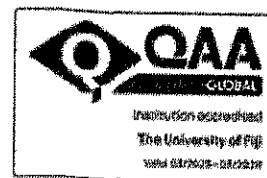


The University of Fiji
(An Entity of Arya Pratinidhi Sabha of Fiji)



SCHOOL OF SCIENCE AND TECHNOLOGY
Semester 2, 2024



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 paper contains two (2) sections A and B. All questions are compulsory to answer.
6. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
7. 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	54 minutes
B	31-45	Programming Questions	70	126 minutes
		TOTAL	100	180 Minutes

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1. Which of the following statements correctly instantiates a House object if the House class contains a single constructor with the declaration `House(int bedrooms, double price)`?

A. `House myHouse = new House();`
B. `House myHouse = new House(3, 125000.00);`
C. `House myHouse = House(4, 200000.00);`
D. Two of these

2. What will the following code print?

```
int x = 5;
if (x == 5 || x == 6)
{
    Console.WriteLine("x is 5 or 6");
}
else
{
    Console.WriteLine("x is neither 5 nor 6");
}
```

A. x is 5 or 6
B. x is neither 5 nor 6
C. No output
D. Compilation error

3. What is the output of the following code?

```
void PrintNumber(int num = 5)
{
    Console.WriteLine(num);
}
PrintNumber();
```

A. 0
B. 5
C. Error
D. null

4. When a method is declared as static, what does this mean?

A. The method belongs to an instance of a class.
B. The method belongs to the class itself.
C. The method can return multiple values.
D. The method is inaccessible from outside the class.

5. Which of the following methods in C# has the highest access level?

- A. Public
- B. Private
- C. Protected
- D. Internal

6. Which of the following is true about constructor methods in C#?

- A. They must have a return type.
- B. They must have the same name as the class.
- C. They can have different names from the class.
- D. They can be called multiple times.

7. What will happen if a method is missing a return statement but is expected to return a value?

- A. It will return null
- B. It will return a default value
- C. A compile-time error will occur
- D. The method will execute without errors

8. What will the following code print?

```
int x = 10;
if (x > 10)
{
    Console.WriteLine("Greater than 10");
}
else if (x == 10)
{
    Console.WriteLine("Equal to 10");
}
else
{
    Console.WriteLine("Less than 10");
}
```

- A. Greater than 10
- B. Equal to 10
- C. Less than 10
- D. Compilation error

9. What is the output of this code?

```
int x = 5;
switch(x)
{
case 1:
Console.WriteLine("One");
break;
case 5:
Console.WriteLine("Five");
break;
default:
Console.WriteLine("Default");
break;
}
```

- A. One
- B. Five
- C. Default
- D. Compilation error

10. Which of the following is a valid method call for DetermineHighestScore?

```
void DetermineHighestScore(int val1, int val2)
```

- A. void DetermineHighestScore(int val1, int val2)
- B. DetermineScore(int val1, int val2)
- C. DetermineHighestScore(val1, val2)
- D. DetermineHighestScore(2, 3.5)

11. 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

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. 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

14. 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

15. What happens when aValue is less than 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

16. 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

17. 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;`

18. 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

19. Given the code snippet below, how many times will the loop body be executed?

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

- A. 4
- B. 6
- C. 5
- D. 10

20. 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

21. 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};`

22. If you intend to place a block of statements within an if statement, you must use around the block.

- A. Parentheses
- B. square brackets
- C. quotation marks
- D. curly braces

23. For a class called Account that has data members of accountNumber, balance, and transactionAmount, which would be the most appropriate instance method heading for a method that reduces the transaction amount from the current balance?

- A. `static double ReduceAccount(double accountBalance, double transactionAmount)`
- B. `double ReduceAccount(double accountBalance, double transactionAmount)`
- C. `static ReduceAccount( )`
- D. `void ReduceAccount( )`

24. 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);`

25. 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

26. 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);

27. 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)

28. 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

29. How many lines of output will be printed by the following program fragment?

```
for (i = 0; i < 5; i += 2)
    for (j = 0; j < 4; j = j + 2)
        Console.WriteLine("{0}\n{1}", i, j);
```

- A. 20
- B. 6
- C. 9
- D. 12

30. What would be the output produced from the following statements?

```
int i = 0;
while (i < 0)
{
    Console.WriteLine("{0}\t", i);
    i++;
}
Console.WriteLine("{0}\t", i);
```

- A. 0
- B. an infinite loop
- C. an error
- D. 0 0

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

```
Line 1      // Sample program – calculating and displaying output.
Line 2      using System;
Line 3      namespace CalculationExample
Line 4      {
Line 5          class Program
Line 6          {
Line 7              static void Main()
Line 8              {
Line 9                  int x = 5;
Line 10                 int y = 10;
Line 11                 Console.WriteLine("Sum: " + (x + y));
Line 12                 Console.Write("Difference: ");
Line 13                 Console.WriteLine(x - y);
Line 14             }
Line 15         }
Line 16     }
```

- i. What will be the output of the program? [2 marks]
- ii. What happens if you change the value of y to 20 on Line 10? [2 marks]
- iii. Which lines of code produce output that ends without a newline? [1 mark]
- iv. 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

32. Using the following declaration:

```
int[] myArray = {12, 24, 36, 48, 60};
```

What would be the result of each of the following output statements? **[0.5+0.5+0.5+1+0.5+3 = 6 marks]**

- i. Console.WriteLine(myArray.Length);
- ii. Console.WriteLine(myArray[3]);
- iii. Console.WriteLine(myArray[myArray.Length - 3]);
- iv. Console.WriteLine(myArray[1] * myArray[4]);
- v. Console.WriteLine(myArray[2] + 50);
- vi. Write a for loop to display the index and value of each element in myArray after incrementing each value by 10.

