NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF ELECTRONIC ENGINEERING

BACHELOR OF ENGINEERING (HONS) DEGREE

TEE 3132 SOFTWARE ENGINEERING
JANUARY 2013
Duration of Examination – 3 Hours

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of 4 printed papers and 7 questions.
2. Answer any **FIVE** questions.
3. Each question carries 20 marks.
4. Start the answers for each question on a fresh page.
5. Use relevant concrete examples to support your answers.
6. All programming questions refer to the **Java** programming Language

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QUESTION 1

Given the array
char [ ] chars ={ 'I', ' ', 'a', ' m', ' ', 'a ', ' S' ,' ' , 't ' 'u ', 'd ' , 'e ' , ' n' , 't ' };
a) State the number of elements in the above array. [2]

b) Write the java statement that will print out the **number of elements** in the array. [2]

c) Write the **enhanced-for** loop that will print out the above array's elements and display the output as a **properly constructed** sentence. [6]

d) Provide an alternative declaration (without assignment) for the above array. [3]

e) Show the element values following the declaration at d) above. [7]

QUESTION 2

a) i) Write a program that will count repeated consecutive characters in a given string and prints out the number of such pairs encountered.
A typical print out would be: **"There are 9 double consecutive characters in the string Miss Chattanooga Choo Choo Hotel Tennessee :: "** [7]

ii) What would be the effect, on the output of using a **"tttt"** in the second string? [3]

b) Write the **while** equivalent for the following **for** loop program.

```
for (int number = 1; number <= 12; number++) {
   System.out.println(number + " squared is " + (number * number));
}
```

[4]

d) Give a sample output from executing the following statements:

```
int count = 0; for(; count<6;) {
System.out.println("The value of " +count+ " is " + 100*Math.random());

}

int x=4. y= 10, max= (x>y)? x:y;

System.out.println("The value of max is: " + max);
```

[6]

QUESTION 3

a) Using some method definition example explain what a method signature is. [4]
b) Using relevant java statements illustrate overriding and overloading. [4]
c) Explain the difference between the two concepts with respect to java **method signatures**. [4]

d) Using a field and method example from the Math class, demonstrate how the **final** and **static** keywords are used. [4]

e) Why are the Math class fields declared with the **public** access modifier? State a major disadvantage of using such a modifier for field access. [4]

QUESTION 4

a) Using the Math-random ( ) method, write a coin tossing game in which a player predicts the outcome by typing in a character: 'H' for heads and 'T' for tails. The program then simulates **30** simultaneous tosses of four using fair "coins". To win all the four coins must display heads or tails and match the predicted character, with the game then **terminating.**
The player is awarded points equal to four times the difference between the total number of chances **plus one** and the number of tosses it took to win. In other words if the prediction is arrived at on the **first** toss the player will be awarded **120 points** whilst if this happens on the **eleventh** throw **80 points** and so forth with 4 **points** on the last throw.
The program must fully communicate with user input using the **Scanner** class and screen printouts and eventually print out the full results including the toss number that brought out the prediction and the number of points awarded. **[12]**

b) List the exceptions that are likely to occur in the above program. **[4]**

c) For the Animal super class and its sub classes Mouse and Cat (whose sub classes are Lion and Tiger) determine which of the following **java statements** are **true or false.**

```
Animal  rights = new Lion ();
Mouse trap = new Animal ();
Cat lioness  = new Tiger ();
Mouse mouse  = new Lion ("Tiny");
```
[4]

QUESTION 5

a) What is an exception? **[2]**
b) State the difference between checked and unchecked exceptions. **[4]**
c) Provide three examples for checked and unchecked exception classes each all of which should be subclasses of the Exception class. **[6]**
d) Describe using sample code how the Exception class and at least two of its java exception subclasses may be organized in a program so as to cater for specific exceptions. **[6]**
e) What would be the effect of arranging the program otherwise? **[2]**

QUESTION 6

a) Briefly outline 8 characteristics of the Java language. [8]

b) Using the Math.random( ) method, write a program **Lotto.java** that outputs **six unique** integers between **1** and **36**. At the end of a draw the program should print out a screen similar to the one below
The lotto numbers drawn for this week are : 13-7-23-30-1-15 [12]

QUESTION 7

a) Determine the exact output of the following Java program which was run using the Eclipse IDE. [8]

```
package exercises2012;

public class IfElseNests {

public static void main(String[] args) {

int i =1;
        while( i <= 20){
                if(i == 3){  i+=2; continue;}
                System.out.println(i);
                  i++;
                   if((i%3)==0)  { i++;}
                        // if(i>10)        {break;}
                }
                        }       }
```

b) Write out the output be if the following were done independently **(one step at a time)**

i) the **//** if(i>10) {break;} statement was uncommented [4]

ii) the **continue**; statement was removed. [4]

iii) the **3** in **if**((i%3)==0) was replaced by a **2** [4]

END OF PAPER