

CS 3009: Software Engineering (A)

15

Quiz 1

Time: 15 minutes

Max Marks: 20

Roll No.

Q1.

20 Marks

Mark each statement as True or False. Circle the letter T if the statement is true, circle the letter F if the statement is false. Unclear answers will not be given any credit.

1. Software engineering is about multi-person construction of multi version software. T / F
2. A software system must change if it has to stay usable by its users. T / F
3. With the passage of time, the quality of software shall decline if no conscious rigorous effort is made to maintain the quality. T / F
4. One objective of using the SE guidelines is to reduce the cost of a change in software. T / F
5. Following the software engineering guidelines can help prevent defects and avoid the defect correction costs. T / F
6. The cost of correcting a defect in production is lower than the cost of correcting the defect during requirements analysis phase. T / F
7. A software engineer can always use agile methods to develop software successfully. T / F
8. Waterfall model makes assumptions such as customer is always available for demos, requirements shall be complete by the end of coding phase. T / F
9. Different roles in a usual software development team include scrum master, product owner, tester, and trainer. T / F
10. In order to have user satisfaction, the functional content of a software system must grow for the systems built for specific customers. T / F
11. Refactoring is an activity that helps reduce the cost of future changes in software. T / F
12. Extreme programming and pair programming are two names for the same concept. T / F
13. Maintainability of software should remain a concern for good software engineers. T / F
14. Separation of concerns is one of the software engineering principles that primarily helps reduce costs related to modifying software. T / F
15. Faults can be injected in software due to human errors, these faults may or may not lead to failures. T / F
16. Malleability is one property of software that allows the software engineers to keep the customers from changing their requirements frequently. T / F
17. Software and hardware follow the same bath tub curve of failure. T / F
18. In a software system security and performance can be achieved to the maximum at the same time if a client requires so. T / F
19. One of the main challenges of software engineers is to manage conflicts related to cost and time. T / F
20. A legacy software can be easily modified because it has good documentation and a well-documented code available. T / F

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Quiz 2

Time: 20 minutes

Max Marks: 20

Roll
1

Q1.

Relate the concepts of Column 1 with concepts of Column 3. Write the most appropriate match in 'Correct Match' column. Write alphabet only and not the complete entry. Do not repeat the alphabet.

Note: There are extra mismatched entries in Column 3 that do not relate with any entry of column 1. Each entry in column 1 must have a match from column 3.

Entries	Correct Match	Mismatched Entries
Testing and Development Phases' Correspondence	X F	A. Last leg in marathon race
Spike solutions, refactoring, story values	X B	B. V-Model
Four Phases, OO, iterations, mini projects	X D	C. RAD Model
Four phases, Determine and Evaluate Risks, evolutionary	X C	D. Waterfall Model
Requirements well understood, stable and complete	X G	E. Spiral Model
Requirements Unclear	X K	F. Framework activities
Requirements Well Understood, scope constrained, short development cycle, sufficient human resources	X E	G. Incremental Model
Short cycle time, subset of requirements well understood, scope of the project largely known, core product first	X H	H. Prototyping Model
Communication, planning, modeling, construction	X L	I. Unified Process
Sprint	N	J. Scrum
		K. Risky Model
		L. Umbrella activities
		M. XP
		N. A time box in scrum

Q2.

5 Marks

Your team is starting work on a new project, but all the requirements and size of the project are not clear at the moment. The internal quality of the project cannot be compromised as it may incur huge financial losses in future. The client requires quarterly releases and will be providing feedback on each release. Your team is not in a position to implement spiral model due to lack of training and exposure. Can you use prototyping model for this project? Why or why not? Give reasons. If you opt for prototyping model, give your plan and exact tasks that can help you use prototyping model in such a situation.

We cannot use prototyping model in this case because client requires quarterly releases whereas in prototyping model small prototypes of the system are shared with the client very frequently.

Q3.

5 Marks

A team of software engineers is working on a project following scrum. At the start of each sprint they select a few user stories to work on. Assume that each user story is of 10 story points. Their selected and completed user stories in the first sprints are as follows:

Sprint 1: The team committed to complete 5 user stories (i.e. 50 story points). However, the team could complete 4 of the 5 user stories.

$$\frac{4}{5}$$

Sprint 2: The team committed 6 user stories (including the one that was not completed in sprint 1) and completed 5 of the 6 user stories.

$$\frac{5}{6}$$

Sprint 3: The team committed 7 user stories (including the one that was not completed in sprint 2) and completed 6 of the 7 user stories.

$$\frac{6}{7}$$

Sprint 4: The team committed 7 user stories (including the one that was not completed in sprint 3) and completed 3 of the 7 user stories.

$$\frac{3}{7}$$

To do: Find project velocity to help the team provide a good estimate of work to be committed for sprint 5. Explicitly state the project velocity and then explicitly mention the **story points** that the team should pick based on the calculated velocity. The estimate should be based on the project velocity.

