



**UNIVERSITY OF COLOMBO, SRI LANKA**

**UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING**

**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)**

*Academic Year 2014/2015 – 2<sup>nd</sup> Year Examination – Semester 3*

***IT3205 – Fundamentals of Software Engineering***

***PART II - Structured Question Paper***

**28<sup>th</sup> February, 2015**

**(ONE HOUR)**

**To be completed by the candidate**

BIT Examination Index No: .....

**Important Instructions:**

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- This paper has **2 questions** and **9 pages**.
- **Answer both questions.** Each question carries **50 marks**.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.  
If a page is not printed, please inform the supervisor immediately.

**Questions Answered**

Indicate by a cross (×), (e.g. 

×
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) the numbers of the questions answered.

	Question numbers		
	1	2	
<b>To be completed by the candidate by marking a cross (×).</b>			
<b>To be completed by the examiners:</b>			

- 1) (a) Define a software process. Briefly describe four (4) basic generic activities in a software process.

(10 Marks)

**ANSWER IN THIS BOX**

A software process is a coherent set of activities for specifying, designing, implementing and testing software systems.

It is a structured set of activities required to develop a software system.

**Generic activities:**

**Specification** - defining what the system should do;

**Design and implementation** - defining the organization of the system and implementing the system;

**Validation** - checking that it does what the customer wants;

**Evolution** - changing the system in response to changing customer needs.

- (b) Briefly explain five (5) phases and the respective deliverables of the waterfall model.

(10 Marks)

**ANSWER IN THIS BOX**

**1. Requirement analysis:** The system's services, constraints and goals are established with consultation with the users.

Deliverable: Requirement Analysis Specification document

**2. Design:** The design process translates requirements into a representation of the software that can be implemented using software tools

Deliverable: Design Diagrams

**3. Implementation:** During this stage the software design is realized as a set of programs or program units.

Deliverable: User Manuals

**4. Testing:** The testing process must ensure that the system works correctly and satisfies the requirements specified.

Deliverable: Testing Reports

**5. Maintenance:** Errors in the system should be corrected and the system should be modified and updated to suit new user requirements.

Deliverable: Maintenance Reports

- (c) Write down four (4) advantages of using the prototype software development model instead of the waterfall model?

(8 marks)

**ANSWER IN THIS BOX**

1. Can clearly identify the requirements
2. Less time consuming than waterfall model
3. Can adopt the changes made by users during information gathering
4. User can get an idea about the system before it is fully developed
5. Suitable for vague / unclear requirements

- (d) What are the objectives of software design?

(8 marks)

**ANSWER IN THIS BOX**

The purpose of the design phase is to plan a solution of the problem specified by the requirements document. This phase is the first step in moving from the problem domain to the solution domain. In other words, starting with what is needed; design takes us towards how to satisfy the needs.

**Basic objectives are:**

- Identify different types of software, based on the usage.
- Show differences between design and coding.
- Define concepts of structured programming.
- Illustrate some basic design concepts.
- See how to design for testability and maintainability.

(e) How is software design different from coding?

(8 marks)

**ANSWER IN THIS BOX**

- The purpose of the design phase is to plan a solution of the Design is most crucial and time-consuming activity. Screen of the system depends on the correct design specifications which is a key activity of the process.
- Designs are transformed into actual code or program during the implementation phase.
- It is more feasible to rectify a design as different users may have conflicting user requirements and only the final and valid design goes for next phase.
- Involves conversion of detailed design specification laid out by designers into actual code, files or database.
- Less time consuming than the design phase and performed by programmers or coders.
- More concerned with technical aspects of the software rather than its functional aspect.
- Different software such as programming languages, front-end tools, database management system, utilities etc. are used to facilitate the coding process.

(f) Briefly describe three (3) standard coding practices.

(6 marks)

**ANSWER IN THIS BOX**

1. **Commenting:** Briefly note down the functions and the objectives of each variable and functions
2. **Naming Conventions:** Use meaningful names for variables and functions
3. **Keeping the code simple:** Use functions (or modules) and keep the code as simple as possible.

2) (a) Define software testing. Briefly explain the test process.

(10 Marks)

**ANSWER IN THIS BOX**

- Software testing is a process used to help identify the correctness, completeness and quality of developed computer software.
- With that in mind, testing can never completely establish the correctness of computer software.
- Only the process of formal verification can prove that there are no defects. Testing is the process of demonstrating that defects are not present in the application that was developed.
- Testing is the activity or process which shows or demonstrates that a program or system performs all intended functions correctly.
- Testing is the activity of establishing the necessary confidence that a program or system does what it is supposed to do, based on the set of requirements that the user has specified. Testing is a process of executing a program with the intent of finding an error.

**Test process are:**

- Designing appropriate test cases
- Prepare test data
- Run test cases and record outcome
- Compare results with test cases
- Repeat the process the usage.

- (b) Why is maintenance of a software important? Discuss some of the problems that are faced during maintenance of software.

(10 Marks)

**ANSWER IN THIS BOX**

- The modification of a software product, after delivery, to correct faults, to improve performance or other attributes, or to adapt the product to a changed environment
- Maintenance is an important part of the software life-cycle.
- It is expensive in manpower and resources and one of the aims of software engineering is to reduce its cost. The most important problem during maintenance is that before correcting or modifying a program, the programmer must first understand it.

**The problems are:**

- Often another person or group of persons working over the years in isolation from each other writes the program.
- Often the program is changed by a person who did not understand it clearly, resulting in a deterioration of the programs original organization.
- There is a high staff turnover within the information technology industry. Due to this persons who are not the original authors maintain many systems. These persons may not have adequate knowledge about the system.
- Some problems become clearer only when a system is in use.
- Many users know what they want but lack the ability to express it in a form understandable to programmers. This is primarily due to information gap.

- (c) Briefly describe the four (4) main activities of the Risk Management Process.

(8 marks)

**ANSWER IN THIS BOX**

1. **Risk identification** - Identify project, product and business risks
2. **Risk analysis** - Assess the likelihood and consequences of these risks
3. **Risk planning** - Draw up plans to avoid or minimise the effects of the risk
4. **Risk monitoring** - Monitor the risks throughout the project

- (d) Briefly define software **Evolution** and **Servicing** and explain the difference between the two terms?

(8 marks)

**ANSWER IN THIS BOX**

**Evolution:**

It is the stage in a software systems life cycle where it is in operational use and is evolving as new requirements are proposed and implemented in the system.

**Servicing:**

At this stage, the software remains useful but the only changes made are those required to keep it operational i.e. bug fixes and changes to reflect changes in the software environment. No new functionality is added.



- (e) Describe four (4) software quality attributes which can be used to measure the software quality.

(8 marks)

**ANSWER IN THIS BOX**

**Security**

Security is the ability of the software to remain protected from unauthorized access. This includes both change access and view access.

**Maintainability**

Maintainability is the ability of a software to adapt to changes, improve over time, correct any bugs and be proactively fixed through preventive maintenance.

**Redundancy**

AdvOSS uses different technologies in combination to achieve redundancy in the system and make sure that the redundancy is used towards availability when needed.

**Reliability**

High Reliability is the measure of how a product behaves in varying circumstances.

- (f) Write down and explain three (3) cost estimation techniques.

(6 marks)

**ANSWER IN THIS BOX**

**Expert judgment**-Use expert knowledge.

**Estimation by analogy**-Use past similar projects to do the estimation.

**Function point analysis**-It uses the requirements specification to assess inputs, outputs, file accesses, user interactions and interfaces and calculates the size based on them.

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