

ICS 2309 - Commercial Programming and BCT 2315 - Computer Systems Project

Cat One [Due date – 2/04/2025]

Instructions:

- Answer all questions
- Use examples from your project.
- Diagrams may be used where applicable.

Section A

Question 1: (10 Marks)

You are tasked with leading a student software development team for a university project.

a) Briefly define the following software development paradigms and give a practical example for each:

- i. Agile
- ii. DevOps
- iii. Lean Software Development

(6 marks)

b) Explain how the integration of these paradigms supports 21st-century software development best practices.

(4 marks)

Question 2: (10 Marks)

Your team is planning to design an enterprise software system.

a) Illustrate the **MVC architecture** and describe the role of each component.

(5 marks)

b) Discuss two scalability and two security considerations your team must address during the architecture design phase.

(5 marks)

Question 3: (10 Marks)

You have been appointed DevOps lead in your team project.

a) Explain the importance of CI/CD in modern software development.

(3 marks)

b) Describe how Git and GitHub can be used to facilitate collaborative development in your team.

(4 marks)

c) List any three tools used in CI/CD pipelines and briefly explain their role.

(3 marks)

Question 4: (10 Marks)

Your team has been asked to deliver a functional prototype by the end of Week 4.

a) Compare and contrast **Frontend** and **Backend** development in terms of responsibilities,

technologies, and team roles.

(6 marks)

b) Describe the purpose of API documentation and name two tools commonly used to create such documentation.

(4 marks)

Section B

Question 5: (15 Marks)

You are mentoring a junior team of developers on project setup.

a) Outline the steps to initialize a GitHub repository for your project, including branching strategy for collaboration.

(6 marks)

b) Using a diagram, describe a basic CI/CD pipeline using GitHub Actions or Jenkins, and explain the function of each stage.

(6 marks)

c) State three common mistakes students make in version control and suggest solutions to each.

(3 marks)

Question 6: (15 Marks)

Your team is working on a digital healthcare solution.

a) Design a software architecture diagram using **microservices** approach for a patient management system. Indicate components such as authentication, patient records, appointment scheduling, and notifications.

(6 marks)

b) Explain why microservices might be preferable over monolithic architecture for this type of application.

(3 marks)

c) Discuss how database design decisions (SQL vs. NoSQL) can affect performance and scalability in your proposed system.

(6 marks)

Question 7: (15 Marks)

As the team lead, you are preparing your members for design and UI prototyping.

a) List and explain four best practices for wireframing a user interface using Figma or Adobe XD.

(4 marks)

b) Given a problem domain of an online bookstore, sketch or describe the key UI wireframes for the homepage, search page, and checkout page.

(6 marks)

c) Explain the role of UX considerations in software architecture, with at least two real-world examples.

(5 marks)