



HIGHER EDUCATION PROGRAMMES

Academic Year 2025:	January - June
Formative Assessment 1:	Systems Analysis and Design 3 (HSAD300-1)
NQF Level, Credits:	6, 20
Weighting:	40%
Assessment Type:	Essay Questions
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Examiner:	Ralph Mavhunga
Due Date:	27 March 2025
Total:	100 Marks

Instructions:

- This paper consists of three (3) questions.
- It is based on Unit 1 to Unit 3 of the prescribed study guide and Chapters 1, 2, 11, 12, 13, 14, 23, and 26 of the module textbook.
- All questions are compulsory.
- Submit your complete assessment as one (1) pdf document.
- A **Copyleaks Report** will be issued via ColCampus once the assignment is submitted. Please ensure that you follow the correct steps when uploading your assignment, to ensure that the Copyleaks Report is correctly issued. If the incorrect document is uploaded, or if no Copyleaks Report is issued, a mark of zero (0) will be awarded. If the Copyleaks Report indicates that a 30% similarity/plagiarism score has been exceeded, 25% of the assessment total will be deducted from the final grade.

Question 1**(40 marks)**

The Repo Online Retail Store is transforming digitally to manage better its sales, customer relationships, inventory, and delivery processes. The management team has hired you as a system analyst to design models that will guide the development of this system.

System Overview:

- The store manages customer orders, inventory, and deliveries.
- Customers can browse products, add items to a shopping cart, place orders, and track deliveries.
- The system has the following external entities: Customers, Suppliers, and Delivery Services.
- The system processes customer orders, checks inventory levels, generates invoices, and tracks product deliveries.
- The system stores customer information, order data, product inventory, and delivery status.

Use the scenario above to answer the questions that follow:

Your task as the system analyst is to create the necessary models to represent the system's data, processes, and interactions with external entities.

- A.** Design a Data Flow Diagram (DFD) for the Repo Online Retail Store system that shows the flow between the major processes, data stores, and external entities.

(10 marks)**Rubric**

Criteria	Marks
Correct identification of processes	3
Identification of external entities	2
Data flow representation	3

Use of data stores	2
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- B.** Design a Context Diagram for the Repo Online Retail Store system. Your diagram should represent the system as a single high-level process and show the external entities and the data flow between them and the system. (10 marks)

Rubric

Criteria	Marks
Identification of external entities	3
Representation of the central process	3
Clear and correct data flow representation	4

- C.** Create an Entity Relationship Diagram (ERD) for the system, focusing on the relationships between Customers, Orders, Products, and Deliveries. Ensure that you include the appropriate entities, attributes, and relationships. (12 marks)

Rubric

Criteria	Marks
Identification of entities	3
Definition of relationships between entities	4
Proper use of attributes for entities	3
Use of data stores	2

- D.** Assess the benefits of using models such as DFDs, Context Diagrams, and ERDs in systems analysis and design. (8 marks)

Question 2 (20 marks)

- A.** Critically evaluate the significance of the Systems Development Life Cycle (SDLC) in contemporary software development projects. (12 marks)

- B.** Analyse the role of feasibility studies and requirement analysis within the SDLC.

(8 marks)

Question 3 (40 marks)

The Role of Software Metrics in Enhancing Software Development Processes: Case Study

Background:

Software measurement is a crucial aspect of software development that ensures the quality and control of the entire information system. Various metrics are employed to assess different characteristics of information systems, providing quantitative attributes that relate to a system, component, or process. Metrics help identify problems and improve the software product and the overall development process.

One widely adopted approach to software measurement is the Goal Question Metric (GQM) framework. GQM emphasises the need to establish the goal of the measurement, define relevant questions that need to be answered and identify well-formulated metrics for any part of the software development process. Software metrics can be categorised into three types: product metrics, project metrics, and process metrics, each serving distinct purposes.

Scenario:

A software development company, "Tech Innovators," is developing a complex enterprise resource planning (ERP) system. The company's management emphasises the importance of software measurement to ensure the quality and efficiency of the development process. The project has reached the halfway mark, and the management is keen to assess the project's current state and identify any areas that require improvement.

The project manager, Sarah, implements a comprehensive software measurement strategy using the GQM approach. She focuses on the following aspects:

- **Product Metrics:** To assess the design and construction quality of the software, Sarah implements metrics such as Function Points (FPs), Source Lines of Code (SLOC), and Defect Removal Efficiency (DRE).
- **Project Metrics:** She tracks project rates, time to complete tasks, and resource allocation to monitor the ongoing project.
- **Process Metrics:** Given the agile methodology adopted by Tech Innovators, Sarah measures team velocity, lead time, and cycle time to assess the efficiency of the development process.

As the project progresses, Sarah notices that while the project is on track in terms of timelines, there are concerns about the software's usability and maintainability. Additionally, the defect rate is higher than anticipated. Sarah decides to adjust the metrics being tracked, focusing on trends rather than static numbers and shortening the measurement periods to provide more timely feedback.

Challenge:

Despite the changes, the team finds it challenging to balance the need to meet metric-based goals with the overarching goal of delivering high-quality software that meets customer expectations. The management is particularly concerned about the risk of

focusing too much on the metrics at the expense of software quality and customer satisfaction.

Objective:

Analyse the situation faced by Tech Innovators and discuss the role of software metrics in balancing project management with the delivery of high-quality software. Consider the challenges of implementing software measurement and how to ensure that metrics drive meaningful improvements.

Use the scenario above to answer the questions that follow:

- A.** Analyse the potential benefits and limitations of using the Goal Question Metric (GQM) approach in the context of the ERP project at Tech Innovators. (6 Marks)
- B.** Discuss the importance of product, project, and process metrics in completing the ERP project. (7 marks)
- C.** Evaluate how these metrics in **question 3b** contribute to different stages of the software development life cycle and their impact on the overall project quality. (7 Marks)
- D.** Critically assess Sarah's decision to focus on trends rather than static numbers and shorten the measurement periods. What are this approach's potential advantages and disadvantages in software development, and how might it influence team performance and software quality? (10 Marks)
- E.** Evaluate the risk of "metric fixation" in the case of Tech Innovators. How can the company ensure that the metrics used do not detract from the ultimate goal of delivering a high-quality, user-friendly ERP system? Management could implement strategies to balance metric-based management with customer satisfaction and software usability. (10 Marks)