



The University of Fiji

Undergraduate Programme
Department of Computer Science and Mathematics
Semester 1 Year 2019

FINAL EXAMINATION PAPER

ITC106 Programming Concepts and Constructs

Important Instructions to Students:

1. Read the questions, instructions carefully and answer the questions.
2. You are allowed an **extra 10 minutes reading time** (during this time, you are not allowed to write with pen) and **180 minutes (3 Hours) to complete this paper**.
3. Silent, non-programmable calculators are allowed, but not supplied.
4. Write all your answers in the answer booklet provided. If you need extra sheets, please ask from the supervisor. Write your name, course code and student identification number in the answer booklet and in the attendance sheet.
5. **This Final Course Examination Paper is worth 100 marks contributes 50% of the total course assessments.**
6. This paper contains two (2) sections A and B. All questions are compulsory to answer.
7. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
8. This is a **Closed Book Examination**. The University views plagiarism, cheating and dishonest practice as serious offences and if found, offenders are penalized.

Examination Paper Content (Format):

<u>Section</u>	<u>Question</u>	<u>Content</u>	<u>Marks</u>	<u>Suggested Time</u>
A	1-30	Multiple Choice	30	45 minutes
B	1-15	Programming Questions	70	135 minutes
		TOTAL	100	180 Minutes

1. Using the object-oriented approach, a(n) ____ is a combined set of attributes and actions.
 - a. Algorithm
 - b. Abstraction
 - c. Prototype
 - d. Class
2. During which phase of software development should questions be asked to clarify the problem definition?
 - a. analysis
 - b. coding
 - c. design
 - d. testing
3. Packaging data characteristics and behaviors into a class is called ____.
 - a. Inheritance
 - b. Encapsulation
 - c. Instantiation
 - d. Classes
4. Which of the following would display "Good day!" on the screen?
 - a. `WriteLine.Console("Good day!");`
 - b. `WriteLine.Console{"Good day!"};`
 - c. `Console.WriteLine["Good day!"];`
 - d. `Console.WriteLine("Good day!");`
5. A quick way to identify a method is by looking for ____.
 - a. the keyword class
 - b. parentheses
 - c. the { } combination
 - d. a namespace
6. `WriteLine( )` differs from `Write( )` in that ____.
 - a. `WriteLine( )` does not automatically advance to the next line
 - b. smaller items are printed using `Write( )`
 - c. `WriteLine( )` was added in later releases of C#
 - d. `WriteLine( )` advances to the next line after it finishes displaying output
7. The ____ parameter type cannot be used unless the original argument is initialized before it is sent to the method.
 - a. ref
 - b. out
 - c. in
 - d. params

8. Which of the following statements would produce the output shown here?

```
Live
Life to the fullest
```

- a. `Console.WriteLine("Live\nLife to the \tfullest");`
- b. `Console.WriteLine("Live Life to the fullest");`
- c. `Console.WriteLine("Live
Life to the fullest");`
- d. `Console.WriteLine("Live\\nLife to the \\tfullest");`

9. The result of the following expression is ____.

```
double ans, v1 = 45.7, v2 = 10.5;
int v3 = 5;
ans = (int) v1 + v2 / (double) v3;
```

- a. 48.8
- b. 48
- c. 47.1
- d. 47

10. Using the code snippet below, when does Excellent get displayed?

```
if (examScore > 89)
    grade = 'A';
Console.WriteLine("Excellent");
```

- a. whenever the score is greater than 89
- b. never, a syntax error is generated
- c. when the score is less than or equal to 89
- d. every time the program is run

11. What happens when aValue is equal to largest in the program segment below?

```
if (aValue < largest )
    result = aValue;
else
    result = largest;
```

- a. result is assigned aValue
- b. result is assigned largest
- c. nothing, neither assignment statement is executed
- d. an error is reported

12. Which of the following statements about logical operators is correct?

- A. Logical AND yields true if and only if both of its operands are either true or false.
- B. Logical OR yields true if either or both of its operands are true.
- C. Logical OR is represented in C# by `&&`.
- D. Logical NOT is represented in C# by `|`.

