

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION
DURATION: 3 HOURS

SUMMER SEMESTER, 2021-2022
FULL MARKS: 150

SWE 4401: Software Requirement and Specifications

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer **all 6 (six)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

Bangladesh Government wants to build a software named SafeBangladesh that will enable any user to request emergency assistance from police, fire service, or one-stop crisis centers (OCC). The company you work for, SoftTechInnovator, has been selected to build the software. The CTO has built a team consisting of few members, you as the team lead, Renu as the senior developer, Zahid as the developer, and Salman as the test engineer.

Nibir, an associate secretary of Bangladesh Government, has been assigned as the project director for SafeBangladesh. You, Renu, and Salman had a meeting with Nibir to gather initial requirements for the project. Renu took meeting notes and summarized them as follows:

“SafeBangladesh will be a mobile app. The app will be freely available on Google Play Store and will be designed to be user-friendly for both young and old people. The user will be able to register using a Google account and mobile number. After registration, user-related information like name, national ID etc., can be fetched from the mobile operator. Whenever app will be opened, the user will be presented with three orange-colored buttons representing police help, fire-service help, and one-stop crisis help. If any of the button is pressed for more than 5 seconds, it will turn into red color and if the button is pressed for more than 10 seconds, an automatic alarm will be sent to the system including user information and current location.

If the internet connection is unavailable, a message will be sent to a toll-free number dedicated for such events. If the user has insufficient balance, the message will still be sent. There will be a separate app for police, firefighters and OCC employees. When an alarm is raised, all nearest employees will get a notification.

There will be a web portal where anyone can see reports of the past incidents and the quality of response by police or others. A map will be shown with the areas more prone to fire incidents, or crimes highlighted. To provide better service, Nibir wants a portal where users can give feedback. The feedback can be for a police-station or fire service station in general or a specific incident. These feedbacks can be published to the web portal so that other people can be informed.

There is an existing system where police station, fire-service station and one-stop crisis center along with their employees information are already stored. SafeBangladesh will use the database of that system.”

Nibir is very excited about the project and wants very frequent updates. He also wants that software will be built using using Kotlin language. However, he is not very certain about the way the features will work, so requirements can change now and then.

You have to answer Questions 1, 2, and 3 considering the given scenario.

- | | | |
|----|--|---------------------|
| 1. | a) Identify stakeholders, user roles, and external systems for SafeBangladesh. | 6
(CO2)
(PO2) |
| | b) Create a persona for any of the user type of SafeBangladesh. | 5
(CO2)
(PO2) |

- c) Identify 6 functional requirements as user stories from the scenario. Use the template "As a (role), I want (function) so that (business value)" to write the stories. (CO2) (PO2) 4
- d) Propose 2 functional requirements as user stories that could be added to the scenario. Use the same template as 1.c) to write the stories. (CO2) (PO2) 4
2. a) Write acceptance testing criteria for identified user stories in question 1.c) and 1.d). (CO2) (PO1) 8
- b) Identify 3 non-functional testable requirements as user stories from the scenario. Use the template "As a (role), I want (non-functional requirement) so that (additional details)" to write the stories. (CO2) (PO1) 6
- c) What is the MoSCoW technique in release planning? Briefly explain with an example from the scenario. (CO2) (PO1) 8
- d) Identify 2 constraints that are valuable to the buyer of SafeBangladesh. (CO2) (PO2) 3
3. a) Why is Kanban agile process more appropriate over Scrum for SafeBangladesh? (CO1) (PO1) 5
- b) Identify the Entity, Process, Data, and their flow to draw a Data Flow Diagram from the scenario. (CO2) (PO2) 12
- c) Draw a Swimlane Diagram to represent the interaction between actors to perform any use case from the scenario. (CO2) (PO2) 8
4. a) What is Quality Function Deployment (QFD)? Briefly explain QFD for requirements selection with one example. (CO1) (PO1) 5
- b) Observing the users operate the software you are developing can be an effective method of requirements gathering. Despite the advantages, why is the technique not widely used? (CO1) (PO1) 5
- c) Answer the following questions with a brief explanation: (CO1) (PO1) 3 × 5
- i. What is the purpose of using 3C for writing a user story?
- ii. Why user proxy is relevant for requirement collection?
- iii. Can user stories be considered as use cases? If not, why?
5. a) Differentiate the iterative process and evolutionary process of software development. (CO1) (PO1) 5
- b) Why do you think human factors are important in agile software development? (CO1) (PO1) 5

c) Consider the following story card:

Card: A user can pay for products using cards.

Note: Accept credit cards, debit cards, and gift cards. On purchases over 6000, give 5% cashback on debit cards, give 4% cashback as points on gift cards and add 0.5% extra to the purchase amount on credit cards. The system should collect email addresses as well so that offers can be sent to them.

Which INVEST properties are violated in the story card below? What is the consequence of this violation? Write a possible version of this card where the properties are not violated.

5
(CO1)
(PO1)

d) Suppose, a team followed Agile methodology to build a software. The team velocity is 25 story points. At the beginning of the first sprint, there were 72 story points. At the end of the first sprint, 5 new stories with 10 points were added to the backlog, and 5 points were increased for already estimated stories. At the end of the second sprint, 10 points were reduced from the estimated stories and 1 story with 3 points were added to the backlog. Represent sprint-wise changing state of story points, draw a burndown chart, and comment about project health.

5 + 5
(CO3)
(PO1)

6. a) Briefly describe the iterative process of estimating user stories.

8
(CO1)
(PO1)

b) How can Cycle time and Lead time be used to monitor Kanban Project?

5
(CO1)
(PO1)

c) A team of three developers follows the Scrum software development methodology for a project. The team has a total of 43 points of user stories in the backlog. Table 1 represents stories, points, and priorities. Here, A, F, and J are compound stories and the story point can be split into 3+2, 2+4, and 5+2 respectively. Each point indicates an ideal day of work. The customer prioritized the user story as ↑ as High, ↔ as Medium, and ↓ as Low. They want the release the software within four weeks.

12
(CO3)
(PO3)

Table 1: User stories with story points and priority for Question 6.

Story	A	B	C	D	E	F	G	H	I	J
Point	5	3	4	3	5	6	4	2	4	7
Priority	↑	↔	↔	↑	↑	↓	↑	↓	↔	↓

Considering the iteration length of one week, perform iteration planning with the stories. In each iteration, tasks should be assigned to developers as well.