0};`

a) 3, 4
b) 3, 5
c) 4, 5
d) 1, 2

5) What, if any, is the output of this program?

```
class AClass {
        public static int i;
        public int j;
        AClass()    {
                i = 1;
                j = 2;
        }
}
```

```
public class Main {
        public static void main(String args[])
        {
                AClass obj1 = new AClass();
                AClass obj2 = new AClass();
                obj1.i++;
                System.out.println(obj2.i);
        }
}
```

a) 2
b) 1
c) 3
d) Compilation error

6) What is the output of the following program?

```
public class AClass {
        public int y = 10;
        public AClass(){
                this(20);
        }
        public AClass(int y){
                this.y += y;
        }
        public static void main(String[] args) {
                AClass object = new AClass();
                System.out.print(object.y);
                object = new AClass(5);
                System.out.print(object.y);
        }
}
```

a) 1530
b) 3015
c) 2015
d) 1520

7) What is the output of the following code fragment?

```
int[] egArray = {2,4,6,8,10,1,3,5,7,9};
for (int index= 0 ; index<5 ; index+=2)
      System.out.print(egArray[index] + " ");
```

a) 2 4 6 8
b) 2 4 6 8 10
c) 2 6 10
d) 2 4 6 8 10 1 3 5 7 9

8) What is the output of the following program?

```
public class D {
      public static void method(C object, int y) {
            object.x = y;
            y++;
            object = new C();
            object.x = y+2;
            System.out.print(object.x);
      }

      public static void main(String[] args) {
            int z = 4;
            C object = new C();
            object.x = 3;
            method(object, z);
            System.out.print(object.x);
            System.out.print(z);
      }
}
```

```
public class C {
      public int x;
}
```

a) 734
b) 735
c) 744
d) 775

9) Which of the following is the correct expression that evaluates to true if the number x is between 1 and 100 or the number is negative?

a) `1< x < 100 && x < 0`
b) `(1 > x > 100) || (x < 0)`
c) `((x < 100) && (x > 1)) || (x < 0)`
d) `((x < 100) && (x > 1)) && (x < 0)`

10) What, if any, is the output of the following program?

```
public class AClass {
      public void method1() {
            System.out.print("B");
      }
      public static void method2() {
            System.out.print("A");
            method1();
            System.out.print("C");
      }
      public static void main(String[] args) {
            method2();
      }
}
```

a) BAC
b) ABC
c) ACB
d) Compilation error

Question 2. (5 Marks)
Complete the following program so its output will be the following:

```
10.0
```

```
public class CN {
    private int ……var…… ;
    public ……CN…… (int var)
    {
        this.var=var;
    }
public static double get()
    {
        return var;
    }
    public static void main(String args[]) {
        CN ……o…… =new CN(……10……);
        System.out.println( o.get() );
    }
}
```

Question 3. (7 **Marks)**
Implement the following class in Java:

Item
- id: int - itemCount: int - name: String - UPC: int
+ Item() + Item (String name, int UPC) + getID(): int + getName(): String + getUPC(): int + setName(String type): void + setUPC(int UPC): void

- This class implements items that can be stored in a warehouse. Every item has an ID that is assigned by the class in an orderly fashion (1, 2, 3, 4, …).
- Item's name can contain any string assigned by the user (e.g. Dell computer, MS mouse, etc.)
- UPC is a unique identification number (for example: 4011200296908).

Attributes:

`id`	An auto incremental ID where the first item has the id=1
`itemCount`	A static variable that holds the number of created objects
`Name`	Name of the item
`UPC`	A unique identification number

Methods:

`Item()`	A default constructor
`Item (String name, int UPC)`	A constructor that takes the name and UPC of an item. It should assign an id to each item, and increments the `itemCount` everytime
`getID(): int`	An accessor for the attribute `id`
`getName(): String`	An accessor for the attribute `name`
`getUPC(): int`	An accessor for the attribute `UPC`
`setName(String type): void`	A setter for attribute `name`
`setUPC(int UPC): void`	A setter for attribute `UPC`

```
public class Item {
 private int id, UPC;
 private static int itemCount;
 private String name;
 public Item() {}
 public Item (String name, int UPC) {
  this.name = name;
  this.UPC = UPC;
  id = ++itemCount;
 }
 public int getID() {return id;}
 public String getName() {return name;}
 public int getUPC() {return UPC;}
 public void setName(String type) { name = type;}
 public void setUPC(int UPC) {this.UPC = UPC;}
}
```

Question 4. Implement the following class in Java: (13 Marks)

Warehouse
- items: Item[] - nOfItems: int
+ Warehouse(int maxSize) + addItem(String name, int UPC): void + deleteItem(int UPC): void + searchItem(int UPC): int + sort(): void + printItemsInfo(): void + getNumberOfItems(): int + isFull(): boolean + isEmpty(): boolean

Attributes:

items	An array of the object Item (from the previous Question)
nOfItems	The number of the items in the array.

