

1. Which of the following systems controlling and managing hardware devices?
a. Stand-alone applications
b. Interactive transaction-based applications
c. Embedded control systems
d. Batch processing systems
2. Which of the following statements are considered as a computer misuse?
a. Searching on private information and files.
b. Playing games on an other's machines
c. Dissemination of viruses.
d. All of them.
3. Decide if the following statements are true or false.
"S1: Software engineering is part of the system engineering."
"S2: Delivery time is a challenge to software engineering."
a. True, True
b. True, False
c. False, True
d. False, False
4. Which of the following is not a software process model?
a. The Waterfall Model.
b. The component-based model.
c. The Spiral Model.
d. The Redwine Model.
5. Waterfall software process model is not suitable to be used when _____.
a. Requirements are clearly understood.
b. Requirements are poorly understood
c. Replacing an existing system.
d. Producing a web-based system.
6. Which of the following is not correct regarding software cost in general?
a. Software cost depends on the product.
b. Maintenance costs are always several times of development costs.
c. Development costs are always several times of maintenance costs.
d. Software costs often dominate computer system costs.
7. Taibah University web site is an example of:
a. Customized software
b. Generic software
c. Open source software
d. All of them
8. Kaspersky Internet Security 2014 is an example of:
a. Customized software.
b. Generic software.
c. Open source software.
d. All of them.
9. Which of the following is not an activity of software engineering process?
a. Requirements specification
b. Implementation
c. Validation
d. None of them
10. Software engineering is concerned with _____ for professional software development.
a. Theories
b. Methods
c. Tools
d. All of them.
11. The software process model in figure-5 is called:
a. Water-fall model.
b. Spiral model.
c. Reuse model.
d. Formal specification model.
12. Which of the following is not correct regarding agile methods?
a. They focus on design rather than code.
b. They based on iterative approach to software development.
c. Customers should be closely involved throughout the development process.
d. The skills of the development team should be recognized and exploited.
13. Which of the following is correct regarding extreme programming?
a. It focuses on automated testing.
b. It based on incremental development.
c. It is an example of agile methods.
d. All of the above.
14. In extreme programming, pair programming ...
a. Serves as informal double checking of the code.
b. Two or more programmers set together to write the code.
c. It reduces the overall risks to the project if team members leave.
d. All of the above.

3-

-S1 True

System engineering is concerned with all aspects of computer-based systems development including hardware, software and process engineering. Software engineering is part of this more general process.

-S2 True

software engineering challenges:

Coping with increasing diversity, demands for reduced delivery times and developing trustworthy software.

4- **d-The Redwine model**

Software process models:

1- The waterfall model

2- Incremental development(spiral model)

3- Integration and configuration(the component-based model)

4- large systems are developed using a process that incorporates elements from all of these models.

5-b- **Requerment are poorly understood.**

Waterfall model is only appropriate when :

1-the requirements are well-understood and changes will be fairly limited during the design process.

2-Few business systems have stable requirements.

3-The waterfall model is mostly used for large systems engineering projects where a system is developed at several sites

6- **c-Development costs are always several times of maintenance.**

Software costs:

1- Software costs often dominate computer system costs. The costs of software on a PC are often greater than the hardware cost.

2- Software costs more to maintain than it does to develop. For systems with a long life, maintenance costs may be several times development costs.

3- Software engineering is concerned with cost-effective software development.

7-Customized software

Software products:

Generic products

- Stand-alone systems that are marketed and sold to any customer who wishes to buy them.
- Examples – PC software such as graphics programs, project management tools; CAD software; software for specific markets such as appointments systems for dentists.

Customized products

- Software that is commissioned by a specific customer to meet their own needs.
- Examples – embedded control systems, air traffic control software, traffic monitoring systems.

9-Which of the following is not Activity of software engineering process:

a-Requirement specification

b-Implementation

c-Validation

d-Noun of them

Software process activities:

- ✧ Software specification, where customers and engineers define the software that is to be produced and the constraints on its operation.
- ✧ Software development, where the software is designed and programmed.
- ✧ Software validation, where the software is checked to ensure that it is what the customer requires.
- ✧ Software evolution, where the software is modified to reflect changing customer and market requirements.

10-Software engineering is concerned with
..... for professional software development.

d-All of them

Software engineering is concerned with theories, methods and tools for professional software development

11-Software figure-5 **not found**

12-a-They focus on design rather than code.

Agile methods:

- Focus on the code rather than the design
- Are based on an iterative approach to software development
- Are intended to deliver working software quickly and evolve this quickly to meet changing requirements.

The aim of agile methods is to reduce overheads in the software process (e.g. by limiting documentation) and to be able to respond quickly to changing requirements without excessive rework.

13-d-All of the above

- ◇ Extreme Programming (XP) takes an 'extreme' approach to iterative development.
 - New versions may be built several times per day;
 - Increments are delivered to customers every 2 weeks;
 - All tests must be run for every build and the build is only accepted if tests run successfully.

14-d-All of the above

Pair programming:

- ◇ Pair programming involves programmers working in pairs, developing code together.
- ◇ This helps develop common ownership of code and spreads knowledge across the team.
- ◇ It serves as an informal review process as each line of code is looked at by more than 1 person.
- ◇ It encourages refactoring as the whole team can benefit from improving the system code.
- ◇ In pair programming, programmers sit together at the same computer to develop the software.
- ◇ Pairs are created dynamically so that all team members work with each other during the development process.
- ◇ The sharing of knowledge that happens during pair programming is very important as it reduces the overall risks to a project when team members leave.
- ◇ Pair programming is not necessarily inefficient and there is some evidence that suggests that a pair working together is more efficient than 2 programmers working separately.
- ◇

15. Which of the following is correct regarding agile methods?
- a. They focus on code rather than design.
 - b. They focus on producing the system at once.
 - c. Waterfall model is an example of these methods.
 - d. Developers work in isolation from the customers.

16. Decide if the following statements are true or false.
- "S1: In incremental model, the system is assembled from existing components."
"S2: In incremental model, specification, implementation, and validation are interleaved."
- a. True, True
 - b. True, False
 - c. False, True
 - d. False, False

17. The four activities included in many different software processes - mentioned in order - and are fundamental to software engineering are:
- a. Specification, design and implementation, validation, and evolution.
 - b. Evolution, specification, implementation, and validation.
 - c. Specification, design and implementation, reusing, and evolution.
 - d. Configuration, validation, specification, design and implementation.

