**SECTION: A [45 MARKS]**

**Use the grid, provided at the end of the question paper, to answer SECTION A.**

**QUESTION 1:**

**CROSS (X) THE CORRECT ANSWER only on the answer grid.**

**TRUE (T) AND FALSE (F)**

* 1. Type casting forces a value of one data type to be used as a value of another type.
  2. Integer division provides a result with no fractional part.
  3. Constant describes values that can be changed during the execution of an application.
  4. A Boolean variable always contains a TRUE value.
  5. A local variable is known only within the boundaries of a method.
  6. An instantiation of a class is an object.
  7. A class client is an application or class that instantiates objects of another pre-written class.
  8. A black box is a device you can use only if you understand how it works.
  9. Mutator methods retrieve values.
  10. Overloading involves using one term to indicate diverse meanings.
  11. The java.lang package provides classes that are fundamental to the design of the Java programming language, and must be explicitly imported into every Java program.
  12. The prefix ++, also known as the prefix increment operator, evaluates a variable, and then adds 1 to the variable.
  13. The do….while loop executes a loop body at least one time.
  14. A sentinel is a value that stops a loop.
  15. An infinite loop is a loop that never ends.

**Answer this question on the answer grid provided. CROSS (X) THE CORRECT ANSWER.**

**QUESTION TWO [15 MARKS]**

**MULTIPLE CHOICE**

**Answer this question on the answer grid provided. CROSS (X) THE CORRECT ANSWER.**

2.1 In Java, what is the value of 2 + 7 \* 4 / 2?

a. 18 c. 0

b. 16 d. 20

2.2 Which assignment statement is correct in Java?

a. char aChar = 5.5;

b. char aChar = “J”;

c. char aChar = ‘@’;

d. Two of the preceding answers are correct.

2.3 Most class data fields are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

a. private c. static

b. public d. final

2.4 Which of the following statements determines the square root of a number and assigns it to the variable S?

a. S = sqrt(number); c. number = sqrt(S);

b. S = Math.sqrt(number); d. number = Math.sqrt(S);

2.5 What is the output of the following code segment?

T = 7;

if (T > 7)

{ System.out.print(“AAA”);

System.out.print(“BBB”);

}

a. AAA c. AAABBB

b. BBB d. no output

2.6 Assuming a variable f has been initialized to 5, which of the following statements sets g to 0?

a. if (f > 6 || f == 5) g = 0; c. if (f >=0 || f < 2) g = 0;

b. if (f < 3 || f > 4) g = 0; d. all of the statements sets g to 0

2.7 Which of the following statements correctly outputs the names of voters who live in district 6 and all voters who live in district 7?

a. if (district == 6 || 7)

System.out.println(“Name is “ + name);

b. if (district == 6 || district == 7)

System.out.println(“Name is “ + name);

c. if (district == 6 && district == 7)

System.out.println(“Name is “ + name);

d. all of the above

2.8 Which of the following displays “Error” when a student ID is less than 1000 or more than 9999?

a. if (studentID < 1000)

if (studentID > 9999)

System.out.println(“Error”);

b. if (studentID < 1000 && studentID > 9999)

System.out.println(“Error”);

c. if (studentID < 1000)

System.out.println(“Error”);

else

if (studentID > 9999)

System.out.println(“Error”);

d. all of the above

2.9 What is the output of the following code?

b = 1;

while (b < 4)

System.out.print(b + “ “);

1. 1 c. 1 2 3 4
2. 1 2 3 d. 1 1 1 1 1 1 .…

2.10 What is the output of the following code?

b = 1;

while (b < 4)

{ System.out.print(b + “ “);

b = b + 1;

}

1. 1 c. 1 2 3 4
2. 1 2 3 d. 1 1 1 1 1 1 .…

2.11 What is the output of the following code?

for (a = 0; a < 5; ++a)

System.out.print(a + “ “);

1. 0 0 0 0 0 c. 0 1 2 3 4 5
2. 0 1 2 3 4 d. no output

2.12 What is the output of the following code?

for (x = 1; x > 3; ++x)

System.out.print(x + “ “);

1. 1 1 1 c. 1 2 3 4
2. 1 2 3 d. no output

2.13 What does the following program segment output?

d = 0;

do

{

System.out.print(d + “ “);

d++;

} while (d < 2);

1. 0 c. 0 1
2. 0 1 2 d. no output

2.14 What does the following program segment output?

for (m = 0; m < 3; ++m)

for (n = 0; n < 2; ++n)

System.out.print( ( m \* n ) + “ “);

1. 0 0 0 1 0 2 c. 0 0 0 1 0 2 0 3
2. 0 1 0 2 0 3 d. 0 1 1 0 1 1 2 0 2 1

2.15 for (k = 11; k > 0; k = k -2)

System.out.print( (k % 2) + “ “);

1. 1 1 1 1 1 1 c. 2 2 2 2 2 2
2. 0 0 0 0 0 0 d. 1 0 1 0 1 0

**QUESTION THREE [15 marks]**

**Answer this question on the answer grid provided only.**

3.1 If x = 11, y = 3, z = 8. Evaluate the following expression: (2)

(x + z) % y

3.2 Consider the following statement:

String str = “If music be the food of love, play on!”;

String myStr = “Annette”;

**char** ch;

**int** len;

**int** position;

3.2.1 What value is stored in ch by the following statement? (1)

ch = str.charAt(1);

3.2.2 What value is stored in len by the following statement? (1)

len = str.length();

* + 1. What value is stored in position by the following statement? (1)

position = str.indexOf(‘s’);

* + 1. What is the output of the following statement? (1)

System.out.println(myStr.replace(‘n’,’X’));

* 1. What is the value of alpha after the following Java code executes if the input is 5? (Assume that all variables are properly declared.) (1)

alpha = Integer.parseInt(keyboard.nextLine());

**switch** (alpha)

{

**case** 3: alpha = alpha + 3;

**case** 1: alpha++; **break**;

**case** 5: alpha = alpha + 5;

**case** 4: alpha = alpha + 4; **break;**

}

* 1. What is the output of the following code if the input is 23 37 20 6 -1 ?

