MAASAI MARA UNIVERSITY

UNIVERSITY EXAMINATIONS

2018/2019 ACADEMIC YEAR

(REGULAR)

SCHOOL OF SCIENCE AND INFORMATION SCIENCES

DEPARTMENT OF COMPUTING AND INFORMATION SCIENCES

FOURTH YEAR FIRST SEMESTER EXAMINATION

FOR DEGREE IN COMPUTER SCIENCE

COURSE CODE: COM – 413

COURSE TITLE: OBJECT ORIENTED PROGRAMMING

DATE: 06TH December 2018   **TIME: 11:00-13:00(2 HRS)**

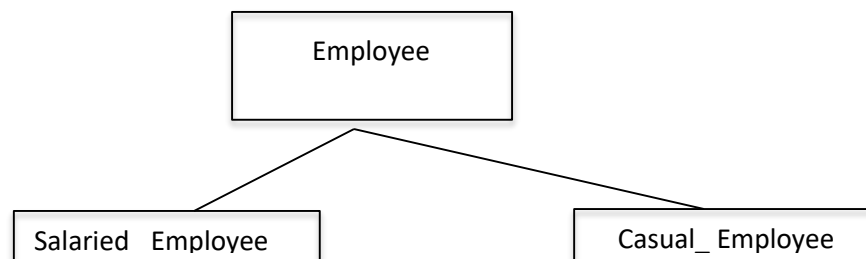## INSTRUCTION TO CANDIDATE

   i.   Question ONE in section A is compulsory
  ii.   Answer any OTHER Two (2) Questions from section B
 iii.   Use diagrams, example and illustration where necessary
  iv.   All questions in section B have equal marks

SECTION A [30 MARKS]

QUESTION ONE [30 MARKS]

a. In relation to Java language, give the meaning of the following terms as used to describe object oriented programming languages
   i. Exclusivity of objects **[2 MARKS]**
   ii. Dynamic binding **[2 MARKS]**

b. Given a class called Sphere with private data member radius. Define a parameterized constructor that lets the client set the radius **[2 Marks]**

c. Using an example to explain the message passing syntax as used in the Java language **[2 Marks]**

d. Give the main use of a constructor method and demonstrate how it is involved in Java **[3 Marks]**

e. Using an example, describe the three parts of a CRC card **[3 Marks]**

f. In relation to object oriented programming, what is cohesion? How can we use classes to maximize cohesion? **[3 Marks]**

g. Explain how multiple inheritance may be implemented in Java
   [3 Marks]

h. Using an example, differentiate between the internal from the external views of a class **[2 Marks]**

i. Explain TWO disadvantages of using inheritance **[2 Marks]**

j. In relation to Java language, what is a package? List 6 Java packages.
   [3 Marks]

k. Given the following inheritance hierarchy, assume a method Cal_Salary() to explain the concept of polymorphism **[3 Marks]**

```
                    ┌─────────────┐
                    │  Employee   │
                    └─────────────┘
                     /           \
        ┌─────────────────┐   ┌─────────────────┐
        │ Salaried Employee│   │ Casual_ Employee│
        └─────────────────┘   └─────────────────┘
```

SECTION B [40 MARKS]

QUESTION 3 [20 MARKS]

a) In terms of state and behavior, use an example to explain the statement
" a superclass is a subset of any of its subclasses"   **[4 Marks]**

b) Give three guidelines that are used in choosing names, methods and
variables in Java   **[3 Marks]**

c) Use the arithmetic operator +(plus) to explain the concept overloading

[2 Marks]

d) Explain the use of viewer classes and give an example of a viewer class
in Java.   **[3 Marks]**

e) Use an example from your group project to explain the concept of
initialization and Instantiation   **[5 Marks]**

f) With appropriate Use an example (write code in Java) to illustrate the
relationship between an object and a class in object oriented design

[2 Marks]

QUESTION 4 [20 MARKS]

a) Explain how scenarios may be used to deal with ambiguity in
specification requirements.   **[4 Marks]**

b) Use examples to differentiate specialization from specification as used
in object oriented programming   **[4 Marks]**

c) Explain three memory strategies that may be used to allocate memory
space for classes in object oriented programming   **[6 Marks]**

d) Briefly explain the meaning of the following terms as used in object
oriented programming languages
    (i)   Polymorphism   **[2 Marks]**
    (ii)   Encapsulation   **[2 Marks]**
    (iii) Abstraction   **[2 Marks]**

QUESTION 5 [20 Marks]

(a) Read the case below and answer the questions that follow
A hospital has 12 wards , each containing up to 10 patients .Patient have
only one doctor allowed to prescribe drugs for them .Doctors do their

rounds once a day and prescribe drugs by prescription to their patients as they see fit. A prescription identifies the drug by code and name, since different drugs may have similar names, which the pharmacy could confuse, doctors' handwriting being what it is. The prescription also contains the recommended dosage, and the length of treatment. The pharmacist types out a label for the drugs container, incorporating notes about the drugs listed in the catalogue provided by the drugs supplier. After the pharmacist has prepared the drugs, they dispatch them via hospital porter to the appropriate patient. Once a month the pharmacy prepares several reports for the hospital management committee. These include one which shows the value of drugs, issued by each doctor

(i) Identify 2 candidate classes and two operations **[2 Marks]**
(ii) Assuming that the above case will form one of the components of a hospital management system, give this component a meaningful name and draw a CRC card for it. You may assume the existence of the 'Admissions' Component (processes the admissions of patients into wards) and ' Finance' Component (keeps records of all the financial transactions of the patients). **[3 Marks]**

(iii)
Given the Java code below,
Public class Window {
int height;
int width;
    public void draw() {
    . . .
      }
. . .
}
Puplic class TextWindow extends Window {
    int cursorLocation;
    String contents[];
      . . .

```
   Public void draw() {
     . . .
     }
  Window y;
   TextWindow x;
   . . .
   }
```

i.   What is the effect of using keyword 'extends'   **[3 Marks]**
ii.   What is the difference between overloading and overriding?
      Which of the two can be found in the code above? Why?**[4 Marks]**
iii. Identify the method(s) and objects(s) found in this code.

[4 Marks]
iv. Write the constructor of the class Window   **[4 Marks]**