Methods:

Warehouse(int maxSize)	A constructor that accepts the max number of items in the warehouse
+ addItem(String name, int UPC): void	To add a new item. If the item's UPC exists in the system, the method **should not** add the item
+ deleteItem(int UPC): void	To delete an item from the warehouse using its given UPC
+ searchItem(int UPC): int	To search for an item using its UPC. The method should return the index of the item in the array, and -1 if not found.
+ sort(): void	To sort the items in an ascending order (smallest to the largest) using their UPC
+ printItemsInfo(): void	To print all items information in the system. For each, it should print: id, name, and UPC. Then it should print the number of items in the warehouse.
+ getNumberOfItems(): int	To return the number of items in the warehouse
+ isFull(): boolean	Return true if the array of items is full
+ isEmpty(): boolean	Return true if the array of items is empty

```
public class Warehouse {
 private Item[] items;
 private int nOfItems;
 public Warehouse(int maxsize) {
  items = new Item[maxsize];
  nOfItems=0;
 }
 public void addItem(String name, int UPC) {
  for (int i =0; i<nOfItems; i++) {
   if(items[i].getUPC()==UPC)
    return;
  }
  items[nOfItems++]=new Item(name,UPC);
 }
```

```
public void deleteItem(int UPC) {
  for(int i=0; i<nOfItems;i++) {
   if(items[i].getUPC()==UPC) {
    items[i]=items[--nOfItems];
    items[nOfItems]=null;
   return;}
  }
 }
 public int searchItem(int UPC) {
  for(int i = 0; i<nOfItems;i++) {
   if(items[i].getUPC()==UPC) {
    return i;
   }
  }
  return -1;}
 public void sort() {
  for(int i = 0; i<nOfItems; i++) {
   for(int j=i; j<nOfItems; j++){
    Item store = items[i];
    if(items[i].getUPC()>items[j].getUPC()) {
     items[i]=items[j];
     items[j]=store;
    }
   }
  }
 }
 public void printItmsInfo() {
  for(int i = 0; i<nOfItems; i++) {
   System.out.println("ID: "+items[i].getID()+",Name:
"+items[i].getName()+
     ",UPC: "+items[i].getUPC());}
  System.out.println("Number of items: "+nOfItems);}
 public int getNumberOfItems() {
  return nOfItems;}
 public boolean isFull() { return (nOfItems ==
items.length);}
 public boolean isEmpty() {return (nOfItems == 0);}
}
```

Question 5. Using the previous implemented classes, implement a **main** program that does the following tasks (assume that the max size of items=100): **(5 Marks)**

1) Add the following items to the warehouse

Name	UPC
HP computer	122
Desk	100
Chair	15
Tablet	200
Pen	100

2) Sort the items based on their UPC number in an ascending order
3) Print all items information
4) Delete the item which has (UPC=100)
5) Print all items information

```
public class main {
 public static void main(String[] args) {
  // TODO Auto-generated method stub
  Warehouse h = new Warehouse(100);
  h.addItem("HP computer", 122);
  h.addItem("Desk", 100);
  h.addItem("Chair", 15);
  h.addItem("Tablet", 200);
  h.addItem("pen", 100);
  h.sort();
  h.deleteItem(100);
  h.printItmsInfo();
 }
}
```

6) Using the previously mentioned main method that you have implemented, write in the box the output expected from your main method.

```
ID: 3,Name: Chair,UPC: 15
ID: 4,Name: Tablet,UPC: 200
ID: 1,Name: HP computer,UPC: 122
Number of items: 3
```

Result					
Question No.	**Relevant Student Outcome**	**SO is Covered by %**	**Full Mark**	**Student Mark**	**Assessor's Feedback**
1	a	25	10		
2	a	12.5	5		
3	c	17.5	7		
4	c	32.5	13		
5	c	12.5	5		
Totals		**100%**	**40**		

I certify that the work contained within this assignment is all my own work and referenced where required. **Student Signature:** **Date:**		**Feedback Received:** **Student Signature:** **Date:**