The University of Nottingham, Ningbo China

SCHOOL OF COMPUTER SCIENCE

A LEVEL 1 MODULE, SPRING SEMESTER 2019-2020
AE1FSE-COMP1035

INTRODUCTION TO SOFTWARE ENGINEERING

Time allowed: **ONE HOUR**

Candidates may complete the front cover of their answer book and sign their desk card but must NOT write anything else until the start of the examination period is announced

Answer ALL 25 questions

No calculators are permitted in this examination.

Dictionaries are not allowed with one exception. Those whose first language is not English may use a standard translation dictionary to translate between that language and English provided that neither language is the subject of this examination. Subject specific translation dictionaries are not permitted.

No electronic devices capable of storing and retrieving text, including electronic dictionaries, may be used.

DO NOT turn examination paper over until instructed to do so

ADDITIONAL MATERIAL: None.

INFORMATION FOR INVIGILATORS: Collect examination question papers at the end of the examination.

SECTION A: Multiple Choice Questions

[Section A carries a total of 30 marks, each question carries 1.5 mark]

Choose the *MOST CORRECT* option for each of the following questions.

Question1: Which of the following is **NOT** included in the software that is deployed to the users?

a. Documentation.
b. Testing Code.
c. Configuration components.
d. Installation/upgrade.

Question 2: A scenario starts with an outline of the interaction which in general may include (choose the **CORRECT** answer)

a. A description of the normal flow of events in the scenario.
b. A description of the system state when the scenario ends.
c. Information about other activities that might be going on at the same time.
d. All of the above.

Question 3: Typically, a commercial software system has to go through three stages of testing which is (in the **CORRECT** order):

a. Release testing -> user testing -> development testing.
b. User testing -> release testing -> development testing.
c. Development testing -> user testing -> release testing.
d. Development testing -> release testing -> user testing.

Question 4: Which of the following step is **NOT TRUE** in the Test-Driven-Development (TDD) process?

a. The first step is to identify the increment of functionality that is required.
b. The second step is to write a test for this functionality and implement it as an automated test.
c. The third step is to run the test for the new function, but not other previous tests that have been implemented to save cost.
d. The fourth step is to implement the functionality and re-run the test.

Question 5: The structural models of software can be used to display the organization of a system in terms of components that make up that system and their relationship. Which of the following is **TRUE** for the structural models?

a. Structural models may be static models which show the organisation of the system.
b. Structural models may be dynamic models which show the organization of the system when it is executing.
c. One can create structural models when discussing and designing the system architecture.
d. All of the above.

Question 6: The requirements document has a diverse set of users, which of the following are the **LEAST** possible users of the document?

a. Company owner.
b. Customers.
c. Maintenance engineers.
d. Engineers.

Question 7: A number of requirements validation techniques can be used individually or in conjunction with one another, including (choose the **CORRECT** statement)

a. Test-case generation that specifies requirements can be non-testable because sometimes the test is difficult or impossible to design.
b. Prototyping which involves developing an executable model of a system.
c. Requirements reviews which can be analysed by the managers only.
d. All of the above.

Question 8: Which of the following are **FALSE** about software quality?

a. The development process used has a significant influence on the quality of the software, and good processes are more likely to lead to a good quality software.
b. It is easy to assess software quality attributes such as reliability and maintainability in short period.
c. The subjective quality of a software system is largely based on its non-functional characteristics.
d. Quality managers should encourage teams to take responsibility for the quality of their work and to develop new approaches to quality improvement.

Question 9: Which of the UML models is/are particularly useful for adding details to use case and architectural models? Choose the **CORRECT** statement.

a. State machine models which show the sequence of object interaction.
b. Sequence models which show how the objects change their state in response to events.
c. Subsystem models which show logical groupings of objects into coherent subsystems.
d. All of the above.

Question 10: For large systems that are developed by a software company for an external client, which of the following is the **CORRECT** problem of Agile approach?

a. Agile methods are design for small co-located teams, yet much software development now involves worldwide distribution teams.
b. Agile methods are most appropriate for software maintenance than for new software development.
c. The informality of agile development is compatible with the legal approach to contract definition that is commonly used in large companies.
d. Agile approach has been used in many companies and it is not wise to switch to other approach.

Question 11: Choose one **CORRECT** statement for alpha testing.

a. Is where a release of the software is made available to a much large group of users to allow them to experiment and raise problem that they discover with the system developers.
b. Can be used when custom software is being developed.
c. Usually involved new users that do not have experiences in the products before.
d. Is where users can provide information about practice that doesn't help much with the design of more realistic tests.

