KASNEB

CICT PART II SECTION 4

OBJECT ORIENTED PROGRAMMING

THURSDAY: 24 November 2016. **Time Allowed: 3 hours.**

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

ALL programs written should be in Java object oriented programming language.

QUESTION ONE

(a) Explain the following object oriented programming terms:

(i) Persistence. (2 marks)

(ii) Collaboration. (2 marks)

(iii) Serialisation. (2 marks)

(b) (i) Describe a "parameterized constructor" as used in Java programming language. (2 marks)

(ii) Create a Java program to demonstrate the use of the parameterized constructor in (b) (i) above. (6 marks)

(iii) Outline two rules for creating Java constructors. (2 marks)

(c) Differentiate between the two types of streams used in Java programming language. (4 marks)

(Total: 20 marks)

QUESTION TWO

(a) Highlight the purpose of each of the following components in object oriented programming:

(i) Interface. (2 marks)

(ii) Package. (2 marks)

(iii) Instance. (2 marks)

(iv) Operators. (2 marks)

(b) Dismax Software Solutions Company Ltd. intends to switch from structured programming to object oriented programming.

Explain two benefits that the company is likely to derive from this decision. (4 marks)

(c) Citing the purpose, identify three types of non-access modifiers provided by Java programming language. (3 marks)

(d) Write a program that could be used to output the factorial of 10 numbers from 0 to 9. The program should call a method for calculating factorial of the numbers. (5 marks)

(Total: 20 marks)

QUESTION THREE

(a) Explain the importance of the following concepts in object oriented programming:

(i) Message passing. (2 marks)

(ii) Static methods. (2 marks)

(b) (i) Differentiate between "composition" and "inheritance" in the context of object oriented programming. (2 marks)

(ii) A class named "Author" is designed as shown in the diagram below:

Author
– name: string – email: string – gender: char
+ Author (name: string, email : string, gender : char) + get-Name ( ) : string + get-Email ( ) : string + set-Email (email : string) : void + get-Gender ( ) : char + toString ( ) : string

Required:
Describe any three members within the class. (6 marks)

(c) The table below consists of superclass and subclass instance and static class methods.

	Superclass Instance Method	**Superclass Static method**
Subclass Instance Method	(a)	(b)
Subclass Static Method	(c)	(d)

The subclass methods define the superclass methods with the same signature.

Required:
Complete the cells (a), (b), (c) and (d) in the table above with the appropriate behaviour of the subclass to the superclass of either "Overrides", "Generates a compile-time error" or "Hides". (4 marks)

(d) Write the expected output of the program extract below:

```
int a = 2 ;
int b = 3 ;
double x = – 191.635 ;
double y = 45.375 ;
system.out.println ("Absolute value of:" + x + "is:" + math.abs(x));
system.out.println ("The result is:" + math.pow (a,b));
system.out.println ("Highest is:" + math.ceil (y));
system.out.println ("Value is:" + math.min (x,y));
```

(4 marks)
(Total: 20 marks)

QUESTION FOUR

(a) Analyse six fundamental drawbacks to the use of templates in object oriented programming. (6 marks)

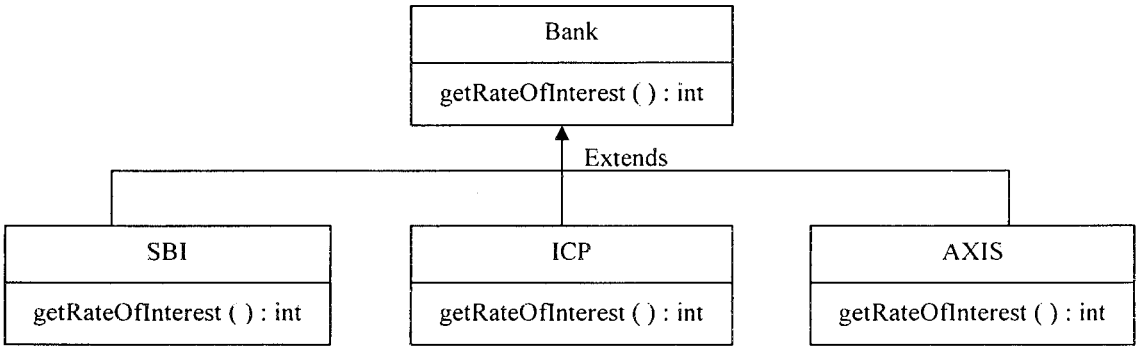
(b) (i) Rewrite the classes below using the concept of inheritance:

```
class student {
    public int age ;
    public String name ;
    public int grade ;
}
class Lecturer {
    public int age ;
    public String name ;
    public int salary ;
}
```

(4 marks)

(ii) State the advantage of using the concept in (b) (i) above. (2 marks)

(c) The figure below shows a Bank class that provides functionality to calculate the rate of interest on a loan amount. The rate of interest charged by three banks namely; SBI, ICP and AXIS are 8, 12 and 16 per cent per annum respectively.



Required:
Write a Java program to implement the above classes and to output the interest rate charged by each bank. (8 marks)
(Total: 20 marks)

QUESTION FIVE

(a) "Java is a "pass by value" as opposed to "pass by reference" programming language".

In the context of parameter passing, argue the case for the above statement. (4 marks)

(b) Summarise four differences between "heap memory" and "stack memory" as used in Java programming. (4 marks)

(c) A variable provides a named storage that could be manipulated by a program.

With reference to the above statement:

(i) State two types of variables other than local variables that could be used in a Java program. (2 marks)

(ii) Highlight in each case three properties of the types of variables named in (c) (i) above. (6 marks)

(iii) Write a Java program to demonstrate the use of local variables.

Ensure that you indicate the output of the program. (4 marks)
(Total: 20 marks)

.....