Object Oriented Programming

برمجة شيئية

Final-A

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Final Spring 2018 (Boys Campus)

501323-3: Object Oriented Programming **Max Marks: 40**

Room No: 2301 Date: 06-05-2018 10:30 to 12:30

Seq. Student الرقم التسلسلي	*Student ID رقم الطالب*								*Section الشعبة*
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Student Name اسم الطالب	.....								

Prof-in-charge	*Total No of pages*	*Question Pages:*
Dr. Walid MAHDI (Computer Science)	**10**	**9**

Assessment of Course Learning Objectives covered in the examination		Question Mapping	Marks Obtained	Max Marks
CLO 1	Understand the features of object oriented programming paradigm	Q2		7
CLO 2	Be able to use the tools and techniques of an object oriented language	Q3		17
CLO 3	Be able to design object oriented applications	Q1		9
CLO 4	Be able to implement object oriented applications	Q4		7

Question	Q 1	Q 2	Q 3	Q 4
Marks				
Max Marks	9	7	17	7
Total Marks	/ 40			
Signature				

Instructions: (تعليمات)

1. The exam consists of **4 questions**.
2. Do not forget to write **your name (in Arabic)**, your **ID** and **serial number**

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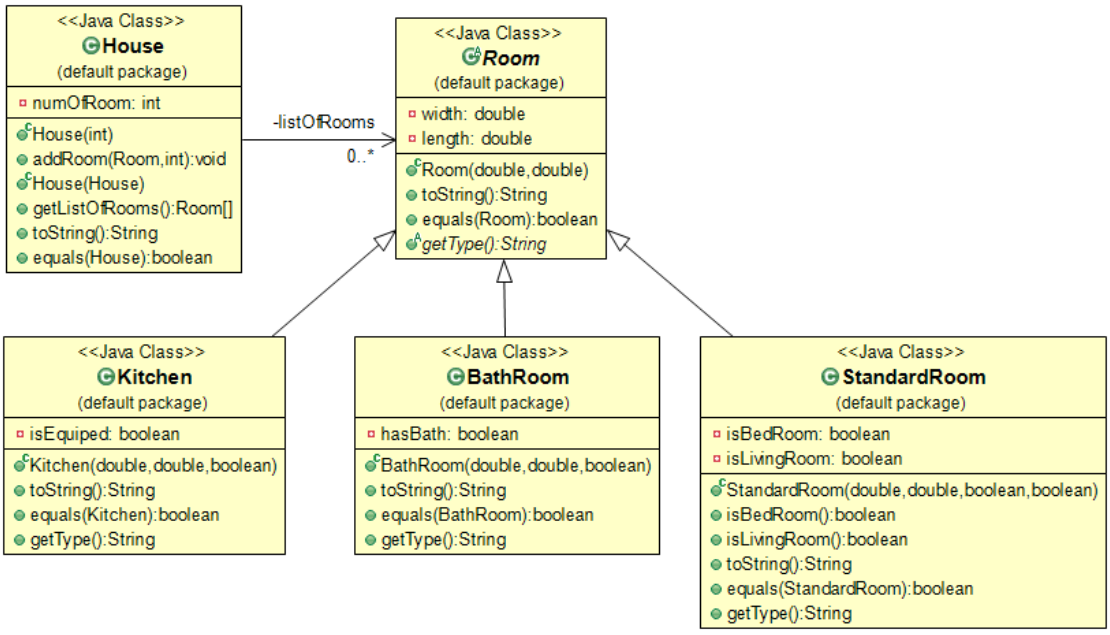
Problem

We need to propose an appropriate **Java** implementation for the following **Uml Class Diagram**.



This diagram is based on **5** classes: **House**, **Room**, **Ktichen**, **BathRoom** and **StandarRoom**.

- A **House** may contain **many Rooms** and **each Room** has **2** states **width** and **length.**
- A **Room** can be a **StandardRoom**, a **Kitchen** or a BathRoom**.**
- A **Kitchen** has one additional **boolean state** named **isEquiped (مجهزة = true** or **false)**
- A **BathRoom** has one additional **boolean state** named **hasBath (حوض إستحمام = true** or **false)**
- A **StandarRoom** has 2 additional **boolean states** named **isBedRoom (غرفة نوم = true** or **false)** and **isLivingRoom (صالون =true** or **false)**
- **getType() methods** return a String as follow :
  - In case of StandardRoom → **if** (isLivingRoom==true) **return** "***LivingRoom***".
    if (bedRoom==true) **return** "***BedRoom***".
  - In case of **Kitchen** → return "***Kitchen***".
  - In case of **BathRoom** → return "***BathRoom***".

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Q. 1 **[CLO 3] [9 Marks]**

a) **Give the name** of the **relation** between **class House** and **class Room**?

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b) **Give the name** of the **relation** between **class Room** and **class Kitchen**?

.....

c) **Give the type** of the **second constructor** in the class **House**?

.....

d) Why the **function getType()** in **class Room** is declared **Abstract**?

.....

e) **getType()** performs a **single behavior** but with **different ways**. **Give the name** of such **java concept**?

.....

f) Why **Class Room** is declared **Abstract**?

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Q. 2 **[CLO 1] [7 Marks]**

- Write the class **Room.java (7 pts)**

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Q. 3 **[CLO 2] [17 Marks]**

a) Write the class **Kitchen.java (5 pts)**

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b) Write the class **BathRoom.java (5 pts)**

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c) Write the class **StandarRoom.java (**

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d) Write the class **House.java (6 pts)**

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Q. 4 **[CLO 4] [7 Marks]**

- Write Java Statements allowing to :

a) Create a **StandardRoom** object **s,** a **Kitchen** object **k** and a **BathRoom** object **b**. **(1.5 pts)**

- s=[4, 6, **false**, **true**];
- K=[4, 4, **false**];
- b=[3, 3, **true**];

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b) Create a **House** object **h1** composed of **s**, **k,** and **b** **by using the first constructor** in **class House**. **(2 pts)**

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c) Create a **House** object **h2** as a **copy** of **h1** **by using the third constructor** in **class House**. **(0.5 pts)**

.....

d) Write the **Java** Statement to compare if object **h1** is equal to object **h2** **(1 pts)**

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e) Give the **output** of the following Java Sub-Program. **(2 pts)**

```
House[] listOfHouse = new House[2];
listOfHouse[0] = h1;
listOfHouse[1] = h2;

for (int i = 0; i < listOfHouse.length; i++) {
  int numOfK = 0;
  int numOfS = 0;
  int numOfB = 0;

  House h = listOfHouse[i];
  Room[] listOfRooms = h.getListOfRooms();

  System.out.printf("_________ House n= %d _________\n", i + 1);

  for (int j = 0; j < listOfRooms.length; j++) {

        if (listOfRooms[j] instanceof StandardRoom) numOfS++;
        if (listOfRooms[j] instanceof Kitchen) numOfK++;
        if (listOfRooms[j] instanceof BathRoom) numOfB++;
  }

System.out.printf("StdRoom %d, Kitchen=%d, BathRoom=%d  \n\n",numOfS, numOfK, numOfB);

}
```


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Good Luck **End of Exam**