

Mansoura University
Software Engineering (1)
Date: 12/1/2015
Final Exam.

Faculty of Computer and Information Sciences
Third year Computer Science Department
Time allowed: Three hours
60 points

Answer the following questions:

Question # 1 (15 points)

a. (10 points) State whether the following sentences are TRUE or FALSE, and correct the false sentences:

- 1. Architecture design is a creative activity which identifies software components and their relationships, based on a customer's requirements.**
- 2. Structured specifications work well for writing business system requirements.**
- 3. Activity diagrams show the activities involved in a data processing.**
- 4. It may be impossible in throwaway prototyping to tune the system to meet non-functional requirements.**
- 5. Application product lines are means of representing, sharing and reusing knowledge.**
- 6. Each use case shows interactions between system components.**
- 7. A system context model demonstrates how the system interacts with its environment as it is used.**
- 8. Testing is the most commonly used V & V activity.**
- 9. Few business systems have stable requirements.**
- 10. An interaction model shows the other systems in the environment of the system being developed.**

b. (5 points) Implement the appropriate structural model for the following systems:

- A computer-controlled video conferencing system that allows video, audio, and computer data to be visible to several participants at the same time.
- A translator which translates from a language to another, and has the spelling-check and the correcting functions.

Question # 2 (15 points)

a. (5 points) Can the non-functional requirements conflict with the functional requirements? give in details some examples to justify your answer.

b. (6 points) Using the UML, design the class diagram (including attributes and operations) for:

- A hotel reservation system.
- An automatic teller machine (ATM) for a banking system.

c. (4 points) Show in details the structured specification of a requirement for an E-mail system which is responsible for sending and receiving electronic mails.

Question # 3 (15 points)

a. (5 points) Describe in details the tabular specification of computation for a conversion system, that converts between different units of measurement such as weights, lengths, currency, time, and temperature.

b. (10 points) A system is developed for registering students at a university. The university has number of colleges, and each college has some departments. The students are allowed to register for limited number of courses. The students also have the ability to change/cancel/add courses at most one month from the semester starting date. The academic year has two semesters. The university has number of class rooms, so the registration process must include checks that place for any course is available. Assume that the student accesses an electronic course catalog to find out about available courses.

- Draw the activity model of this system and list at least three of its stakeholders.
- Show in details one of its use cases, and at least two possible sequence diagrams.
- Which software process model you may use and why?

Question # 4 (15 points)

a. (5 points) Draw the state diagram for:

- An automatic washing machine that has different programs for different types of clothes.
- An automated petrol (gas) pump system that includes a credit card reader. The customer swipes the card through the reader then specifies the amount of fuel required. The fuel is delivered and the customer's account debited.

b. (10 points) A travel planning system that helps customers plan their journeys. The system books airplane tickets for a passenger or group of passengers. The system gives the option to reserve a ground transportation (car, taxi, train,..) at the arriving airport. This passenger (or passengers) should be given the option of booking either of these available ground transportation methods. The system also has the option to reserve a hotel. For this system:

- Show in details its subsystem model, functional, and non-functional requirements.
- Which software process model you may use and why?
- Describe one scenario to show how this system may be used.

You may add any assumptions.

Good Luck

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a. (10 points) State whether the following sentences are TRUE or FALSE, and correct the false sentences:

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- 2. Structured specifications work well for writing business system requirements.**
- 3. Activity diagrams show the activities involved in a data processing.**
- 4. It may be impossible in throwaway prototyping to tune the system to meet non-functional requirements.**
- 5. Application product lines are means of representing, sharing and reusing knowledge.**
- 6. Each use case shows interactions between system components.**
- 7. A system context model demonstrates how the system interacts with its environment as it is used.**
- 8. Testing is the most commonly used V & V activity.**
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b. (5 points) Implement the appropriate structural model for the following systems:

- A computer-controlled video conferencing system that allows video, audio, and computer data to be visible to several participants at the same time.
- A translator which translates from a language to another, and has the spelling-check and the correcting functions.

Question # 2 (15 points)

a. (5 points) Can the non-functional requirements conflict with the functional requirements? give in details some examples to justify your answer.