

25



(KNOWLEDGE FOR DEVELOPMENT)

**KIBABII UNIVERSITY
(KIBU)**

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATIONS
SECOND YEAR FIRST SEMESTER**

**FOR THE DEGREE IN
(INFORMATION TECHNOLOGY/ COMPUTER SCIENCE)**

COURSE CODE: BIT 211

COURSE TITLE: OBJECT ORIENTED PROGRAMMING II

DATE: 02/02/2021

TIME: 2.00 P.M. - 4.00 P.M

INSTRUCTIONS

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a. Using relevant examples, define the following terms and concepts as used in study of OOP.
- i Interface [2 marks]
 - ii Abstract class [2 marks]
 - iii Exception [2 marks]
 - iv Inheritance [2 marks]
- b. Give a definition of a class structure in java. [2 marks]
- c. Using relevant java code differentiate between Accessor (getters) methods and mutator (setters) methods [4 marks]
- d. Using a loop of your choice, write a java code segment that draws a triangle shown in Figure 1. [4 marks]

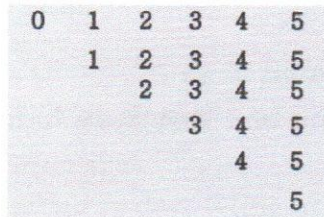


Figure 1: Triangle of Digits

- e. (i) What is the output of the following code [2 marks]

```
char symbol[3]={'a','b','c'};
for (int index=0; index<3; index++)
    System.out.println( symbol [index]);
```

- f. Create a class to represent a Circle. Your class should contain instance variables for the radius, a parameterized constructor, set and get methods for the radius, as well as member method to calculate the area of the circle. Include in your class the method toString that returns the string "Circle object" when called. [6 marks]
- g. Using relevant java codes, differentiate between an interface and an abstract class. [6 marks]

QUESTION TWO [20 MARKS]

- a. i. What is the meaning of a generic class? [2 marks]

- ii. Define a generic class Speaker having instance variable volume of generic type. Include a method to setVolume and getVolume. [4 marks]
- iii. Write a code extract that will create and instantiate two objects of type Volume and pass volume as "High" and 60 respectively. [4 marks]

a. Figure 2 shows the structure of an array named marks in memory

45	78	72	71	57	70	58	80
34	56	76	24	54	75	49	64
60	64	65	42	63	73	80	67

Figure 2: Structure of an array in memory

Write a java code excerpt that will:

- i Create and initialize the structure as in figure 2 above. [3 marks]
- ii Compute Total and mean of each row and populate as new two columns on right-hand-side of the structure. [4 marks]
- iii Sort the marks in descending order. (Hint use the sort () method of function) [3 marks]

QUESTIONTHREE [20 MARKS]

- a. Differentiate between inheritance and composition. [4 marks]
- b. An organization has two types of employees: regular and adhoc. All Employees have a name, an employment_Number and get salary. Regular employees get a salary which is basic_salary + commuter_allowance + house_allowance, where commuter_allowance is 10% of basic_salary and house_allowance is 30% of basic_salary. Adhoc employees are daily wagers who get a salary which is equal to number_of_days * Wage. The class hierarchy diagram is as in the Figure 3.

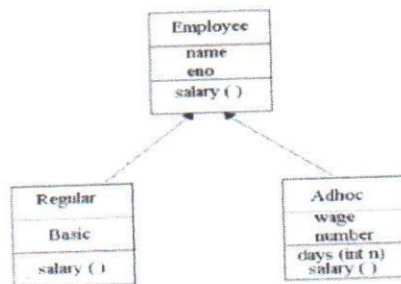


Figure 3: Employees class hierarchy diagram

- i. Give java definition of the classes shown in Figure 3 above. [6 marks]
- ii. Define the constructors such that when a regular employee is created, basic (basic_salary) must be a parameter and when Adhoc employee is created, wage must be a parameter. [3 marks]
- iii. Define the set and get methods for each class. The set method days () updates number (number of hours) of the Adhoc employee. [3 marks]
- iv. Write a Driver program to test the capabilities of the classes. [4 marks]

QUESTION FOUR [20 MARKS]

- a. Explain the meaning of the following terms and concepts as used in oop.
 - i Data abstraction [2 marks]
 - ii Polymorphism [2 marks]
 - iii Late binding [2 marks]
- b. A week has got seven days. The day are numbered from 1-7. Each day has a name with day 1 being Sunday and day 7 corresponding to Saturday. The names of the days are stored in a private static array **names** whose structure in memory is shown in Figure 4.

Names →

Sun	Mon	Tue	Wed	Thu	Fri	Sat
-----	-----	-----	-----	-----	-----	-----

Figure 4: Structure of an array in memory

- i Write a line of code that initializes the array **names** with names shown in Figure 4 such that is accessible to all object of the class **Week**. [3 marks]
- ii Write a method definition that will initialize a day of the week. Day is initialized to a number between 1 and 7. [2 marks]
- iii Write a method definition that returns the number of current day of the week. [2 marks]
- iv Write a method definition that returns the name that corresponds to the current day of the week. If current day is 1, this method returns **Sun**. [Don' t use decision statements]. [2 marks]
- v Write a method definition that returns the name of the next day. [2 marks]
- vi Write a method definition that returns the name of the previous day. [Use decision making constructs sparingly]. [3 marks]

QUESTION FIVE [20 MARKS]

- a. A student is a person who has registration number and a programme of study in addition to Personal attributes. A Person has name, gender and date of birth. A person Name consists of first name and last name, both as strings. A Date is made up of day, month and year.
- i Write the definition of the class Date. [3 marks]
 - ii Write the definition of the class Name. [3 marks]
 - iii Write the definition of the class Person. [3 marks]
 - iv Write the definition of the class Student. [3 marks]
- b. Explain the meaning of the following concepts as used in the Graphical User Interface.
- i What is event driven programming? [1 mark]
 - ii Event delegation [1 mark]
- c. The volume (V) of a Sphere is given by $\frac{4}{3}\pi r^3$ where (π) is pie which is constant, (r) is radius of the cylinder the Sphere. Write a program that takes the values of r, as input and value of PI from Math class compute and display the volume (V) as an output. Use the JOptionPane for both inputs and output routine. [6 marks]