National University of Computer & Emerging Sciences, Karachi
Faculty of Computing
Midterm I Exam (Fall-2023)
26th September 2023, 11:30 AM – 12:30 PM

Course Code: SE2001	**Course Name: Software Requirements Engineering**
Instructor Name: Dr. Syed Muazzam Ali Shah	
Student Roll No:	**Section No:**

Time: 60 minutes **Max Marks**: 30 Points

Instructions:

- Out of order questions will not be graded.
- Return the question paper and make sure to keep it inside your answer sheet.
- Read each question completely before answering it. There are **3 questions and 2 pages**.
- In case of any ambiguity, you may make assumption. However, your assumption should not contradict any statement in the question paper.
- You are **not allowed to write** anything on the question paper (except your ID and section).

Question 1 [10 points] [CLO 1]

During the modern era of technology, there is no question about the impact of automation on revolutionizing in both small and large business organizations. While there are several aspects of automation in the business world, a payroll management system has by far made things even simpler and efficient. These days all business organizations are using a payroll management system to manage financial details of their employees. You have been assigned a role of Requirement Engineer for the development of a **Payroll Management System**.

Answer the following questions:

a) Identify any three functional requirements in the form of complete statements for the above system. ***(except login and logout)*** **(3)**

b) Identify any three non-functional requirements in the form of complete statements for the above system. **(3)**

c) Identify two domain-specific requirements in the form of complete statements for the above system. **(2)**

d) Identify any two actors and stakeholders with their roles for the above system. **(2)**

Solution:

Part a:

Functional Requirements

FR1	Admin must login the system using credentials.
FR2	The system should calculate normal and overtime pay of the employees.
FR3	The system should create or print checks and also provide direct deposit service
FR4	The system should generate custom reports
FR5	The must maintain the records of all employees
FR6	The system should have payroll tax calculator.
FR7	The system should be integrated with HR system
FR8	The system should send alerts and notifications
FR9	The system should generate digital receipt or pay slips

FR10	The system should generate auto-scheduling Reports

Part b:

Non-Functional Requirements

NFR1	System should compatible with other platforms
NFR2	System should provide full security and data is protected against attacks
NFR3	System must maintain the Logs successfully
NFR4	System must have high response rate that shows its performance
NFR5	The system must have mechanism for data backup and recovery

Part c:

Domain Requirements

DR1	System should be secure and protected
DR2	System should have payroll and tax management functionalities
DR3	System should have expense management and processing facilities
DR4	System must have compliance management functionalities
DR5	System must have dashboard and reporting

Part d:

1) Employee
2) Central finance department e.g., accountant
3) HR Director
4) CEO
5) Tax collecting bodies
6) Audit team

Question 2 [10 points] [CLO 2]

a) Define the requirements engineering process maturity model. Also mention the level of maturity for the following organizations with valid justifications. **(3)**

Solution:

A requirements engineering process maturity is the extent to which an organization has a defined requirements engineering process based on good requirements engineering practices. An organization with a mature RE process will have this process explicitly defined. I t will use appropriate methods and techniques for requirements engineering, will have defined standards for the requirements documents, requirements descriptions, etc.

i. Organizations in **Defined** level have a defined requirements engineering process model based on best practices, and an active process improvement program in place.
ii. Level **Repeatable** organizations have introduced policies and procedures for requirements management and also use advanced tools and techniques in their requirements engineering process.

b) Briefly explain the three major objectives or goals of process improvement. **(3)**

Process improvement is concerned with modifying processes in order to meet some improvement objectives.

Solution:

Improvement objectives:

Quality improvement:

The outputs produced by the process are of higher quality. In the case of requirements, this means that they may contain fewer errors, may be more complete or may better reflects the real needs of system stakeholders.

Schedule reduction:

The outputs form the process are produced more quickly. In the case of requirements, this means that less time is needed to produce the final version of the requirements document.

Resource reduction:

Fewer resources such as staff time are needed to enact the process. Therefore, a smaller team of requirements engineers can produce the final requirements document.

c) Which type of process model is required to document the information needs of different people involved in the process? Why and which model of software system (as part of the requirements elicitation process) best describes the above process model? **(4)**

Solution:

Role-action diagrams are process models which show the actors associated with different process activities. They **document the information needs of different people** involved in the process. They use **model of prototype software system** as part of requirements elicitation process.

Question 3 [10 points] [CLO 3]

a) Describe with examples the three fundamental ways to structure knowledge acquired during requirements elicitation process. **(5)**

Solution:

❖ **Partitioning:**

Organization of knowledge into aggregation relationships where requirements knowledge is described in terms of its parts. A booking record may be defined as a flight reference, source & destination of flight, the name & address of the passenger, fare, and date of travel.

❖ **Abstraction:**

Organization of knowledge according to general/specific relationships. Requirement knowledge is described by relating specific instances to abstract structures Passenger abstraction may represent all classes of passengers (children, adults, full-fare paying, concessionary passengers, etc.)

❖ **Projection:**

Organization of knowledge from several different perspectives or viewpoints. Booking system example: travel agents, airline management, check-in desk operators, passengers, a bookings database, etc.

b) Effective elicitation requires effective cooperation; however, it is quite challenging for the requirements engineers and the stakeholders to create and maintain good working environment. Discuss three of these challenges. **(3)**

Solution:

1) **Insufficient time has been allowed for the requirements election:**

Stakeholders are busy people with a job to do and they don't have a great deal of free time to discuss new systems with requirements engineers.

2) **Requirements engineers may not well-prepared themselves for the requirements engineering process:**

Developing an understanding of an application domain is essential for effective elicitation. Sometimes, however, requirements engineers either don't or can't learn about the domain before talking to stakeholders. This make stakeholders impatient and results in misunderstandings because specialized terms are used which are unfamiliar to requirements engineers.

3) **Stakeholder may not want a new system:**

In many cases, buying and installing a new system in an organizational decision and the people who are affected by the system are not consulted. They may feel that a new system is unnecessary and they don't see why should cooperate in its specification.

c) Briefly describe the two essentials for conducting effective interviews during requirements elicitation. **(2)**

Solution:

1) Interviewers must be open-minded and willing to listen to stakeholders. There is no point in holding interviews if the requirements engineer is unwilling to change his/her mind about the real needs of stakeholders. Should not approach the interview with pre-conceived notions about what is required.

2) Stakeholders must be given a starting point for discussion. This can be a question, a requirements proposal or an existing system.