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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR**  
**FIRST YEAR, SECOND SEMESTER EXAMINATION**  
**FOR THE DIPLOMA IN SOFTWARE ENGINEERING**

**DSE 1006: SOFTWARE DESIGN ENGINEERING**

**DATE: 9<sup>TH</sup> DECEMBER, 2024**

**TIME: 8:30AM – 10:30 AM**

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE: COMPULSORY (30 MARKS)**

a) Define Software Design and explain how it differs from Software Engineering. **(4 Marks)**

b) Prepare a Unified Modeling Language (UML) class diagram using the following data **(6 Marks)**

**Class:** Book

**Attributes:** title, author, ISBN, publicationYear

**Methods:** checkout(), return(), reserve()

**Class:** Member

**Attributes:** memberID, name, address, phoneNumber

**Methods:** register(), borrowBook(), returnBook()

**Class:** Library

**Attributes:** name, address

**Methods:** addBook(), removeBook(), findBook()

c) Discuss the components of a Use Case Diagram **(5 Marks)**

d) Highlight and explain the three types of Software Design. **(6 Marks)**

e) Discuss the importance of requirements analysis in software design. **(4 Marks)**

f) Differentiate between functional and non-functional requirements, providing examples for each. **(2 Marks)**

g) Discuss the following Agile methodologies **(3 Marks)**

i. Scrum

ii. Kanban

iii. Dynamic Software Development Method(DSDM)

**QUESTION TWO: (20 MARKS)**

- a) Describe the key elements of a Class Diagram. (4 Marks)
- b) Briefly describe the phases of the Software Development Life Cycle (SDLC). (6 Marks)
- c) Explain the concepts of validation and verification in software testing. (4 Marks)
- d) Discuss the following security design considerations
  - i. Authentication mechanisms (3 Marks)
  - ii. Data encryption (3 Marks)

**QUESTION THREE: (20 MARKS)**

- a) Draw and interpret a simple Class Diagram for a "Library System" showing Book, Member, and Librarian classes. (6 Marks)
- a) List and briefly describe three key UML diagrams. (6 Marks)
- b) Define the SOLID principles in software design and briefly explain any two of them. (4 Marks)
- c) Why do you think system maintenance requires more budgetary allocation than any other stages in the system development process? (2 Marks)
- d) Define user interface design and its significance in software development. (2 Marks)

**QUESTION FOUR: (20 MARKS)**

- a) Define software architecture and explain its role in software development. (4 Marks)
- b) Describe the following architectural patterns:
  - i. MVC (Model-View-Controller) (3 Marks)
  - ii. Client-Server (3 Marks)
- c) Give proper definition of the following terminologies as used in software engineering:
  - i. Deliverable (2 Marks)
  - ii. Requirement (2 Marks)
  - iii. Code re-usability (2 Marks)
  - iv. Software portability (2 Marks)
  - v. Software inter-operability (2 Marks)

**QUESTION FIVE: (20 MARKS)**

- a) It is good to say requirements elicitation and analysis stage is crucial and largely determines the quality of the final product. What key considerations would you keep in mind when writing these requirements. (5 Marks)
- b) For an already developed system, highlight the stages one progresses through when carrying out test runs. (5 Marks)
- c) Highlight three key principles for designing maintainable software. (6 Marks)
- d) Explain the importance of incorporating security considerations during the design phase. (4 Marks)