**Deadline: 11th November, 2021**

**Read carefully**

**Group Members:** Maximum 2 persons allowed in a group.

**Soft Copy Submission:** Through Portal (till 11:59 PM, 11th November, 2021)

**Late Submission:** 25% penalty for first day, 50% for second day and 100% for days later on. Late penalty will start from, 11:59 PM,12th November,2021.

**Evaluation:** 80% marks will be for assignment and 20% marks will be based on evaluation (quiz or viva).

**Plagiarism:** There is a strict policy against plagiarism and cheating. **The penalty can be an F grade.**

**Title Page:** ATTACH THIS TITLE PAGE TO YOUR ASSIGNMENT FILL INFO IN ALL BOXES BEFORE SUBMISSION **(5 MARKS)**

**Total Marks: 100 (80 Assignment + 20 Evaluation)**

**Referencing/Citing:** Write in your own words to answer the following, if you use material from any book/website apart from your recommended book please provide relevant references. All work will be assumed yours otherwise.

**Answers Clarity:** Justify your answers where needed. Explain briefly and concisely

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| **DECLARATION**  I SOLEMNLY DECLARE ALL THE MATERIAL PROVIDED IN ASSIGNMENT HAS BEEN DONE BY ME AND/OR PROPERLY REFERENCED & ALL INFO PROVIDED IS CORRECT   |  | | --- | | **TITLE OF FILE SUBMITTED IN SOFTCOPY** |   \*FILES WITH WRONG NAME OR EXTENSION WILL BE DELETED  (RE\_A1\_SEC\_SRNO\_4digitROLLNO\_FIRSTNAME.DOC/PDF) eg A1\_B\_08\_2346\_HARIS.pdf   |  | | --- | | **SIGNATURE**  **NAME**  **Reg#**  **Section** |  |  | | --- | | **SUBMISSION DATE SUBMISSION TIME** | |

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| |  | | --- | | **QUESTION NO** | | |  | | --- | | **PARTS ATTEMPTED COMPLETELY** | | |  | | --- | | **PARTS ATTEMPTED PARTIALLY** | | PARTS NOT ATTEMPTED |
| **Q1** |  |  |  |
| **Q2** |  |  |  |
| **Q3** |  |  |  |

**Attempt All Questions and Parts in order**

**QUESTION #1 [25 Marks]**

1. You are assigned a project named **“House prices forecasting system”**, Identify and explain at least 5 properties of good requirements with the help of example(s). [5]
2. What are major risks and challenges that you can face while developing a product? Explain in context of a real-life project example? [5]
3. Write user, system and software specification requirement statements for the “UCP FACE RECOGNITION SYTEM”. [5]
4. Draw a DFD diagram (level 0) for an “elevator control system”. [10]

**QUESTION #2 [35 Marks]**

**Proposed Home Safety and Security System**

Your company has been commissioned to design a home safety and security system. This system is designed to protect to the householder against:

* Fire
* Break in
* Flood

The system will act as a fire alarm, a flood alarm and a burglar alarm all integrated into 1 package. To enable this to happen the system will connect to:

* Smoke sensors (fire), Heat sensors (fire)
* Door, window and movement sensors (to detect break in)
* Water sensors (flood)

The system has a key pad and a simple alphanumeric display.



