

**SPECIFY TYPE OF
EXAMINATION**

FIRST ATTEMPT
FIRST RESIT
SECOND RESIT
RE-TAKE



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS
UNIVERSITY SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF
BACHELOR OF INFORMATION COMMUNICATION AND TECHNOLOGY
3RD YEAR 1ST SEMESTER 2023/2024 ACADEMIC YEAR
MAIN CAMPUS**

COURSE CODE: ITB 1311/ICB 1413

**COURSE TITLE: Independent ICT Capstone Research/Computing Forensic Capstone
Research**

DATE: 15TH DECEMBER, 2024

TIME: 9.00-11.00 NOON

TIME: 2 HOURS

Instructions:

- 1. This paper contains FIVE questions**
- 2. Question one is compulsory**
- 3. Answer any other two questions**



QUESTION (30 marks)

Scenario: A medium-sized retail company, "TechMart," is facing challenges with its outdated inventory management system. The current system is slow, prone to errors, and lacks real-time data synchronization between multiple stores. As a result, stock levels are frequently inaccurate, leading to either overstocking or stockouts. The company wants to develop a new, efficient inventory management system that integrates real-time data, automates inventory tracking, and provides analytics for better decision-making.

Problem: You, as a student undertaking your capstone project, are planning to development this new inventory management system. Address the following concerns that you will encounter in the development process.

- a) Give a title for the project. (1 mark)
 - Design and implementation of an Inventory Management System
 - An Inventory Management System for a Medium-Sized Retail Company
- b) Enumerate three key specific objectives for the project. (3 marks)
 - To study and understand inventory management in the retail sector.
 - To undertake system analysis and design of the system
 - To implement and test the application
- c) Identify four key issues that "TechMart" is facing with their current inventory management system. (4 marks)
 - **Inaccuracy of Stock Levels:** The current system's lack of real-time synchronization causes delays in updating stock data, leading to discrepancies in inventory counts.
 - **Manual Processes:** The system requires manual updates, increasing the risk of human error.
 - **Slow Response Time:** The existing system is slow, affecting operational efficiency.
 - **Poor Analytics:** There is a lack of data-driven insights for making decisions about stock replenishment, demand forecasting, and overall inventory management.
- d) Explain the importance of stakeholder engagement in the initial phase of this project. (2 marks)
 - Stakeholder engagement ensures that the system meets the business needs and expectations of all parties involved. This reduces the risk of developing a system that fails to solve the identified problems.
- e) Identify three key stakeholders in the development of the new inventory management system for TechMart. (3 marks)
 - **Store Managers:** They need a user-friendly interface for managing stock levels.



Registration No.....

- **Inventory Staff:** They need a system that automates manual tasks to reduce errors.
 - **IT Department:** They need a scalable and maintainable system to manage across all stores.
 - **Executives:** They need data analytics to make strategic decisions about inventory management.
- f) Briefly discuss, the importance of real-time data synchronization for inventory tracking in a retail business? (2 marks)
- Real-time synchronization ensures that all stores have up-to-date information on stock levels. This prevents stockouts and overstocking by providing accurate data across all locations, allowing the company to respond quickly to demand changes.
 - It helps avoid loss of sales due to stockouts and reduces costs associated with overstocking.
- g) Based on the case study, list three functional and three non-functional requirements for the new inventory management system. (6 marks)
- **Functional requirements**
 - ❖ Real-time data synchronization across all store locations.
 - ❖ Automatic updates to stock levels as sales or restocking occurs.
 - ❖ Reporting tools for inventory analytics (e.g., sales trends, stock turnover).
 - ❖ Integration with point-of-sale (POS) systems for seamless operation.
 - ❖ User access management for different store roles (e.g., store manager, inventory staff).
 - **Non-functional requirements**
 - ❖ System should be scalable to accommodate new stores.
 - ❖ High reliability and fault tolerance (to avoid system downtime).
 - ❖ System should be user-friendly and intuitive to use.
 - ❖ Data security, ensuring only authorized personnel can access sensitive information.
- h) Describe two techniques you would use to ensure the requirements for the system are captured and prioritized. (4 marks)
- Conduct **interviews and workshops** with store managers, inventory staff, and the IT department to gather their pain points and desired features.
 - Create a **requirements document** that lists and prioritizes features based on business value and stakeholder input.
 - Organize **regular review meetings** to validate that the gathered requirements reflect the stakeholders' needs.
- i) Recommend a suitable software development methodology for the TechMart project. Justify your choice and explain how it would benefit the development process. (5 marks)
- **Recommended Methodology:** Agile development.
 - **Justification:**