18. Software implementation is the stage concerned with:
- a. Producing an executable version of the software.
 - b. Producing the software models.
 - c. Preparing the software documentation.
 - d. Preparing the training material.

19. The use of previously written software resources is also referred to as:
- a. Reuse.
 - b. Reengineering.
 - c. Reprocessing.
 - d. Restructuring.

20. The following are advantages of using incremental development model except:
- a. Rapid delivery and deployment of useful software to the customer is possible.
 - b. Earlier produced functions will receive more testing.
 - c. The system structure is well designed.
 - d. The cost of accommodating changing customer requirements is reduced

21. Which of the following is a functional requirement in a course registration system?
- a. Print student schedule.
 - b. Compute student cumulative average.
 - c. Drop a course.
 - d. All of them.

22. System requirements should be complete and consistent. This means:
- a. The requirements should be described in both natural language and UML models.
 - b. The requirements should include all system functions without conflict of their descriptions.
 - c. The requirements should be written using computer jargons.
 - d. All system functions should be described using all UML models.

23. The following statement "When a user request a list of available courses, then the list should be displayed in less than 30 seconds after the user clicked the request button" describes:
- a. A functional requirement.
 - b. A non-functional requirement.
 - c. A domain requirement.
 - d. All of them.

24. Figure-3 is an example of:
- a. Use-case diagram.
 - b. Sequence diagram.
 - c. Activity diagram.
 - d. State machine diagram.

25. Diagrams similar to figure-3 are used to:
- a. Show the steps of interaction between system elements to perform such task.
 - b. Show the movement of data between system classes.
 - c. Show the critical behavior of the system.
 - d. All of the above.

26. Constraints on the services offered by the s are considered as.....
- a. functional requirements
 - b. non-functional requirements
 - c. domain requirements
 - d. all of them

27. NL (Natural Language) is good in wri
- a. The system requirements.
 - b. The user requirements.
 - c. Both the system and user requirem
 - d. Neither the system nor the user re

16-Decide if the following statement are true or false.

s1-In Incremental Model The system is assembled from existing components

s2- In Incremental Model Specification, implementation and validation are interleaved

a- True, True

b- True, False

c- False, True

d- False, False

s1- Integration and configuration (تصحيح الخطاء)

s2-Incremental development

- Specification, development and validation are interleaved. May be plan-driven or agile.

17-The four activities included in many different software processes-mentioned in order –and are fundamental to software engineering are:

a- Specification, Design and implementation, Validation and Evolution

Many different software processes but all involve:

- 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

18-Software implementation is the stage concerned with:

a-producing an executable version of the software

19-The use of Previously written software resources is also referred to as:

a-reuse.

20- The following are advantages of using incremental development model except:

b-Earlier produced functions will receive more testing

advantages of using incremental development

- 1- The cost of accommodating changing customer requirements is reduced.
- 2- It is easier to get customer feedback on the development work that has been done.
- 3- More rapid delivery and deployment of useful software to the customer is possible.

Customers are able to use and gain value from the software earlier than is possible with a waterfall process

22-System Requirements should be complete and consistent this means:

b-the requirement should include all system functions without conflict of their descriptions.

In principle, requirements should be both complete and consistent.

✧ Complete

They should include descriptions of all facilities required.

✧ Consistent

There should be no conflicts or contradictions in the descriptions of the system facilities

23- The following statement “When a user request a list of available courses ,then the list should be displayed in less than 30 seconds after the user clicked the request button”describes:

b-Non –function requirement

الوصف السابق يصف سرعة استجابة جلب البيانات سرعة الاستجابة احد المتطلبات غير الوظيفية

Response time requirements

24- Figure-3 is an example of: **Not found in pdf file**

25-Diagrams Similar to figure-3 are used to : **Not found in pdf file**

26-Constraints on the services offered by the are considered as.....:

b-Non –function requirement

Non-functional requirements

- Constraints on the services or functions offered by the system such as timing constraints, constraints on the development process, standards, etc.
- Often apply to the system as a whole rather than individual features or services.

27-NL(Natural Language) is good in Write:

b-User Requirments

✧ User requirements

Statements in natural language plus diagrams of the services the system provides and its operational constraints. Written for customers

28. Users training time can be used as measure of:
- Software performance.
 - Software testing.
 - Software usability.
 - Software maintainability.
29. The student grades should be accessed only by the authorized users. This is a(an):
- Security requirement.
 - Response time requirement.
 - Reliability requirement.
 - Availability requirement.
30. Which of the following is a measure for software reliability?
- Rate time of failure.
 - Number of transaction/second.
 - Training time.
 - Storage size.
31. Based on figure-4, the employee is:
- Sub-class.
 - Super class.
 - An object of type employee.
 - An operation.
32. Attributes of projectManager in figure-4 are:
- Employee and Manager.
 - budgetsControlled, dateAppointed and projects
 - projects, dept and responsibilities.
 - Projects only.
33. The following is not correct regarding repository architecture?
- Components can be independent.
 - Components interact directly with each other
 - Changes made by one component can be propagated to all components.
 - All data can be managed consistently.
34. In Krutchen model: The Process view shows.....
- How the software is decomposed for development.
 - The key abstractions in the system as object classes. It considers the functional requirements.
 - How the system hardware and software components are distributed across the processors in the system.
 - How, at run-time, the system is composed of interacting processes. It considers the non-functional requirements.
35. Localize critical operations and minimize communications in a system results in:
- Performance enhancement.
 - Availability enhancement.
 - Security enhancement.
 - It is not suitable to do this.
36. The process of breaking the system down into its smaller components best defines:
- Coupling.
 - Cohesion.
 - Decomposition.
 - Scaling.
37. The diagram in figure-1 is:
- Use-case diagram.
 - State machine diagram.
 - Activity diagram.
 - Sequence diagram.
38. The stick notation () is used in the diagrams similar to figure-1 to represent:
- A user or another system.
 - An interaction with the system.
 - A non-functional requirement.
 - A class.
39. Each ellipse in figure-1 represents:
- An external entity involved in the interaction.
 - A part of the functional requirements.
 - A class.
 - All of the above.
40. In figure-2, if the system is in the "shutdown" state, then it can respond to:
- Shutdown(), clock and reportstatus().
 - Restart(), reconfigure() and powersave().
 - Reportweather(), remotecontrol() and testcomplete().
 - None of them.
41. Which of the following statements are correct?
- As the flexibility of a system decreases, its usability increases.
 - The time it takes to make a decision increase the number of alternatives increases.
 - To improve readability use a high contrast, avoid textured background
 - All of them.

