



The University of Fiji



SCHOOL OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE / INFORMATION TECHNOLOGY

FINAL EXAMINATION SEMESTER 1, 2015

Introduction to Software Engineering

ITC115

Time Allowed: Three hours (3 hours)

(An extra ten minutes is allowed for reading this paper)

INSTRUCTIONS

- 1.0 Write **all** your answers in the **Answer Book** provided.
- 2.0 There are nine (9) pages of questions in this Question Booklet (excluding the Cover Page)
- 3.0 Write your **Student Identification Number** on the front page of the **Answer Book**.
- 4.0 If you use extra sheets of paper, be sure to show clearly the question number(s) being answered and to tie each sheet securely in your Answer Book at the appropriate place.
- 5.0 There are **three** sections in this paper, **Section A** consists of 20 multiple choice and is worth 20 marks, **Section B** consists of Open Ended Questions and is worth 45 marks and **Section C** is Programming Questions worth 35 marks. **Answer all the questions in the paper.**
- 6.0 **Programmable calculators** are not allowed.

Section A.

Multiple Choice Questions

[20 marks]

1. Which of the following traits need to exist among the members of an agile software team?
 - A. Competence
 - B. Decision-making ability
 - C. Mutual trust and respect
 - D. All of the above
2. What are the four framework activities found in the Extreme Programming (XP) process model?
 - A. analysis, design, coding, testing
 - B. planning, design, coding, testing
 - C. planning, analysis, design, coding
 - D. planning, analysis, coding, testing
3. Software engineers collaborate with customers to define which of the following?
 - A. Customer visible usage scenarios
 - B. Important software features
 - C. System inputs and outputs
 - D. All of the above
4. The system specification describes the
 - A. Function, performance and constraints of a computer-based system
 - B. implementation of each allocated system
 - C. element software architecture
 - D. time required for system simulation
5. Which of the following **while** clauses tell the computer to exit the loop when the value in the age variable is less than the number 0?
 - A. while (age < 0)
 - B. while age >= 0;
 - C. while (age != 0)
 - D. while (age >= 0)

6. Write a C++ while clause that stops the loop when the value in the **inStock** variable is less than or equal to the value in the **reorder** variable. The instructions in the body of the statement always are processed at least once during runtime.

A. do while
B. for
C. while
D. both a and b

7. What numbers will the following code display on the computer screen?

```
int x = 1;
do{
cout << x << endl;
x = x + 1;
} while (x < 5);
```

A. 0, 1, 2, 3, 4
B. 0, 1, 2, 3, 4, 5
C. 1, 2, 3, 4
D. 1, 2, 3, 4, 5

8. What will the following code display on the computer screen?

```
for (int x = 1; x < 3; x = x + 1){
for (int y = 1; y < 4; y = y + 1)
cout << "*"//end for
cout << endl;
}
//end for
```

A. ***

B. ***

C. **
**
**
D. ***

9. Which of the following raises the number 6 to the third power?

- A. `cube(6)`
- B. `pow(3.0, 6)`
- C. `pow(6.0, 3)`
- D. none of the above

10. What does the function header specifies?

- A. the data type of the function's return value (if any)
- B. the name of the function
- C. the function's formal parameters (if any)
- D. all of the above

11. A program contains the statement `tax = calcTax(sales);`. The tax and sales variables have the double data type. Which of the following is a valid function header for the `calcTax` function?

- A. `calcTax(double sales);`
- B. `double calcTax(salesAmount)`
- C. `double calcTax(double salesAmount)`
- D. `double calcTax(int sales);`

12. A program contains three functions named `main`, `calcGross`, and `displayGross`. Two of the functions—`main` and `calcGross`— declare a variable named `pay`. The `pay` variable name also appears in the `displayGross` function header. When the computer processes the statement `pay = hours * rate;` in the `calcGross` function, it multiplies the contents of the `hours` variable by the contents of the `rate` variable. In which functions `pay` variable does it store the result?

- A. `calcGross`
- B. `displayGross`
- C. `main`
- D. none of the above, because you can't have more than one memory location with the same name

Use the sales array to answer the questions 9 & 10. The array was declared using the `int sales[5] = {10000, 12000, 900, 500, 20000};` statement.