$$\frac{4}{5} + \frac{5}{6} + \frac{6}{7} + \frac{3}{7} = \frac{24+25}{30} + \frac{9}{7} ? \\ = \frac{29}{30} + \frac{9}{7} -$$

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Quiz 3

Time: 15 minutes

Max Marks: 20

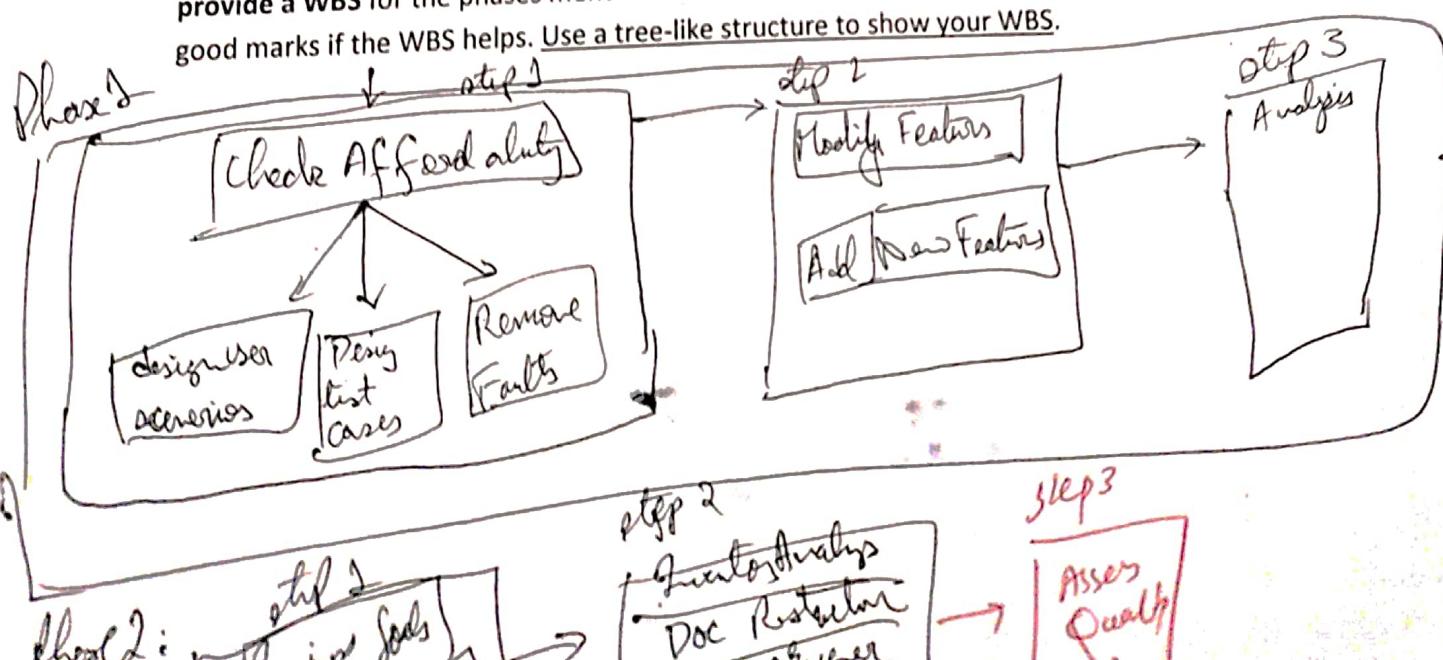
Roll

Q1.

20 Marks

We as a software company have been awarded a maintenance project. Initially, we are required to determine if the continued maintenance of the software application under maintenance is affordable anymore. During this phase, our step will be to determine the cost of fixing defects by performing three activities. The first is to design and execute usage scenarios to determine if the application breaks too often during regular use. The second is to design and execute test cases to uncover faults in the application. The third is to remove the faults to see how long it takes to repair the application. The second step will be to modify existing features to determine if the cost of the changes is affordable or not. During this step, we shall modify the existing features and extend the functionality of the application by adding new features to determine the effort required to modify and add new functionality. After the first two steps, an analysis will be performed and it will be decided if the software application should remain in maintenance as before or it should be re-engineered. The first phase will run for 3 months. In the second phase, if the reengineering-related decision has been made, the foremost step of business process reengineering will be performed. This step will define the business goals, identify existing business processes, evaluate the existing processes, and create revised business processes. The second step will be the reengineering of software. This step will include activities such as inventory analysis, document restructuring, reverse engineering, program restructuring, data restructuring, and forward engineering. The third step will be to assess the quality of the resultant software and measure the maintainability of the resultant software.

Someone has told us that having a Work Breakdown Structure (WBS) will help us execute the project better. We have also been told that students at FAST Lahore are very good at making WBS to help managers of software projects. Assuming that the decision after phase 1 will be to go for reengineering, provide a WBS for the phases mentioned above to help our company. As an incentive, you'll be awarded good marks if the WBS helps. Use a tree-like structure to show your WBS.