33. Using the following declarations, write solutions for questions i and ii:

[4 marks]

```
int[] cArray = new int[7];
```

- i. Write a foreach loop to display the contents of cArray.
- ii. Write a for loop to multiply each element in cArray by 2

34. Write a C# program that uses a for loop to print the numbers from 1 to 50. After printing every 10 numbers, the program should print the message "Milestone reached!" (e.g., after printing 10, 20, etc.).

[3 marks]

35. Write a C# program that uses nested loops to display the following pattern:

[3 marks]

```
1
22
333
4444
55555
```

36. Write a C# program that keeps asking the user to input a number. The program should stop asking when the user inputs a negative number. Once the loop stops, the program should display the sum of all the positive numbers entered.

[3 marks]

37. Given the following piece of code:

```
int i = 0;
while (i >= 0)
{
    Console.WriteLine(i);
    i--;
}
```

- i. Explain why this code results in an infinite loop.
- ii. Rewrite the loop to prevent the infinite loop and make it print numbers from 10 down to 1.

[1 mark]

[2 marks]

38. Write a C# program that asks the user for their age. Based on the age, the program should display one of the following messages: **[3 marks]**

- "You are a child" if the age is less than 12.
- "You are a teenager" if the age is between 13 and 19.
- "You are an adult" if the age is 20 or older.

39. Given the following switch statement:
Convert this switch statement into a series of if-else statements. **[4 marks]**

```
int dayOfWeek = 3;
switch (dayOfWeek)
{
    case 1:
        Console.WriteLine("Monday");
        break;
    case 2:
        Console.WriteLine("Tuesday");
        break;
    case 3:
        Console.WriteLine("Wednesday");
        break;
    case 4:
        Console.WriteLine("Thursday");
        break;
    case 5:
        Console.WriteLine("Friday");
        break;
    default:
        Console.WriteLine("Weekend");
        break;
}
```

40. Rewrite the following code using a ternary operator: **[2 marks]**

```
int number = 7;
if (number % 2 == 0)
{
    Console.WriteLine("Even");
}
else
{
    Console.WriteLine("Odd");
}
```

41. Write the following codes using methods:

i. **Write two methods:**

[4 marks]

Method 1: Ask the user to enter their name and return the value.

Method 2: Accept the name as an argument and call Method 1 within it. Display a welcome message that includes the name.

ii. **Accept two int values as arguments.** Return their sum and product, and display both results in a formatted manner (e.g., "Sum: X, Product: Y").

[3 marks]

iii. **Write a method to calculate the average of five integers.** Accept the integers as arguments and return the average.

[4 marks]

iv. **Create a method that accepts no arguments and returns no values.** Initialize a local integer variable to 0, then print "Initialization Successful" if the variable is equal to 0.

[2 marks]

v. **Write two methods:**

[5 marks]

Method 1: Accept a double representing a product price and a double representing a discount percentage. Return the discounted price.

Method 2: Accept the discounted price as an argument and display the final price formatted as currency.

42. What will be the output from each of the following statements?

[2 marks]

- i. `Console.WriteLine("Result is {0:c}", 67);`
- ii. `Console.WriteLine("Number {0:f 0} is {1:c}", 1, 3);`
- iii. `Console.WriteLine("{0:f 0}— {1:c}", 1, 32);`
- iv. `Console.WriteLine("{0:f 0} result " + "xyz {1:f 2}", 1, 25);`
- v. `Console.WriteLine("This is the {0:f 0}st example: {1:f 2}", 1, 3);`

43. Explain the following terminologies in your own terms.

[3 marks]

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

44. The following program has several syntax errors. Correct the syntax errors. In the answer booklet write the line number explaining the error. **[4 marks]**

```
1. using System;
2. namespace SalaryCalculator
3. {
4. public class Calculator
5. {
6. public static void Main()
7. {
8. double currentSalary = 50000;
9. string bonus;
10. Console.WriteLine("Enter bonus percentage: ");
11. bonus = Console.ReadLine();
12. currentSalary += currentSalary * Double.Parse(bonus / 100);
13. Console.WriteLine("Your total salary with bonus is: " + CurrentSalary);
14. Console.Read();
15. }
16. }
17. }
```

45. Write the code for a system that calculates the total bill for the EFL users. The program should request the current and the previous meter reading to calculate the energy consumed for the month. Per unit rate for the energy consumed is \$0.45. Write the program using different methods.

You will have to have 5 methods, which include the Main() method. The other 4 methods will be: getpreviousmeterreading(), getcurrentmeterreading(), calculatebill() and displaybill() **[4 marks]**

End of Exam