The system is fitted with a wireless network card which allows it to connect to the internet and be controlled by the user via a smart phone application or web interface. The system has an alarm with 3 different tones, depending on the type of alarm (firm, break in or flood). The user has a code which they type into the machine to stop the alarm or change settings. Each sensor input needs configuring as a smoke, heat, door, window, movement or water sensor but the system should also work with smart sensors which send a code which indicates what type of sensor is attached when the system sends a set up message. Every sensor can be enabled or disabled from the main console, it is also possible to set times of the day when different burglar sensors (door/window) can be enabled or disabled. The burglar alarm function can be armed or disarmed automatically depending on the time of day. The fire and flood alarm function cannot be disabled. Smoke detectors will sound a “smoke” alarm if they detect smoke but a fire will only be confirmed and alarmed by the system if they indicate smoke 3 times in 1 minute. The heat detectors will sound an alarm and indicate a fire as soon as they detect excess heat. If the door, window or movement sensors activate the user has a user configurable amount of time to reset the system before the burglar alarm is sounded. All functions of the system can be configured via the smart phone application or web interface. The remote interface has a username and password. For the fire alarm, if the fire alarm has not been reset after 15 minutes the system can be configured to call the fire brigade. For the burglar alarm if the system has not been reset the system can be configured to call the police service.

1. Identify and write 5 testable functional and 5 non-functional requirements from this scenario [5]
2. Identify different types of stakeholders involved [5]
3. Classify the requirements as Business Level, User Level and Product Level. Refer to slide set 5 for this question and fill the given table.[10]

|  |  |
| --- | --- |
| **Why?** |  |
| **What?** | List functional/nonfunctional both requirements Classify as problem solution domain as well. |
| **How?** |  |
| **Who?** |  |
| **When?** |  |
| **If-Then** |  |
| **Does It?** |  |
| **Where?** |  |

1. Identify the ambiguous, non-verifiable and inconsistent requirements from the scenario, if any. [5]
2. Write a goal and its desired objectives for the given scenario. [5]
3. Explain the categories (Product, Organizational and Legislative) of non-functional requirements for this scenario.[5]

**QUESTION #3 [25 Marks]**

**Case #1: St. Mary’s Mercy Hospital**

Imagine waking up one day, checking your mailbox an receiving a letter from your hospital saying you died. Well, that is precisely what happened to 8500 people who received treatment between Oct 25 and Dec 11 at St. Mary’s Mercy Hospital. So what happened? It turns out the hospital had recently upgraded its patient-management software system. However, a mapping error in the software resulted in the system assigning a code of 20 (which means “expired”) instead of 01 which meant the patient had been discharged. But that is not all. The erroneous data was not only sent to the patients but also to insurance companies and the local Social Security Office.

**Case #2: National Health Service**

I don’t know what is worse: Not taking your medicines at all or taking the wrong medication. Either way, at least 300,000 heart patients were given the wrong drug or advise as a result of a software fault. So, what happened? In the year 2016, it was discovered that the clinical computer system SystmOne had an error that since 2009 had been miscalculating patient’s risk of heart attack. As a result, many patients suffered heart attacks or strokes since they were told they were at low-risk, while other suffered from the side-effects of taking unnecessary medication.

**Case #3: Toyota**

In the mid-2000’s many Toyota drivers were reporting that their car was accelerating without them touching the pedal. After a series of accidents, which lead to investigations, investigators discovered that software errors were the cause of the unintended acceleration. In this case, there was a series of things wrong with the software installed in Toyota cars: Memory corruption, wrong memory handling, disabling safety systems, systems with single points of failure, and thousands of global variables. Toyota recalled millions of vehicles and Toyota’s stock price decreased 20% a month after the cause of the problem was discovered. This case demonstrates the consequences of not giving enough attention to good programming practices and testing as a result of wanting to launch the product.

1. For each of the above cases, mention requirement engineering success factors (3 for each) that could have been incorporated in the system to reduce failures. [5]
2. How inadequate requirement engineering process affects other phases later in SDLC. According to you which process model would have been best suited for these failed software systems. [5]
3. Do you think that human involvement in software systems is the main cause of failure? YES or NO, explain? [5]
4. As a requirement analyst, what is your responsibility to ensure reliability and safety in software systems? If you were the requirement engineer for above-described systems, what strategy you would have adapted to avoid failures. [5]
5. Although software systems are effective at calculating large and complex data, they have one main weakness: humans create these systems. And we humans make mistakes… lots of them. Give 5 such examples of system failures that occur due to human error. [5]