

King Fahd University of Petroleum and Minerals
Information and Computer Science Department
SWE-205: 'Introduction to Software Engineering' (081)
Major # 2, January 3, 2009
Time: 90 Minutes

Instructor: Dr. Sajjad Mahmood

Name:	Student ID:
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Questions	Marks	Your Score
Question # 1		
Question # 2	20	
Question # 3	20	
Question # 4	20	
Question # 5	20	
Total	100	

Notes:

1. The exam has questions and consist of pages.
2. You are expected to answer all questions.
3. This is a closed book exam.
4. Please free to use the back of the page. However, please make sure you indicate this in order for me to not miss it for grading.

1. Question 1: True/False & Short Description.

[30 Marks]

a. Mark the correct statements as True [T] and the incorrect statements as False [F]

[15 Marks, 1.5 marks each]

1. A well designed user interface means that users will probably be unable to access some of the system features. F
2. UML sequence diagrams can be used to model behaviour that show the sequence of actions involved in a use case. T
3. A state machine model describes how data is processed by a system. F
4. Risk identification is the process of discovering the root cause of risks in a particular system. F
5. The repository model of architecture organises a system into layers, each of which provide a set of services. F
6. Language processing systems accept a natural or artificial language as an input and generate some other representation of that language as an output. T
7. User interaction is the process of assessing the usability of an interface and checking that it meets user requirements. F
8. One needs to specify the interfaces between the components in the design so that objects and sub-systems can be designed in parallel. T
9. In software testing, failure is an incorrect step, process or data definition. F
10. An object is an entity that has a state and a defined set of operations that operate on that state. T

b. An organization has three categories of employee: professional staff, technical staff and support staff. The organization also has departments and divisions. Each employee belongs to either a department or a division. Assume that people will never need to change from one category to another.

[5 Marks]

2. Question 2: System Models & Critical Systems Specification

[20 Marks]

- a. Develop a sequence diagram showing the interactions involved when a student registers for a course in a university. Courses may have limited enrolment, so the registration process must include checks that places are available. Assume that the students access an electronic course catalogue to find out about available courses. **[6 Marks]**

[Solution Manual page 21.](#)

- b. Based on your experience with an airline online booking system, draw a data-flow diagram modelling the data processing involved when a customer purchases an airline ticket from an airlines website. **[6 Marks]**

[Solution Manual page 19.](#)

- c. Define 'Risk Reduction Assessment'. Be brief, concise and to-the-point. **[2 Marks]**

[Risk reduction assessment aims to identify dependability requirements that specify how the risks should be managed and ensure that accidents/incidents do not arise.](#)

- d. Identify three possible strategies for risk reduction assessment. **[6 Marks]**
1. [Risk avoidance;](#)
 2. [Risk detection and removal; and](#)
 3. [Damage Limitation.](#)

3. Question 3: [20 Marks]

- a. Based on four basic application types discussed in the lectures, classify the following systems and explain your classification.

[12 Marks]

1. A system that sends out reminders that IEEE subscriptions are due to be paid.

[Batch Processing](#)

2. An interactive game in which characters move around, cross obstacles and collect treasure.

[Event Processing](#)

3. A system that reads web pages to visually disabled users.

[Language Processing](#)

- b. Suggest an appropriate structural model for the following systems.

[8 Marks]

1. A computer-controlled video conferencing system that allows video, audio and computer data to be visible to several participants at the same time.

Client server model because the system needs a local processing to handle multimedia data.

2. A robot floor-cleaner that is intended to clean relatively clear spaces such as corridors. The cleaner must be able to sense walls and other obstructions.

Repository model where all sub-systems place information in the repository for other sub-system to use.

4. Question 4: Object-Oriented Design

[20 Marks]

- a. Explain at least two reasons why adopting object-oriented design should lead to a design that may be readily modified.

[8 Marks]

- Object-oriented design helps to reduce the problems encountered during system modification as it supports the grouping of entities (in object classes) so therefore simplifies program understanding.
 - It also provides protection for entities declared within objects so that access from outside the object is controlled. This reduces probability that changes to one part of the system will have undesirable effects on some other part.
- b. A weather mapping system is required to generate weather maps on a regular basis using data collected from remote, unattended weather stations and other data sources such as weather observers, balloons and satellites. Weather stations transmit their data to the area computer in response to a request from that machine.

The area computer system validates the collected data and integrates the data from different sources. The integrated data is achieved and, using data from this archive and a digitised map database, a set of local weather maps is created. Maps may be printed for distribution on a special-purpose map printer or may be displayed in a number of different formats.

[12 Marks]

5. Question 5: User Interface Design and Testing

[20 Marks]

- a. User interface design decisions needs to take into account the physical and mental capabilities of the intended users. Identify four important human factors that you should consider in interface design.

[8 Marks]

- Limited short-term memory
- People make mistakes
- People are different
- People have different interaction preferences

b. User interface is an iterative process involving close cooperation between users and designers. Identify three core activities of user interface design.

[9 Marks]

- User analysis
- System prototyping
- Interface evaluation

c. In the Lion King Animated Game, mention the mistake committed by Disney that led to the software problem in their first CD production.

[3 Marks]

Disney did not test their software on more than one PC platform.