Question 12: Generalisation is a common technique used in class diagram to manage complexity. Which of the following is **TRUE** for generalisation concept?

a. In a generalisation, the attributes and operations associated with lower-level classes are also associated with the high-level classes.
b. In Java, generalisation is implemented using class inheritance mechanism built into the language.
c. The generalisation is shown as an arrowhead pointing down to the more specific class(es).
d. None of the above.

Question 13: Which of the following is **NOT** the important factors that affect how software projects are managed?

a. Type of software programming.
b. Software customers.
c. Organisational culture.
d. Software development process.

Question 14: Which of the following is the **CORRECT** advantage(s) of the pair programming?

a. It encourages communication between developers and customers to improve the software structure.
b. It acts as a formal review process between the team members and the manager because each line of code is looked at by at least two people.
c. It supports the idea of collective ownership and responsibility for the system.
d. All of the above.

Question 15: There are many types of risks involved in the software development and the possible risks do **NOT** include

a. The organisation is restructured so that different managements are responsible for the project.
b. Customers fail to understand the impact of requirements changes.
c. The rate of defect repair is overestimated.
d. Faults in reusable software components have to be repaired before these components are reused.

Question 16: Which of the following is **NOT** part of requirements engineering?

a. Requirements validation.
b. Requirements specification.
c. Requirements definition.
d. Requirements elicitation and analysis.

Question 17: What are the main parameters should be using when computing the costs of a software development project? Choose the **TRUE** statement.

a. Effort costs.
b. Hardware and software costs.
c. Travel and training costs.
d. All of the above.

Question 18: Software maintenance is the general process of changing a system after it has been delivered. Which of the following is the **TRUE** statement for software maintenance?

a. Functionality subtraction to remove functions that are no longer required by the users.
b. Environmental adaption to adapt the software to new platforms and environments.
c. Redesign the software to deliver a new version to replace the old version.
d. None of the above.

Question 19: Which of the following is the **CORRECT** problem with iterative model?

a. Lack of planning.
b. Lightweight documentation.
c. Software could be poorly structured.
d. All of the above.

Question 20: The system specifications can be written in the notations. Which of the following is the **CORRECT** notation?

a. Graphical modelling.
b. Mathematical equations.
c. Natural body language.
d. None of the above.

SECTION B: Software Engineering Methodologies

[Section B carries a total of 10 marks]

Question 21: Describe the coding convention and why it is important.

[4 marks]

Question 22: Explain **THREE** ways how to make good tests for software.

[3 marks]

Question 23: Fill in the table below to explain the differences between unit testing, integration testing, release testing and acceptance testing.

	Unit Testing	Integration Testing	Release Testing	Acceptance Testing
Test Coverage (what to test)	Individual pieces (e.g., classes/functions)			
Input	Functional specification of unit (unit test case)			
Output	Pass/fail			
Subject (who do the testing)	Developer			

[3 marks]

SECTION C: Agile Method

[Section C carries a total of 10 marks]

Santos is a project manager and he has been given to lead a new project to build a sales management system (SMS). His team has applied plan driven (waterfall) approach for more than 5 years in the software development. However, the new customer requests the team do it in agile way – Scrum approach for the new project development process because the customer has some experiences in agile approach which they believed is more efficient in software development.

Santos is a fast-learner and he took initiative to self-study, completing a 3 days online agile coaching course and a Scrum textbook in 5 days. He thought he was ready to be an "agile man".

The first thing Santos did is inviting the customer as a product owner (PO). Then, he spent 2 days interviewing PO, to get detailed information about the SMS that they are going to build. After that, he sat down with his team and break down the information obtained from the PO into user stories and put them on their product backlog. He also prepared a sprint backlog which he had learned in the textbook. Santos's initial plan was a 6 weeks sprint.

The SMS development kick-started very soon since the development team was told that the documentation is not necessarily needed. A prototype was quickly built. Santos invited PO to discuss on the prototype, but the PO did not come for the meeting because he was busy. PO told Santos that he trusted his experience and the professionality of his team, ask them to proceed to the next stage. Eventually, they finished the first sprint, but the first version of the system does not work well (many bugs). So, he decided not to show it to the PO and continue to work on the next sprint. After three sprints, the team finally built the system that are bug-free, and Santos decided to show it to the customer for some early feedback. Nonetheless, the PO raised the concern that the system did not meet the expectation. Besides that, Santos realised that the project was behind the schedule because the team had spent quite amount of time to fix (accumulated) bugs in each sprint. Santos also found out that the team had performed all the unit testing but failed to do the continuous integration. In the end, Santos realised that the agile approach did not work well in this project for SMS development.

Question 24: List out at least **FOUR** reasons why Santo's agile approach failed.

[4 marks]

Question 25: Describe at least **SIX** ways what you would do to help Santos if you are an agile coach for the team.

[6 marks]