13. Looking at the code segment below, if the loop body was changed from counter++; to counter += 5;, how many times would the loop body be executed?

```
int counter = 0;
while (counter < 100) {
    Console.WriteLine(counter);
    counter++;
}
```

- a. 19
 - b. 99
 - c. 20
 - d. 100
14. A company issues \$5,000.00 bonuses at the end of the year to all employees who earn less than \$100,000. Salary and bonus are both defined as double data types. Which of the following selection statements would assign the correct amount to bonus?
- a. if (salary < \$100,000)
 bonus == \$5000;
 - b. if (salary < 100000)
 bonus = 5000;
 - c. if (salary <= 100000)
 bonus = 5000;
 - d. if (salary < 100000);
 bonus = \$5000;

15. Using the nested if program statements, assuming value1 is 100 and value2 is 100, what is stored in largestOne below?

```
if (value1 > value2)
    largestOne = value1;
else
    if (value1 < value2)
        largestOne = value2;
    else
        largestOne = -(value1);
```

- a. value1
 - b. -(value1)
 - c. value2
 - d. not enough information is given
16. Given the code snippet below, how many times will the loop body be executed?

```
for (int i = 0; i < 5; i++)
    Console.Write(i + "\t");
```

- a. 4
- b. 6
- c. 5
- d. 10

17. The nested for statement below displays how many lines of output?

```
int inner;
for (int outer = 0; outer < 3; outer++)
{
    for (inner = 1; inner < 2; inner++)
        Console.WriteLine("Outer: {0}\tInner: {1}", outer, inner);
}
```

- a. 2
- b. 5
- c. 3
- d. 6

18. There are several ways to do a compile-time initialization of arrays. All of the following are valid ways EXCEPT ____.

- a. `int [ ] anArray = {100, 100, 100};`
- b. `int [ ] anArray = new int [ ] {100, 100, 100};`
- c. `int [ ] anArray = new int [3] {100, 100, 100};`
- d. `int [ ] anArray = new int [10] {100, 100, 100};`

19. Using the declaration above for score, what is added to total during the first iteration?

```
int [ ] score = {86, 66, 76, 92, 95, 88};
for (int i = score.Length-1; i > -1; i--)
{
    total += score[i];
}
```

- a. 0
- b. 86, 66, 76, 92 and 95
- c. 88
- d. unknown, because i is not initialized

20. Using the declaration below along with the for loop, what is stored in total after the program statements are executed?

```
int [ ] anotherArray = {6, 7, 4, 5, 6, 2, 3, 5, 9, 1};
int total = 0;

for (int i = 0; i < anotherArray.Length; i++)
    total += i;
```

- a. 10
- b. 48
- c. 2
- d. 45

21. How many components are allocated by the following statement?

```
double [ , ] values = new double [5, 3];
```

- a. 32
- b. 3
- c. 15
- d. 6

22. Given the declaration for values in question 20 above, how would you store 0 in the last physical location?

- a. values[4, 2] = 0;
- b. values = 0;
- c. values[15] = 0;
- d. values[5, 3] = 0;

23. With the following declaration:

```
int [ ] points = {300, 100, 200, 400, 600};
```

The statement points [2] = points [4-1]; will

- a. replace the 200 amount with 3
- b. replace the 200 with 400
- c. replace the 600 and 100 with 2
- d. result in an error

24. What output is produced by the following code?

```
int i;
```

```
int [ ] anArray = new int [5];  
for (i = 0; i < anArray.Length; i++)  
anArray [i] = 2 * i;
```

```
for (i = 0; i < anArray.Length; i++)  
Console.Write(anArray [i] + " ");
```

- a. 2 2 2 2 2
- b. 2 4 6 8 10
- c. 0 2 4 6 8 10
- d. 0 2 4 6 8

25. With the following declaration:

```
int [ , ] points = {{300, 100, 200, 400, 600}, {550, 700, 900, 200, 100}};
```

The statement `Console.WriteLine(points[1, 2] + points[0, 3]);` will

- a. display 900400
- b. display 1300
- c. display "points[1, 2] + points[0, 3]"
- d. result in an error

