



# SCOTT CHRISTIAN UNIVERSITY

## SCHOOL OF EDUCATION AND BUSINESS STUDIES

### DIPLOMA IN BUSINESS INFORMATION TECHNOLOGY

#### UNIT CODE/NAME: DCT 035 SOFTWARE ENGINEERING

January - April 2024/2025 End Semester Exam

- Time: 2 Hours

#### INSTRUCTIONS:

- Answer **Question ONE (30 Marks)** and **ANY TWO** of the remaining four questions.
- Be clear and concise in your responses.

#### SECTION ONE: 30 MARKS-COMPULSORY

a) Define the following terms as used in software engineering:

- |                                |          |
|--------------------------------|----------|
| i. Software Engineering        | (1 mark) |
| ii. Professional Ethics in ICT | (1 mark) |
| iii. Logical Data Modeling     | (1 mark) |
| iv. Software Testing           | (1 mark) |
| v. Software Support            | (1 mark) |

b) List the key differences between Agile and waterfall methodologies in software development. (4 Marks)

#### Scenario:

You are tasked with designing a logical data model for a **Library Management System**. The system needs to track the following information:

- **Books:** Each book has a unique ISBN, title, author, publication year, and genre.
- **Members:** Each member has a unique MemberID, name, email, and phone number.
- **Borrowing Transactions:** Members can borrow books, and the system must record the borrowing date and due date for each transaction.

#### Requirements:

c) **Identify Entities and Attributes** (5 Marks)

- List the entities and their attributes for the Library Management System.
- Specify primary keys for each entity.

d) **Define Relationships**

(5 Marks)

- i. Identify the relationships between the entities.
- ii. Specify the cardinality (1:1, 1:N, M:N) for each relationship.

e) **Normalization**

(5 Marks)

- i. Normalize the data model to **Third Normal Form (3NF)**.
  - ii. Explain the steps you took to achieve 3NF.
- f) Describe three critical risks in software project management and suggest possible mitigation strategies. (5 Marks)
- g) Explain the concept of role-based access control (RBAC) in software security and its importance. (4 Marks)
- h) Clarify how data normalization improves database efficiency. (4 Marks)

**Question 2 (15 Marks)**

- (a) Explain the importance of usability testing in Human-Computer Interaction (HCI). (5 Marks)
- (b) Discuss three key activities involved in software implementation. (6 Marks)
- (c) Describe the difference between functional and non-functional testing in software quality assurance. (4 Marks)

**Question 3 (15 Marks)**

- (a) Discuss the significance of empirical research in software engineering. (5 Marks)
- (b) Identify and explain three types of software maintenance in the post-implementation phase in software engineering. (6 Marks)
- (c) Briefly explain how Artificial Intelligence (AI) is influencing modern software development trends. (4 Marks)

**Question 4 (15 Marks)**

- (a) Explain three key principles of good software design. (6 Marks)
- (b) Differentiate between relational and hierarchical data models. (5 Marks)
- (c) Discuss the role of professional ethics in Information and Communication Technology and its impact on software engineering. (4 Marks)

**Question 5 (15 Marks)**

- a) Define Spiral modelling and state two advantages and two disadvantages of using the Spiral Model in software development. (5 Marks)
- b) Define and differentiate between primary and foreign keys in logical data modelling in relation to software engineering. (4 Marks)
- c) Explain three common challenges in logical data modelling (6 Marks)