(Assume all variables are properly declared.) (2)

sum = 0;

num = Integer.parseInt(keyboard.nextLine());

**while**(num != -1)

{

sum = sum + num;

num = Integer.parseInt(keyboard.nextLine());

}

System.out.println(“Sum = “ + sum);

* 1. Consider the following method: (2)

**public static int** suspense(**int** x, **double** y, **char** ch)

{

**int** u;

**if**(‘B’ <= ch && ch <= ‘K’)

**return** (2 \* x + (**int**) (y));

**else**

**return** ((**int**) (2 \* y) – x);

}

What is the output of the following Java statement:

System.out.println(suspense(4, 2.6, ‘C’));

* 1. Suppose list is an array of six components of the type **int**. What is stored in list after the following Java code executes? (2)

list[0] = 5;

**for**(**int** i = 1; i < 6; i++)

{

list[i] = i \* i + 5 – list[i – 1];

}

3.7 Consider the following declaration: (2)

**int**[ ][ ]alpha = **new int**[3][3];

What is stored in alpha after the following statement executes?

**for**(x = 0; x < 3; x++)

**for**(y = 0; y < 3; y++)

alpha[x][y] = x \* y;

**SECTION B [55 MARKS]**

**Write COMPLETE Java Programs for both questions in SECTION B in your answer booklet.**

**QUESTION FOUR [30 Marks]**

Write a program that will allow the user to store the names of candidates in a local election, and the number of votes cast by various districts for the candidates. Your program will assist in determining the total votes cast for each candidate, as well as who won the local election.

Create the following methods for the program:

4.1 Create a class called Election. (1)

4.2 Declare a 1-D array called **names** that will store the following 5 candidates names. The names are Thabo, Khan, Muzi, Julius, and Jacob (2)

4.3 Declare a 2-D array called **votes** to store the number of votes received by each candidate for each of the 3 districts. Also, create another 1-D array called **total** that will later be used to store the total votes for each candidate. (2)

4.4 Write a method called **input** to enter via the keyboard the votes cast from each of the 3 districts for the 5 candidates. The prompt should display the name of the candidate for whom the number of votes is to be entered. (4)

4.5 Write a method called **findHighest** to find and display the highest number of votes by a district for a candidate, as well as the district number, and the name of the candidate that received the most votes by an individual district. (4)

4.6 Write a method called **calculateTotal** to determine the total number of votes that each candidate received from all 3 districts. Store the total votes for each candidate in the **total** array. (3)

4.7 Write a method called **output** to display the voter statistics as shown below. The data must be displayed in a tabular format. (5)

Candidate District 1 District 2 District 3 Total Votes

Thabo 3000 2000 5000 10000

Khan 500 800 700 2000

Muzi 5000 3000 4000 12000

Julius 4000 3000 2000 9000

Jacob 2000 1500 500 4000

4.8 Write a method called **searchName** to input the name of a candidate from the keyboard. Find and output the total votes for this candidate. Note, if the name of the candidate is not found, then output the message: Candidate was not found. (6)

4.9 Write the test driver to call up the methods. (3)

**QUESTION FIVE [25 Marks]**

**You have been approached by a local gym to develop a Fitness Tracker application to assist gym members to keep track of their fitness activities.**

5.1 Create a Fitness Tracker class that includes data fields for a fitness activity (String), the number of minutes spent participating in the activity, and the date (String) when the activity took place. Name your data fields as activity, minutes and date respectively. (3)

5.2 Create mutator methods for all class attributes except points. (3)

5.3 Create accessor methods for all class attributes. (3)

5.4 Create a default constructor that automatically sets the activity to “running”, the minutes to 0, and the date to 1 January 2016 and points to 0. (2)

5.5 Create an additional overloaded constructor for the fitness class that will receive parameters for each of the data fields and assigns them appropriately. (3)

5.6 Create a toString method for the Fitness Tracker class to display all data field values with appropriate labels. Each value will be displayed on a new line. (3)

5.7 Write a method named calculatePoints that will calculate and set the points based on the minutes of activity by the member. Minutes of zero activity will result in 0 points, whilst minutes of activity more than 0, but less than or equal to 30 will give the member 50 points, and exercise in excess of 30 minutes will result in 100 points. (3)

5.8 Create an application to test the FitnessTracker class. (5)

Create 2 objects of the Fitness Tracker class called member1 and member2.

The data fields of member1 object will receive the default constructor values.

Member2 object must have hard-coded values of “cycling”, 30, “4 October 2016” for each of its data fields.

Calculate the points for member2 object only.

Display the values for both objects using the toString method.