29-The Student Grades should be accessed only by the authorized users ,this is a(an):

a-Security Requirments

30-Which of the following is a measure for software reliability?

a-Rate time of failure

software reliability

1-Mean time to failure

2-Probability of unavailability

3-Rate of failure occurrence

4-Availability

31-Based on Figure-4 the employee is:**Not Found Figure-4 in pdf file**

a-Sub-class

b-Super class

c-An object of type employee.

d-An operation

32-Attributes of projectManger in figure-4 are:

a-Employee and Manger

b-budgetsControlled,dateAppointed and projects

c-projects,dept and responsibilities.

d-Projects only

33-The following is not correct regarding repository architecture?

b-components interact directly with each other.

Repository architecture:

- ✧ Sub-systems must exchange data. This may be done in two ways:
 - Shared data is held in a central database or repository and may be accessed by all sub-systems;
 - Each sub-system maintains its own database and passes data explicitly to other sub-systems.
- ✧ When large amounts of data are to be shared, the repository model of sharing is most commonly used a this is an efficient data sharing mechanism.
- ✧ Components do not interact directly, only through the repository.

Advantage of Repository architecture:

Components can be independent—they do not need to know of the existence of other components. Changes made by one component can be propagated to all components. All data can be managed consistently (e.g., backups done at the same time) as it is all in one place.

34-In krutechen model: the process view shows.....

d-how at run-time the system is composed of interacting processes .it considers the non-functional requirments

37-The diagram in figure-1 is: **not found in pdf file**

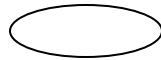
38-The Stick notation (Actor) is used in the diagrams similar to figure-1 to represent:

a-Auser or another system.

Actors in a use case may be people or other systems.(توضيح)

39-Each ellipse in figure-1 represents:

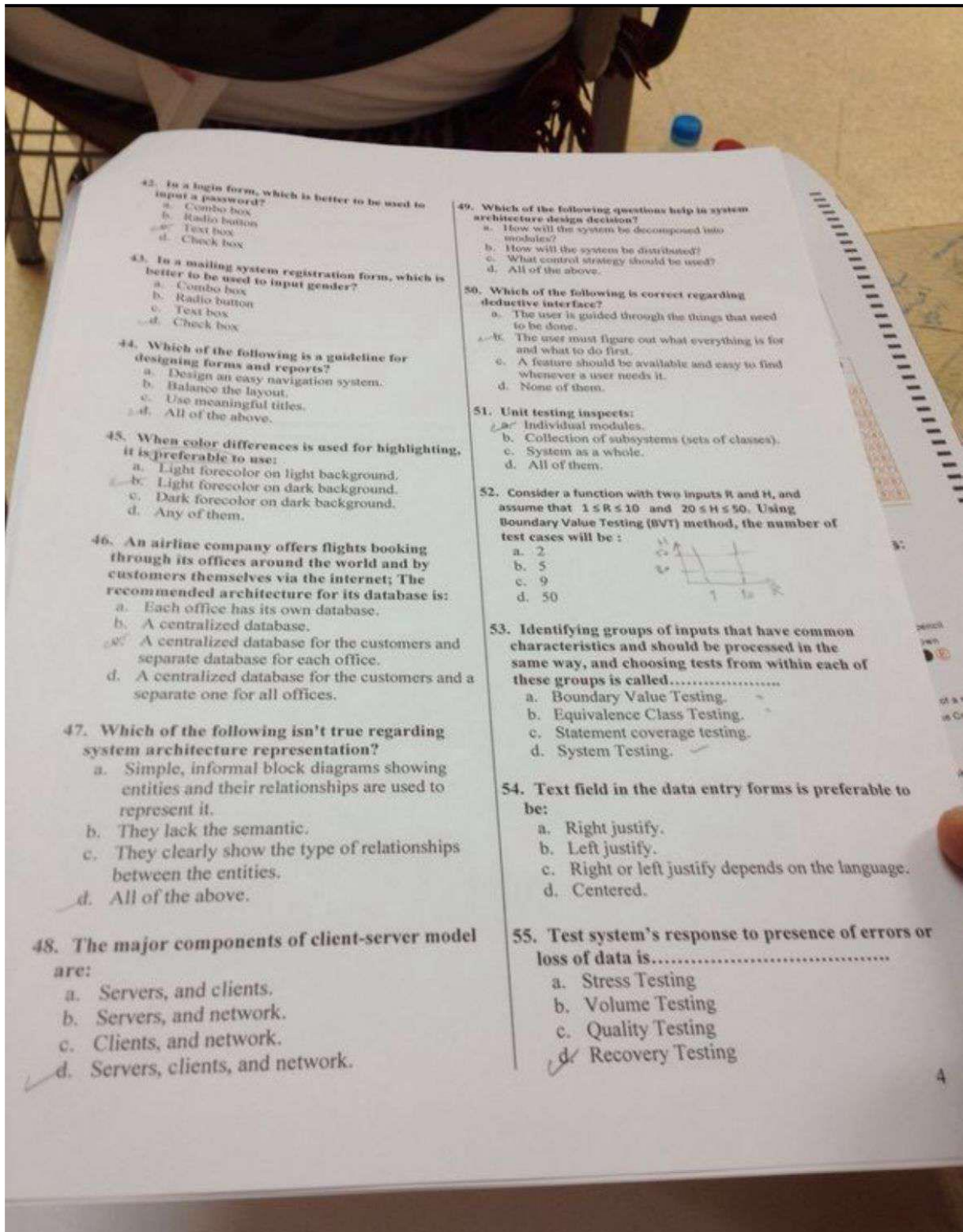
b-Apart of the function requirements



40-in figure-2 if the system is in the “shutdown” state then it can respond to: **Not Found Figure2 in pdfFile**