13. The `sales[3] = sales[3] + 10;` statement will replace the number.

- A. 500 with 10
- B. 500 with 510
- C. 900 with 910
- D. 900 with 910

14. The `cout << sales[0] + sales[1] << endl;` statement will.

- A. display 22000
- B. display 10000 + 12000
- C. display `sales[0] + sales[1]`
- D. result in an error

15. Which of the following is a valid if clause? (The sales variable has the double data type.)

- A. `if (sales > 500.0 && < 800.0)`
- B. `if (sales > 500.0 || < 800.0)`
- C. `if (sales > 500.0 And sales < 800.0)`
- D. `if (sales > 500.0 && sales < 800.0)`

16. Which of the following tells the computer to display real numbers in fixed-point notation with no decimal places?

- A. `cout << fixed << decimal(0);`
- B. `cout << fixed << precision(0);`
- C. `cout << fixed << setprecision(0);`
- D. `cout << fixed << setdecimal(0);`

17. Which one of the following is NOT a project management activity?

- A. Project monitoring and reviews
- B. Getting a freelancer
- C. Procuring of switch for distributed computing
- D. Report writing and presentation

18. Assuming that a user enters 4 as the value for num, what is the output of the following code snippet?

```
int num = 0;
cout << "Enter number: ";
cin >> num;
if (num < 50) { num = num + 5; }
if (num < 10) { num = num - 2; }
if (num > 5) { num++; }
else { num--; }
cout << num << endl;
```

- A. 7
- B. 8
- C. 9
- D. 10

19. What is the value stored in the last element of an array named numdata with the given definition?

```
int numdata[3] = { 1, 2 };
```

- A. The answer cannot be determined from the information given.
- B. The last element stores value 0.
- C. The last element stores value 1.
- D. The last element stores value 2.

20. While using setprecision(n), which header file must be used?

- A. <cmath>
- B. <iomanip>
- C. <fstream>
- D. <string>

Section B.

Open Ended Questions

[45 marks]

Question 1

[10 marks]

- a. Classify the following risks into three categories of risk which are project, product and business. [2 marks]
- i. Specifications of Essential interfaces are not available on schedule.
 - ii. A competitive product is marketed before the system is completed.
 - iii. Experienced staff will leave the project before it is finished.
 - iv. The underlying technology on which the system is built is superseded by new technology.
- b. Identify possible stakeholders in the following system: [3 marks]
- A stockholding system for oil companies which keeps track of the amount of petrol (gas) at each of its sales outlets and automatically reorders new stock when the tanks fall below a certain level.
- c. Discuss three characteristics of RAD process. [1.5 marks]
- d. Explain what traceability table is and why software engineers need to use this table. [1.5 marks]
- e. What is the distinction between milestone and deliverable? [1 mark]
- f. Explain why the process of project planning is iterative and why a plan must be continually reviewed during a software project. [1 mark]

Question 2**[10 marks]**

- a. Explain why the rapid delivery and development of new system is often more important to business than the detailed functionality of these systems. **[2 marks]**
- b. User requirements are defined using natural language, as these can be understood by all users. Discuss the use of natural language in this context and also elaborate on the problems of using natural language. **[4 marks]**
- c. What is a software process? Explain the generic activities in all software processes. **[2.5 marks]**
- d. Write the distinction between component testing, system testing and acceptance testing. **[1.5 marks]**

Question 3**[25 marks]**

- a. What is refactoring? Explain when and how this process was proposed. **[1.5 marks]**
- b. Elaborate on the six design principles, which has to be considered while designing the user interface. **[6 marks]**
- c. Explain two advantages and four problems with incremental development process. **[6 marks]**
- d. What is Ethnography? **[0.5 mark]**
- e. What is the difference between software engineering and system engineering? **[1 mark]**
- f. What are the four important attributes which all software products should have? **[4 marks]**
- g. To help counter terrorism, many countries are planning the development of computer systems that track large numbers of their citizens and their actions. Clearly this has privacy implications. Discuss the ethics of developing this type of systems. **[3 marks]**
- h. Discuss the advantages of graphical information display and suggest four applications where it would be more appropriate to use graphical rather than digital displays of numeric information. **[3 marks]**