26. Which of the following would be a valid call to the default constructor for the following class?

```
public class Employee {
```

- a. `Employee employee1 = new Employee( );`
- b. `Employee employee1= new undergrad( );`
- c. `Employee employee1;`
- d. `Employee employee1= new Employee(default);`

27. Which of the following would be the most appropriate way to invoke the `CalculateAvg( )` method found in the `Student` class if an object named `gradStudent` had been instantiated from the class?

```
public double CalculateAvg(double,double)
```

- a. `gradStudent = CalculateAvg(87.2, 90);`
- b. `answer = Student.CalculateAvg(87.2, 90);`
- c. `answer = gradStudent.CalculateAvg(double, double);`
- d. `answer = gradStudent.CalculateAvg(87.2, 90);`

28. Given the following task, which would be the most appropriate method heading?

Results have been calculated for `taxAmount` and `totalSales`. Write a method heading that accepts these values as input for display purposes.

- a. `public DisplayResults(double)`
- b. `public static void DisplayResults( )`
- c. `public static void DisplayResults(double taxAmount, double totalSales)`
- d. `public static void DisplayResults(taxAmount, totalSales)`

29. Properties are associated with the _____ of the class while methods are affiliated with the _____ of the class.

- a. accessors, mutators
- b. objects, instances
- c. data, behaviour
- d. behavior, data

30. Consider the following if statement, which is syntactically correct, but uses poor style and indentation:

```
if (x >= y) if (y > 0) x = x * y; else if (y < 4) x = x - y;
```

Assume that x and y are int variables containing the values 9 and 3, respectively, before execution of the preceding statement. After execution of the statement, what value does x contain?

- a. 9
- b. 1
- c. 6
- d. 27

1. Use the code segment below to answer the following question.

```
Line 1 // Example program – displaying output.
Line 2 using System;
Line 3 namespace Exercisel
Line 4 {
Line 5 class Problem2
Line 6 {
Line 7 static void Main( )
Line 8 {
Line 9     Console.Write("Go ");
Line 10    Console.Write("Laugh ");
Line 11    Console.WriteLine("Out Loud");
Line 12    Console.Write("Think ");
Line 13    Console.Write("Happy");
Line 14 }
Line 15 }
Line 16 }
```

- i. What is produced when you run the following application? [2 marks]
 - ii. What must be changed in the segment of code above to cause all of the output to be displayed on one line? [1 mark]
 - iii. Using the program segment above, identify line number(s) in which each of the following can be found: [3 marks]
 - a. method invocation
 - b. namespace
 - c. class name
 - d. argument to a method
 - e. comment
 - f. identifier
2. Suppose x, y, and z are double variables and x = 2.5, y = 6.9, and z = 10.0. What will be in the memory locations of each of the variables after each of the following statements is executed? (For each exercise, use the original declaration.) [5 marks]
- i. $z *= y++ \% 7;$
 - ii. $x = (\text{int}) y + (14 - z / 7);$
 - iii. $x = z / 3 * --y;$
 - iv. $z /= (\text{int}) y / x;$
 - v. $z = x + y / 4;$

3. Write methods to do the following:

[3+3+2+1+1=10 marks]

- i. Display three full lines of asterisks on the screen using while loop.
- ii. Write two methods Method 1: Ask the user to enter age and return the value of age. Method 2: Accept as an argument the age, call method 1 in this method and display that value along with an appropriate label.
- iii. Accept two floating-point values as arguments. Display the values formatted with two digits to the right of the decimal.
- iv. Accept three int arguments and return their average.
- v. Accept no arguments and return no values. Initialize a local Boolean variable to true. Have the method print the Boolean's value.