41-Which of the following statements are correct?

d-All of them



43-b-Radio button

44-d-all of above

تصميم الواجهات والتقارير تتضمن سهولة التنقل وتناسب التصميم واستخدام عناوين ذات معنى

45-b-light forecolor on dark background

46-c-A centralized database for the customers and separate database for each offices

قاعدة البيانات تكون مركزية بالنسبة للعميل من اجل حجز بطاقة الطيران من أي مكان في العالم دون النزول الى مكتب الطيران من اجل الحجز .
ومنفصلة بالنسبة لمكاتب الطيران من اجل تسجيل البيانات وانشاء التقارير اليومية الخاصة بكل مكتب

47-d-All of the above

Architectural representations:

- ✧ Simple, informal block diagrams showing entities and relationships are the most frequently used method for documenting software architectures.
- ✧ But these have been criticised because they lack semantics, do not show the types of relationships between entities nor the visible properties of entities in the architecture.

Depends on the use of architectural models.The requirements for model semantics depends on how the models are used

48-d-Servers ,clients and network

Network which allows clients to access servers.

51-

a-Individual modules

Unit testing is a software development process in which the smallest testable parts of an application, called units, are individually and independently scrutinized for proper operation. This testing methodology is done during the development process by the software developers and sometimes QA staff

52-a-2

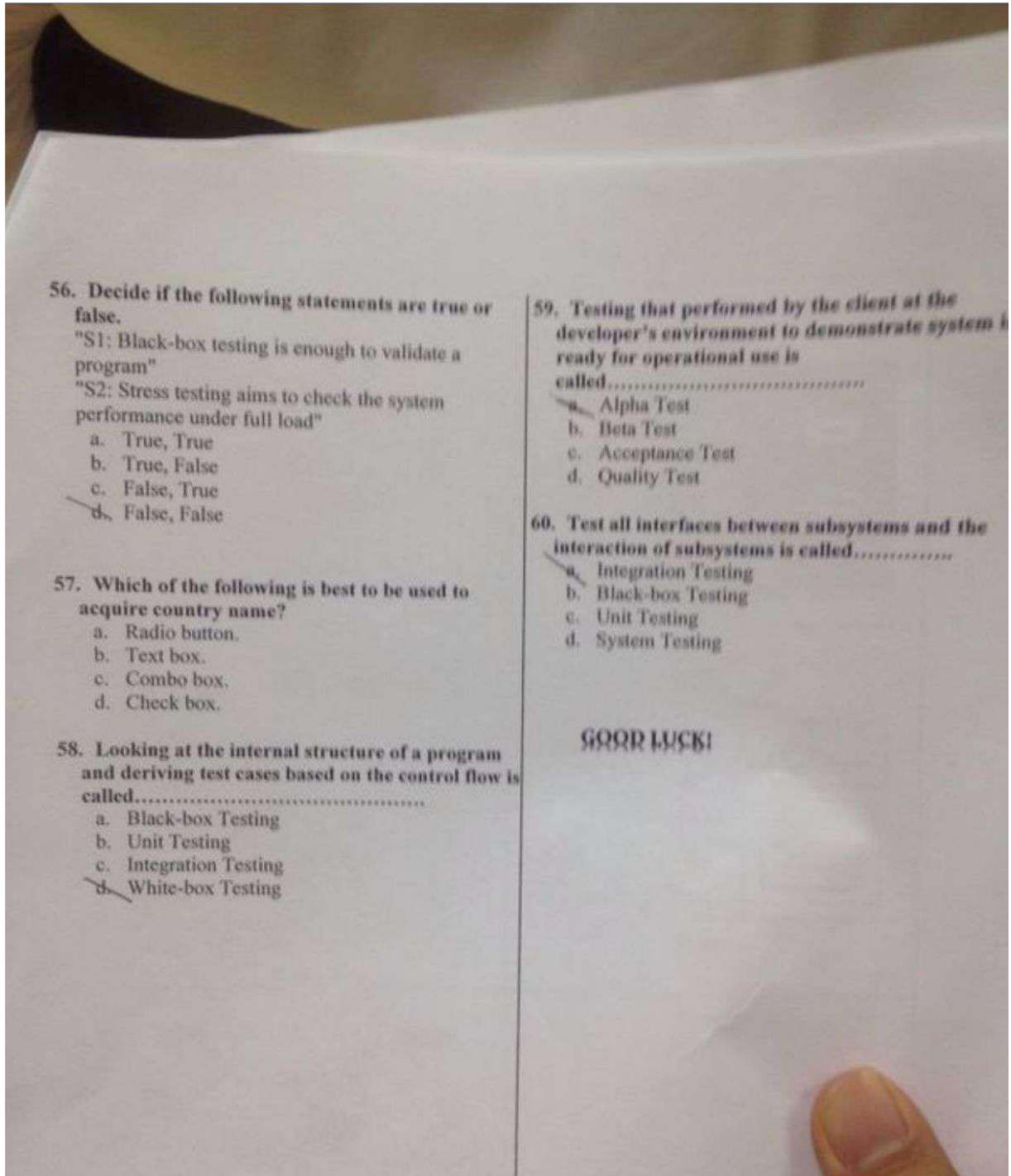
typically, we choose one test case from each boundary. Finding defects using Boundary value analysis test design technique is very effective and it can be used at all test levels. So one test case for valid input data should be sufficient.

53-a Boundary value testing

54-d-centerd

55-d-Recovery Testing

يتم اختبار النظام عند حصول أخطاء أو فقد البيانات تسمى اختبار استعادة النظام الى نقطة صحيحة



56-c-False,True

S1- Black-box testing is a method of software testing that examines the functionality of an application without peering into its internal structures or workings.

S2- Stress Testing A type of performance testing performed to find the behavior of the application under extreme load.