- a. What is the role of #include directive in C++? [1 mark]
- b. Write a program which allows you to output on a text document. [3 marks]
- c. C++ program often goes through six phases to be executed. Explain the phases which are used. [3 marks]
- d. Identify and correct the errors in each of the following: [3 marks]

i. While(c <= 5 and c >= 10) { Product *=c; ++c;	ii. cout >> "enter x\n"; cin << x;
iii. if (gender == 1) cout << "Woman" << endl; else; cout<< "Man" << endl;	iv. int sum(int x, y) { int result; result = x + y; }
v. for (int k = 2, k <=12, k++)	vi. cout<<hello world \n;

- e. Consider the following program.

```
int a, b;  
char z, y;
```

- i. What will be the output if the input is 28.07 for the following? [0.5 mark]

```
cin>>a;  
cout<<a;
```

- ii. What will be the output if the input is AB for the following? [0.5 mark]

```
cin>>y;  
cout<<y;
```

- iii. What will be the output if the input is 102 for the following? [0.5 mark]

```
cin>>b;  
cout<<b;
```

- f. Write C++ code for two functions. First, write function **int readvalidmark()** which reads a number from standard input, checks that this number is between 0 and 100, asks to re-enter the mark if it is not, and returns the mark if it is. Second, write function **char computegrade(double mark)**, which returns for a given mark the correct grade, a character 'A', 'B', 'C', 'D', or 'E'. Example 0 to 39 is E, 40 to 49 is D, 50 to 59 is C, 60 to 79 is B and 80 to 100 is A. Please provide function **int readvalidmark()** and **char computegrade(double mark)** in the answer booklet. **[4 marks]**

- g. What is the output when the following code fragment is executed? **[2 marks]**

```
char ch;  
char title[] = "Titanic";  
  
ch = title[1];  
title[3] = ch;  
  
cout << title << endl;  
cout << ch << endl;
```

- h. In the code fragment below, the software developer has almost certainly made an error in the first line of the conditional statement.

```
int n = 5;  
if (n = 0) // NOTE THE OPERATOR!!!  
    cout << "n is zero" << ".\n";  
else  
    cout << "n is not zero" << ".\n";  
cout << "The square of n is " << n * n << ".\n";
```

- i. What is the output of this code fragment as it is written? **[1 mark]**

- ii. How can it be corrected to do what is the programmer surely intended? **[1 mark]**

- i. What is the output when the following code fragment is executed? **[2 marks]**

```
int i = 7;  
while (i < 13)  
{ i++;  
  cout << i << "\n"; }
```

- j. Write a function named "sum_from_to" that takes two integer arguments, call them "first" and "last", and returns as its value the sum of all the integers between first and last inclusive. Thus, for example: **[5 marks]**

```
cout << sum_from_to(4,7) << endl; // will print 22 because 4+5+6+7 = 22  
cout << sum_from_to(-3,1) << endl; // will print -5 because (-3)+(-2)+(-1)+0+1 = -5
```

```
cout << sum_from_to(7,4) << endl; // will print 22 because 7+6+5+4 = 22
cout << sum_from_to(9,9) << endl; // will print 9
```

- k. What are the 2 different ways to comment code in C++ and how are they different? Give 3 reasons why it's important to comment your code. [2.5 marks]
- l. Write the output of the following segments of code. [2 marks]
- i. `int x = 3;`
`cout << x << 2*x;`
- ii. `int x = 7;`
`int y = 3;`
`cout << x/y << "\n";`
- m. Write a program (starting from #include) that repeatedly collects positive integers from the user, stopping when the user enters a negative number or zero. After that, output the product of all positive entries. A sample run should appear on the screen like the text below. [4 marks]

```
Enter a number: 7
Enter a number: 6
Enter a number: 11
Enter a number: -7
The product of all your positive numbers is 462.
```

End of Exam