Birla Institute of Technology & Science, Pilani
Work Integrated Learning Programmes Division
Second Semester 2023-2024

Mid-Semester Test
(EC-2 Regular)

Course No.	: SE ZG651
Course Title	: Software Architecture
Nature of Exam	: Closed Book
Weightage	: 30%
Duration	: 2 Hours
Date of Exam	: 16/03/2024 (FN)

No. of Pages = 3
No. of Questions = 3

Note to Students:
1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q.1 [10 Marks]

You are building an inventory management system for a manufacturing company. The inventory of raw material and finished products need to be managed so that optimum raw material stocks can be maintained. The finished products will be transferred to various warehouses in container. The raw material will be used in FIFO basis based on expiry date. Any unused raw material to be taken back in the inventory and placed in such manner so that next time it will be issued based on above rule. Based on the sales booking by different location the finished products will be sent to the customer from the nearest warehouse. The management should made necessary steps so that finished products manufacturing does not get disrupted and is based on the sales order.

a. Explain the benefits of layered architecture with respect to above case study. [1]
b. How would you go about implementing layered architecture in this case? Explain with a diagram. [3]
c. Is Architecture evaluation in conflict with Agile process? Explain how an Agile Process would work in the above case. You answer should be in the context of the above case study and should cover at least 3 agile principles. [3]
d. Explain with rough sketches how you would use Kruchten's 4+1 architectural view model with respect to the above case study? [3]

Q.2 [10 Marks]

The GoLearn system is a digital learning environment used to support learning in schools for students from age 4 to 18. It is intended to replace an existing system (Utech) that was specially built for this purpose, and which includes its own applications for e-mail, etc. Utech was a closed system where it was impossible for users to introduce their own applications. It had a poor reliability and was not popular as the facilities in freely available systems were far superior to those offered in this closed system.

One of the most important requirements for the GoLearn system was that it should be an open system that could easily accommodate new features and existing services. Developers aimed to achieve this by designing the system so that everything was a service and that, with appropriate permissions, users could replace pre-specified services with their own service version. This approach also allowed the developers to deal with the complexity of integrating with existing network management systems (local areas had different policies on which websites could be visited by school students, depending on age and content) and school administration systems. Hence, the developers created a service interface to this system which in turn can accommodate different underlying systems.

There are three types of service in the system:

- Utility services that provide basic application-independent functionality and which may be used by other services in the system. Utility services are usually developed or adapted specifically for this system.
- Application services that provide specific applications such as email, conferencing, photo sharing etc. and access to specific educational content such as scientific films or historical resources. Application services are external services that are either specifically purchased for the system or are available freely over the Internet.
- Configuration services that are used to adapt to the environment with a specific set of application services and define how services are shared between students, teachers and their parents.

a. How can the testability tactics be applied for the utility services, application services and configuration services? Explain your answer by drawing a diagram giving the scenario only one tactic for each of these services in the context to the case study [5]
b. "Utech is replaced by GoLearn"– Justify the role of usability-tactics in this context. [2]
c. Please give examples of 3 Design Decision for Performance that you would take for the services described in the above case. The answer must be in the context of the case study given. [3]

Q.3 [10 Marks]

Case Hospital Patient Management System

Objective: A hospital seeks to modernize its patient management system to improve security and user experience.

Background:

The hospital is in the business of healthcare delivery. The patients in the hospital should be safe and any information about them must be secure. It should facilitate the working of all employees and consider the needs of visitors and patients.

Challenges:

- Identify ASRs related to security and usability.
- Understand user needs and workflows for effective system design.

Answer the following questions in the above context. You may use your own knowledge of the working of hospitals while answering this question:

a. What are the hospital's goals for the new patient management system? [1]
b. What are the roles and responsibilities of stakeholders involved in the system (doctors, nurses, patients, administrators)? [2]
c. Describe using diagrams 4 Brainstorm scenarios for potential security breaches and usability issues. [4]
d. What methodology have you studied in the course to assist in prioritizing scenarios for a small project where the time available is short. [1]
e. Prioritize scenarios based on their criticality, considering the potential impact on patient safety and user experience. [1]
f. Is there any international standard for deciding what scenarios are the be given priority? [1]

******