57-c-Combo Box

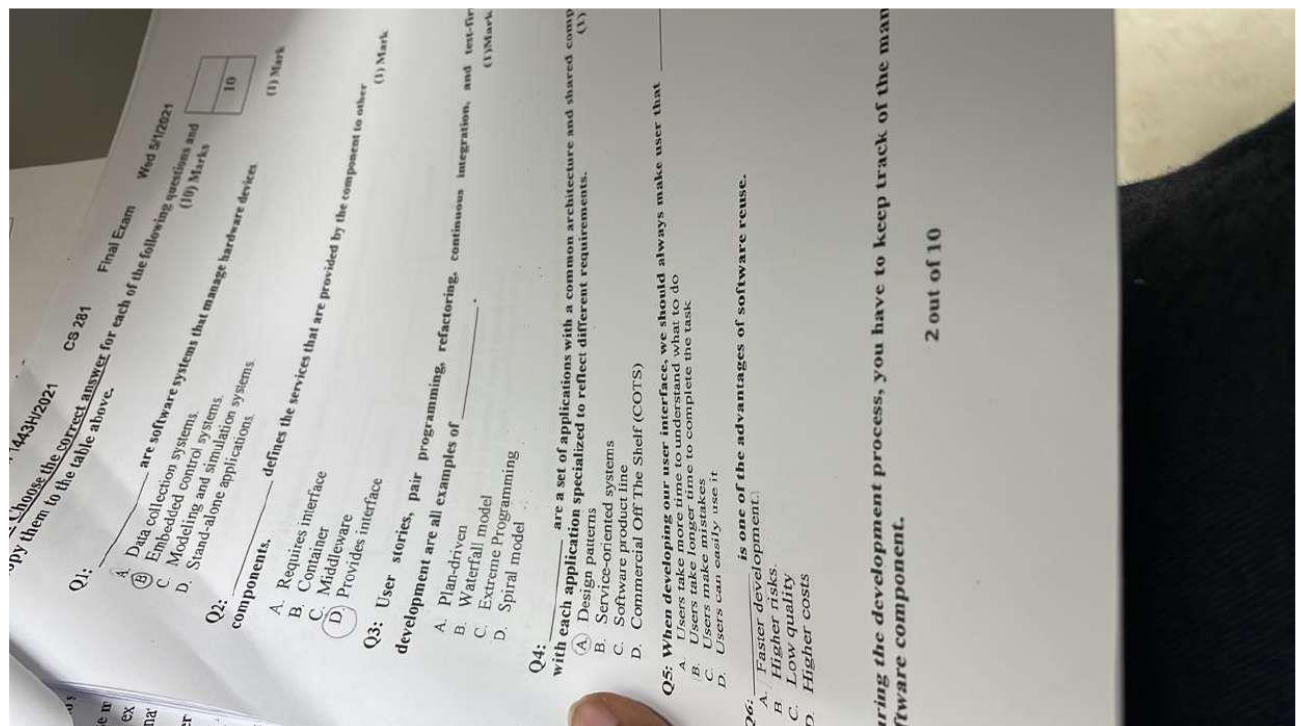
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58-d-White-box Testing

White Box Testing is software testing technique in which internal structure, design and coding of software are tested to verify flow of input-output and to improve design, usability and security.

59-b-Beta test

Beta Test is a type of software testing which is carried out by the clients/customers. It is performed in the **Real Environment** before releasing the product to the market for the actual end-users.



Q1:

B-Embedded control systems

الانظمة المدمجة هي التي تقوم بادارة المكونات المادية

Q2-

D-provides interface

A provided interface on a port specifies one or more operations that a block (or one or more of its parts) must provide. A part that has a port with a required interface needs to be connected to another part that provides the services it needs, typically via a port with a provided interface.

Q3-

D-Spiral Model

في هذا النموذج الحلزوني تتم بشكل مستمر

Q4-

c- software product line

A software product line is a set of applications with a common architecture and shared components, with each application specialized to reflect different requirements.

Q5-

D-Users can easily use it

Q6-

A-faster development

Final Exam Wed 5/1/2021

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Umm Al-Qura University
Riadina Campus
Faculty of Science and Engineering
Computer Science
(2021/2022)

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CS 281

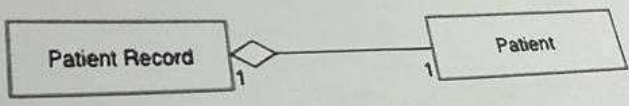
Final Exam Wed 5/1/2021

- A. Configuration management.
- B. Reuse.
- C. Host-target development.
- D. Problem tracking.

Q8: Which one of the following is a representation of Agile Principles? (1) Mark

- A. Process not People
- B. comprehensive documentation
- C. Accept changes
- D. No Customer Involvement

Q9: Which of the following statements about the given diagram is true? (1) Mark



- A. Patient class is part of Patient Record class.
- B. Patient Record class is part of Patient class.
- C. Patient Record class is inherited from Patient class
- D. Patient class is inherited from Patient Record class.

Q10: In _____, project managers assess the risks that may affect a project, monitor these risks and take action when problems arise. (1) Mark