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Quiz 4

Time: 15 minutes

Max Marks: 20

Roll N.

Q1.

20 Marks

Characterize the following requirements as Functional/Non-functional (F/NF). Also identify if they are Testable or Not-Testable (T/NT). In the second last column write F if a requirement is functional and write NF if the requirement is Non-functional. Similarly in the last column write T if a requirement is Testable & write NT if the requirement is not testable.

No.	Requirement	F/NF	T/NT
1	System shall allow users to find and view a location on the map.	F	T
2	System shall allow users to pick from the top 3 optimal route choices.	NF	T
3	The server shall connect with the Google Maps API for display.	EX	T
4	The system shall allow the teacher to send the lecture to student(s).	F	T
5	The system shall show the user the details about the monthly donation pool i.e. the money accumulated and the time left for the pool to end.	F	T
6	The user shall be able to make payment via the payment gateway they wish to opt	EX	TX
7	The system shall be accessible almost all the time due to the availability of reliable cloud services (provided by google and amazon)	NF	NT
8	The system shall be efficient and optimized for better performance.	NF	TX
9	Only the users with the role "site admin" shall view the applicant's verified phone number	EX	T
10	The system shall maintain data integrity by frequently taking backups of all updates to the database for every record transaction	EX	TX

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Quiz 6

Time: 20 minutes

Max Marks: 20

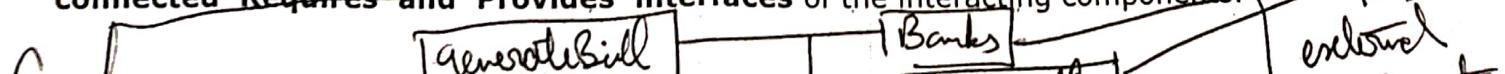
Roll No.

Q1.

20 Marks

Water and Sanitation Authority (WASA) is planning to have an information system (let us call it WASA Information System or WIS) developed so that collection of bills and resolution of customers' complaints becomes easier. The WIS shall be working with all commercial banks for bill collection. In addition to the commercial banks, the WIS shall have a functional unit to let the customers pay bills through other payment methods including JazzCash and EasyPaisa. The WIS is expected to generate bills. The Customer Relationship Management (CRM) module shall allow the customers to lodge complaints by providing details of their area, nature of the complaint, contact number, and bill number etc. The CRM module shall also be responsible for generating complaints related reports. The Human Resource department (HRD) wants the WIS to keep track of performances of employees so that their efforts can be compensated with awards and increments. To this end the HRD wants the system to track details of each team that has participated in resolution of a complaint, recovery of bill, distribution of bills etc. WIS shall keep record of WASA customers by asking them to register with the WIS using their bill number, address, phone number, and email address. This registration module shall provide the required information at the time of bill generation, complaint recording, complaint resolution, bill payment etc. The bill payment module shall allow the registered bills to be paid using debit/credit cards, internet banking, Jazzcash, and EasyPaisa. The WASA's billing system should work fine with the banking applications of all the commercial banks. All bill payments are recorded in the database through a storage management module.

To do: Identify components of the WIS and **draw a component diagram** for the WIS application discussed above. **Use ball and socket notation.** Appropriately **label the connected 'Requires' and 'Provides'** interfaces of the interacting components.



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(19)

Quiz 6

Time: 20 minutes

Max Marks: 20

Roll No. 21L-1805

Q1.

20 Marks

Water and Sanitation Authority (WASA) is planning to have an information system (let us call it WASA Information System or WIS) developed so that collection of bills and resolution of customers' complaints becomes easier. The WIS shall be working with all commercial banks for bill collection. In addition to the commercial banks, the WIS shall have a functional unit to let the customers pay bills through other payment methods including JazzCash and EasyPaisa. The WIS is expected to generate bills. The Customer Relationship Management (CRM) module shall allow the customers to lodge complaints by providing details of their area, nature of the complaint, contact number, and bill number etc. The CRM module shall also be responsible for generating complaints related reports. The Human Resource department (HRD) wants the WIS to keep track of performances of employees so that their efforts can be compensated with awards and increments. To this end the HRD wants the system to track details of each team that has participated in resolution of a complaint, recovery of bill, distribution of bills etc. WIS shall keep record of WASA customers by asking them to register with the WIS using their bill number, address, phone number, and email address. This registration module shall provide the required information at the time of bill generation, complaint recording, complaint resolution, bill payment etc. The bill payment module shall allow the registered bills to be paid using debit/credit cards, internet banking, Jazzcash, and EasyPaisa. The WASA's billing system should work fine with the banking applications of all the commercial banks. All bill payments are recorded in the database through a storage management module.

To do: Identify components of the WIS and **draw a component diagram** for the WIS application discussed above. **Use ball and socket notation.** Appropriately **label the connected 'Requires' and 'Provides' interfaces** of the interacting components.