4. Assuming a is 5, b is 6, and c is 8, indicate which of the following is true and which ones are false?

[3 marks]

- i. `a == 5;`
- ii. `7 <= (a + 2);`
- iii. `c <= 4;`
- iv. `(1 + a) != b;`
- v. `c >= 8;`
- vi. `a <= (b * 2);`

5. Write conditional expressions to perform the following tests:

[2 marks each = 8 marks]

- i. When amountOwed is greater than 1000.00, display an overdue message.
- ii. When amountOfRain is greater than 5 inches, add 5 to total. When it is between 3 and 5 inches, add 3 to total. When it is less than 3 inches, add 1 to total.
- iii. When middleInitial is equal to the character z, display message "You're one in a thousand"; otherwise, check to see if it is equal to the character 'a'. When it is equal to the character a, display the message "You have a common initial".
- iv. When balance > 100 and transaction < 50, subtract transaction from balance. When balance is not greater than 100, add transaction to balance.

6. Using the following declaration:

[0.5+0.5+0.5+0.5+0.5+2.5 = 5 marks]

```
int [ ] anArray = {34, 55, 67, 89, 99};
```

What would be the result of each of the following output statements?

- i. `Console.WriteLine(anArray.Length);`
- ii. `Console.WriteLine(anArray[2]);`
- iii. `Console.WriteLine(anArray[anArray.Length - 2]);`
- iv. `Console.WriteLine(anArray[2 + 1] * anArray[0]);`
- v. `Console.WriteLine(anArray[1] + 100);`
- vi. Write a for loop to read and display the content of anArray with its index (address) after incrementing the anArray values by 5.

7. Using the following declaration:

[0.5 mark each = 2 marks]

```
int [ , ] anArray = {{34, 55, 67, 89, 99}, {22, 68, 11, 19, 45}};
```

What would be the result of each of the following output statements?

- i. `Console.WriteLine(anArray.Length);`
 - ii. `Console.WriteLine(anArray[1, 2]);`
 - iii. `Console.WriteLine(anArray[0, anArray.GetLength(0) - 2]);`
 - iv. `Console.WriteLine(anArray[0, 2 + 1] * anArray[0, 0]);`
8. Write an application that allows the user to input monthly rainfall amounts for one year. Calculate and display the average rainfall for the year. Display the month name along with the rainfall amount. [2 marks]
9. List at least five issues to consider when you plan the design of graphical user interfaces. [2.5 marks]
10. Write a for loop to display every third number beginning with 10 and continuing through 100. [2.5 marks]
11. Convert the following do...while loop into a for loop and a while loop. Did the logic change? If so, explain. [4 marks]

```
int counter = 100;
```

```
do
```

```
{
```

```
    Console.WriteLine(counter);
```

```
    counter--;
```

```
}
```

```
while (counter > 0);
```

12. Write an application that computes the area of a circle, rectangle, and cylinder. Display a menu showing the three options. Allow users to input which figure they want to see calculated. Based on the value inputted, prompt for appropriate dimensions and perform the calculations using the following formulas:

[6 marks]

Area of a circle = $\pi * \text{radius}^2$

Area of a rectangle = length * width

Surface area of a cylinder = $2 * \pi * \text{radius} * \text{height} + 2 * \pi * \text{radius}^2$

13. Explain the following terminologies in your own terms.

[4 marks]

- A. private member data
- B. local variables
- C. global variable
- D. properties
- E. arguments
- F. parameters
- G. encapsulation
- H. inheritance

14. Write the syntax for the following:

[6 marks]

- A. While loop
- B. For loop
- C. Do while loop
- D. One-way if selection
- E. Two-way if selection
- F. Multiple if selection
- G. Method call
- H. Formal parameter list
- I. Method header
- J. Array
- K. Two dimensional array
- L. Declare a variable

15. Write a program that computes the amount of money the computer club will receive from proceeds of their granola bar sales project. Allow the user to enter the number of cases sold and the sale price per bar. Each case contains 12 bars; each case is purchased at \$5.00 per case from a local vendor. The club is required to give the student government association 10% of their earnings. Display their proceeds formatted with currency. Write appropriate methods for your solution.

[4 marks]

End of Exam