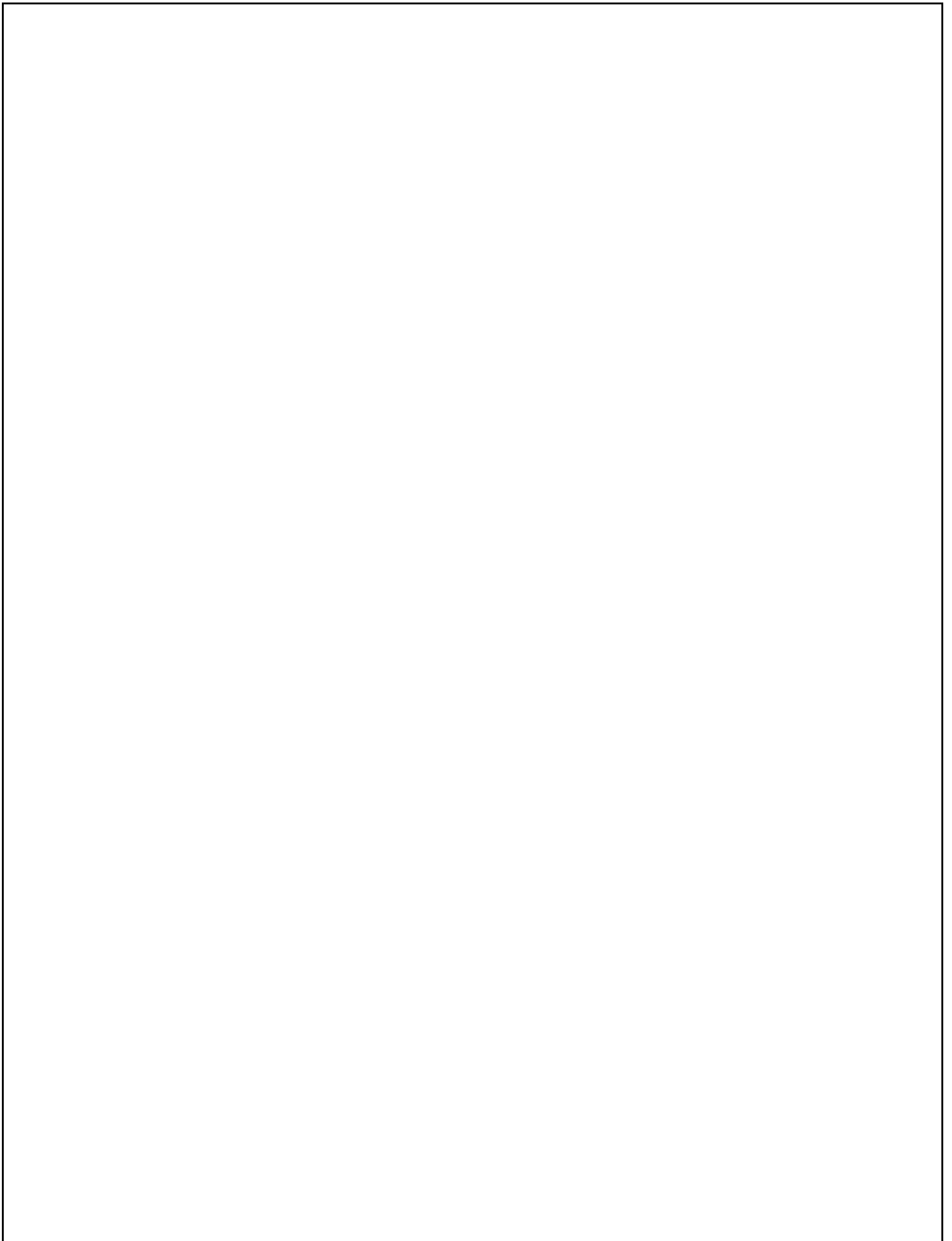
- A. People management
- B. Project planning.
- C. Risk management.
- D. Reporting.

Q7-A-Configuration management

Q8-B-Comprehensive documentation

Q9-B-Patient Record class is part of Patient class

Q10-C-Risk Managment



Part 2: Select the best software process model (Waterfall model, Incremental development model, or Reuse-oriented model, Spiral model) that can be used in the following cases and **explain your answer.** (6) Marks

6

Q11: "An information management system that will be developed for a company where the requirements are poorly understood." (2) Marks

Software process model	Explanation
Waterfall model	

Q12: "An accounting system that replaces an existing system. The functionality of the current system works fine and no need to start from scratch." (2) Marks

Software process model	Explanation

Q13: "A system will be developed for an aircraft where safety is the main concern." (2) Marks

Software process model	Explanation

Q11:

SoftWare Process Model	Explanation
Incremental development Model	Requirment are poorly understood So we use the Incremental development Model

Q12:

SoftWare Process Model	Explanation
Reuse-oriented model	We reuse existing system functions in replacement system and no need to strat from scratch.

Q13:

SoftWare Process Model	Explanation
Waterfall model	We used this model to start from zero and focuse in system's safety

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Final Exam

Wed 5/1/2021

Based on the following description, select the most appropriate architectural design pattern (Layered pattern, Client-server pattern, Pipe-filter pattern, or Model-view-controller pattern) and explain your answer:

Q14: "The view receives the user action, passes it to the controller, which then requests for adding data from the model to the database."
(4) Marks

4

Design pattern

M C V

Explanation

(2) Marks

Q15: "Online applications such as email, that the client can send his email to other using address."
(2) Marks

Design pattern

client server

Explanation

Q14-

Design Pattern	Explanation
Mvc Model	System content 1-View Receives User Action passess to the Controller Controller Request for adding data from the model This system use Model View Controller

Q15:

Design Pattern	Explanation
Cleint Server	Client send Email to other Users Reciver User is Read Email from Gmail Server

Based on your knowledge of testing activities, select the most suitable testing approach (Component testing, Release Testing, Alpha testing, Unit testing, System testing) for the following scenarios and explain your answer: (4) Marks

4

Q16: "An e-commerce website allows buyers to enter their usernames and passwords to log in and access their recent orders. At the login page, the website's admin wants to check whether the "username" and "password" text fields and "OK" button work as intended and accept input from buyers every time."
(2) Marks

Testing approach	Explanation

Q17: "A new chatting app, referred to as Halla, proposed by a local start-up company. The testing team were asked to perform a collective testing process to ensure how compatible and correct interaction between the apps' components. The team maintained a test plan that will verify many requirements including: 1) users can register using a new mobile number after downloading the app, 2) users can send and receive chats in secondary languages, 3) users can delete text, images, audio, video messages within a chat, and 4) users can take a complete backup of chats."
(2) Marks

Testing approach	Explanation

Q16:

Testing approach	Explanation
Beta Testing	Beta Testing usability, functionality, security, and reliability are tested to the same depth.

Q17:

Testing approach	Explanation
SystemTesting	System testing is divided into more than 50 types. In this system we have a lot of testing

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CS 281

Final Exam

Wed 5/1/2021

Part 3: You have been assigned to a team that will be developing an ATM system. As part of the project startup, the project manager has asked you to specify the software requirements during the requirements specification phase and create an initial design for the domain-specific classes. You have been given the written description of the system as follows:

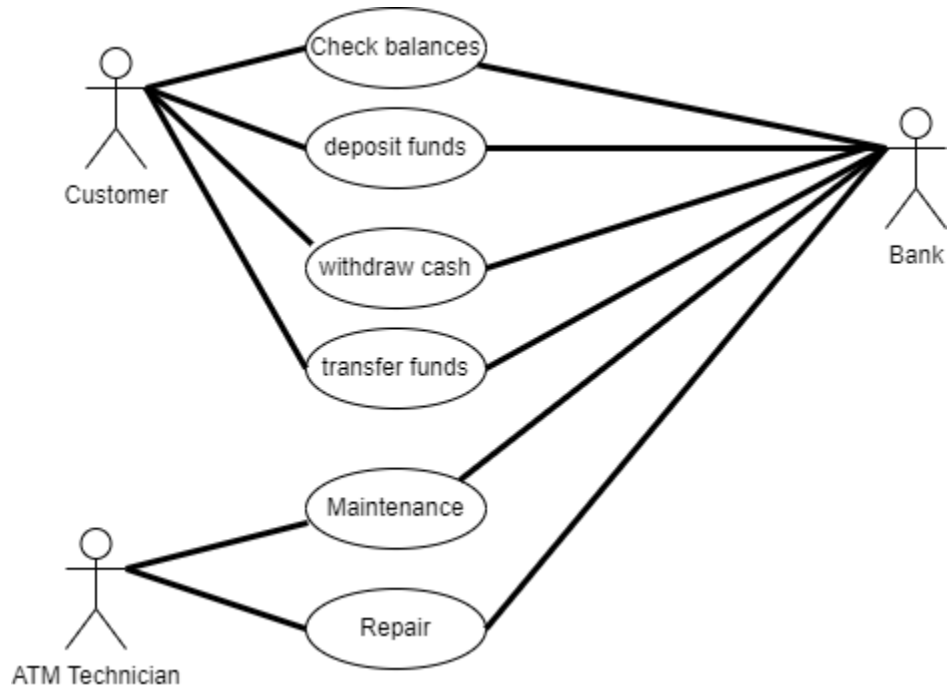
6

(6) Marks

"Customer uses a bank ATM to check balances of his/her bank accounts, deposit funds, withdraw cash and/or transfer funds. ATM Technician provides maintenance and report fault. The bank maintains all of the above information."

Q18: Draw a use case diagram for the above system's requirements.

Use case Diagram



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CS 281

Final Exam

Wed 5/1/2021

You have been assigned to a team that will be developing a system for an Information System department. As part of the project startup, your project manager has asked you to draw a class diagram. You have been given the written description of the system as follows:

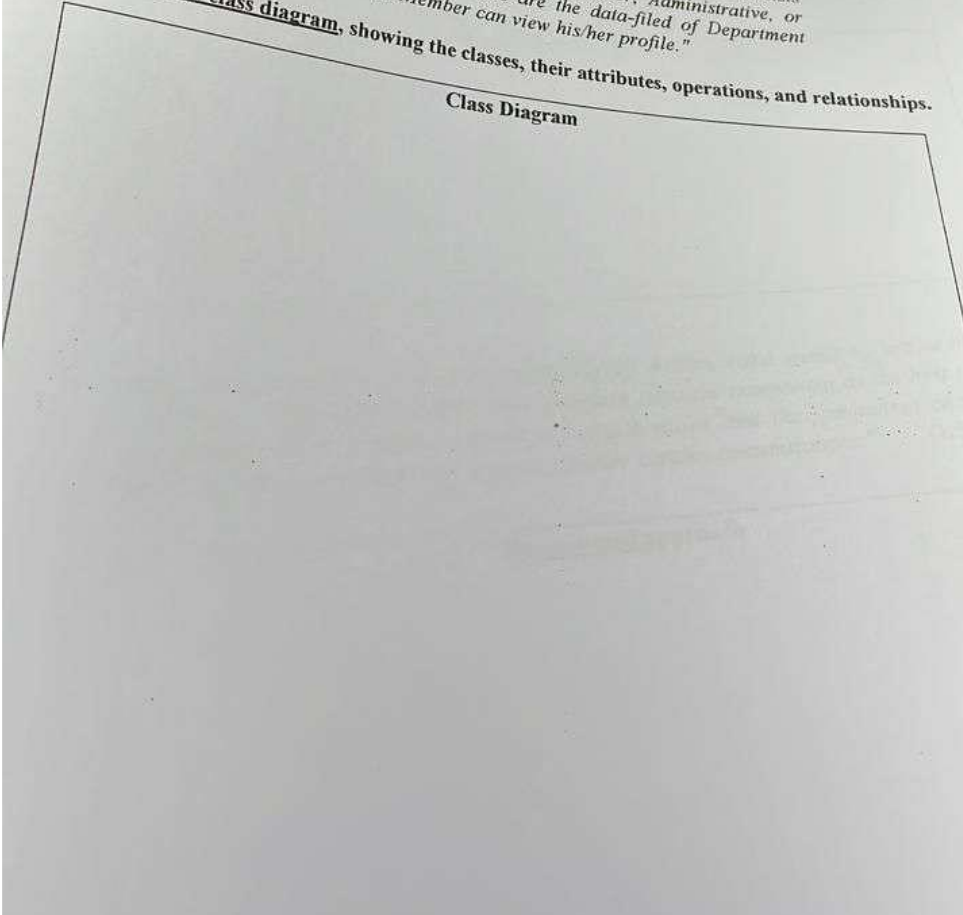
"The system stores the name and info of a department. A Department consists of several Members. A Member can be a Professor, Administrative, or Student. ID, name, email and address are the data-fields of Department Members. Any Department Member can view his/her profile."

(7) Marks

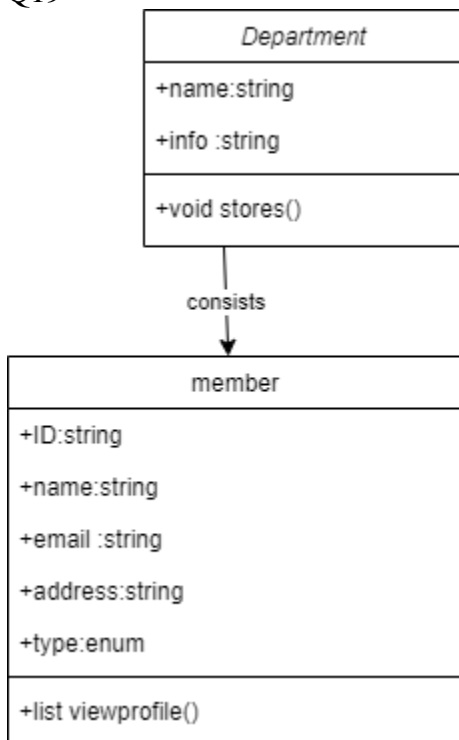
7

Q19: Draw a class diagram, showing the classes, their attributes, operations, and relationships.

Class Diagram



Q19



Based on your knowledge of software reuse activities, choose the most suitable reuse-based (Function reuse, Component reuse, System reuse) software engineering approach for the following scenarios: (3) Marks

3

Q20: "Tutoring website allows students to use its mathematical functions for example, calculate `TriangleArea()` function, that was created and tested before. The programmer wants to use the same function without reimplementing it from scratch." (1.5) Marks

Reuse-based approach

Q21: "An e-commerce website is upgrading its features and wants to use a new payment component. The website's admin sees a certain payment component as the best option for a new upgrade. The payment component manual stated that the component came from financial sub-systems that may be reused under certain circumstances." (1.5) Marks

Reuse-based approach

Q20:

1-Function reuse

calculate `TriangleArea()`

2-component reuse

Use Source code and UserInterface of Tutoring website

3-System reuse

Tutoring website and hardware like Server

Q21:

1-Function reuse

certain payment

2-Component reuse

financial sub-systems

3-System reuse

e-commerce website

upgrading its features and wants to use a new component

3

Optional: "You have been asked to develop an online shopping system. Customers can browse the catalog to view various items and request to purchase one or more items from the supplier. The customer provides personal details, such as address and credit card information. The supplier checks the available inventory, confirms the order, and enters a planned shipping date. When the order is shipped, the customer is notified. The system should provide fast and accurate services to the users in addition to the ease of use".

Based on the above scenario description, answer the following questions: (3) Marks

Q22: List two methods/techniques that can be used to help you discover requirements during requirements discovery activity. (1) Mark

Q23: Write two non-functional requirements in the above system and describe how do you measure it. (1) Mark

Q24: Write two functional requirements found in the scenario.

Q22

Software process activities:

- ✧ Software specification, where customers and engineers define the software that is to be produced and the constraints on its operation.
- ✧ Software development, where the software is designed and programmed.
- ✧ Software validation, where the software is checked to ensure that it is what the customer requires.
- ✧ Software evolution, where the software is modified to reflect changing customer and market requirements

Q23

1-The System should provide fast and accurate to the users.

2-The System Ease of use

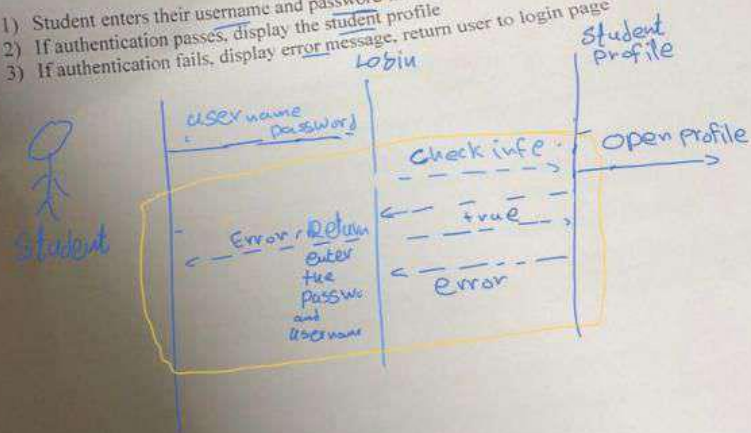
Q24

1-Customer can browse the catalog to view various item and request to purchase one or more item from the supplier.

2-The Supplier Checks the available inventory confirms the order and enters the planned shipping.

Draw a sequence diagram for students logging into a university website as follows:

- 1) Student enters their username and password through login page.
- 2) If authentication passes, display the student profile
- 3) If authentication fails, display error message, return user to login page



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Part 3: Answer each of the following questions

(7) Marks

11. Suppose that you were asked to build a library management system. Read the following requirements, then answer below:

A Library Management System is software built to handle the primary functions of a library. Libraries rely on library management systems to manage asset collections as well as relationships with their members. Library management systems allow users to reserve books and checkouts where there are multiple ways to view and interact with data. Library management systems also involve maintaining the database for entering new books and modifying books.

Functional Requirements

1. Any librarian should be able to search books by their title, author, subject category as well by the publication date.
2. Librarian should be able to adding and modifying books, and return book.
3. The system should be able to send notifications whenever the reserved books become available.
4. The system should be able to send notifications when the book is not returned within the due date.
5. All Users can search the catalog, as well as check-out and return any copy.
6. There should be a maximum limit (5) on how many books a member can check-out.
7. There should be a maximum limit (10) on how many days a member can keep a book.

(1) Mark

1) Identify the actors of the system.

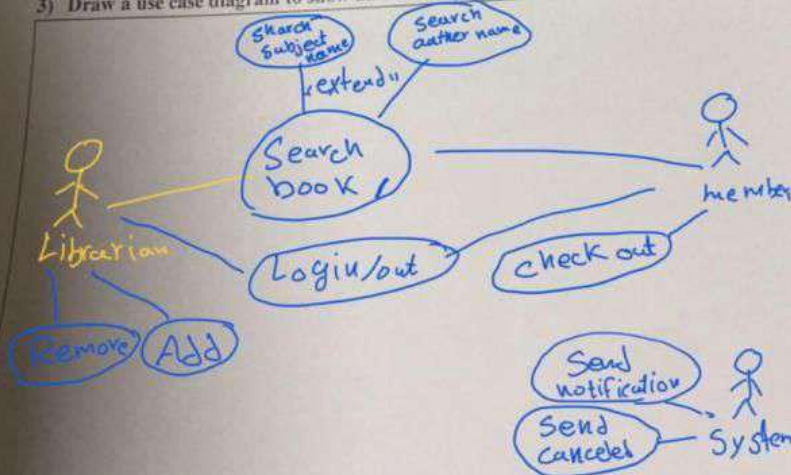
- System Librarian
- Member

2) Identify the architecture patterns that would be suitable for the system. Briefly explain your answer.

MVC

multiple ways to view and interact with data.

3) Draw a use case diagram to show all the functionality of the system.



1-Librarin, System Library, Member

2-Used when there are multiple ways to view and interact with data. Also used when the future requirements for interaction and presentation of data are unknown.

3-

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