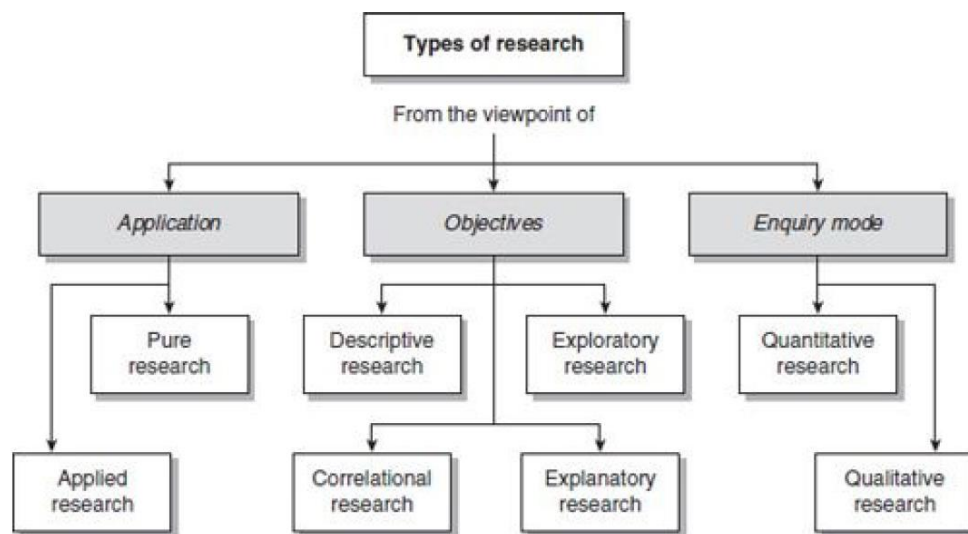


Registration No.....

- ❖ Agile allows for iterative development, meaning the project can adapt to changes in requirements more easily. This is beneficial for TechMart since real-time feedback from store managers or users during the development process can lead to frequent improvements.
- ❖ Agile encourages continuous testing, reducing the risk of critical bugs appearing late in the project. It also allows for frequent delivery of small, usable features, keeping stakeholders engaged throughout the development.
- **Benefits:**
 - ❖ Flexibility: Agile accommodates changes in requirements without significantly impacting the project's overall progress.
 - ❖ Stakeholder Involvement: Regular feedback from TechMart staff ensures the system remains aligned with business needs.
 - ❖ Early Detection of Issues: Continuous testing and reviews mean that bugs and issues are caught early, reducing rework.

QUESTION 2 (20 marks)

- a) During your internship, secured immediately after graduation, you come across a group of colleagues who are seeking to understand different methodologies to use when undertaking research. One of them requests you to intervene and help them understand and clearly articulate the differences. Discuss the different research methods taking into consideration the three viewpoints of research types. (15 marks)



- **Application perspective (1 mark)**
 - Pure research – Involves developing and testing theories and hypotheses that may or may not have practical application at present or in the future. (1.5 marks)



Registration No.....

- Applied research – The research techniques, procedures, and methods are applied to the collection of information which can then be used in other ways. (1.5 marks)
 - ***Objectives perspective (1 mark)***
 - Descriptive – Attempts to systematically describe a situation, problem, phenomenon, service or program, or describes attitudes towards an issue. (1.5 marks)
 - Correlational study – Discovers or establishes the existence of a relationship/association/interdependence between two or more aspects of a situation. (1.5 marks)
 - Explanatory research – Attempts to clarify why and how there is a relationship between two aspects of a situation or phenomenon. (1.5 marks)
 - Exploratory research – A study that explores an area where little is known or investigates the possibilities of undertaking a particular research study. (1.5 marks)
 - ***Mode of enquiry perspective (1 mark)***
 - Structured (quantitative) approach – Everything that forms the research process is predetermined. (1.5 marks)
 - Unstructured (qualitative) approach – Allows flexibility in all aspects of the process. (1.5 marks)
- b) List any five ways of providing testimonial evidence or a sample of your work for project evaluation. (5 marks)
- Letters from management, users, or other stakeholders
 - Annotated Web site screenshots
 - Copies of manuals or other documents that were produced
 - Presentation materials
 - Surveys and findings
 - Research results
 - Feedback reports

QUESTION 3 (20 marks)

- a) Consider the capstone project whose problem statement is given below:

“For mobile applications, faultless communication for data processing as well as accessing the information is the backbone for successful growth & operation shortly. The expansion of such infrastructure for mobile devices is a challenge. These devices demand that the storage space must be reliable and robust. In handheld devices, flash memory is an alternative because these are opposite to disks because of several features like less



Registration No.....

power consumption, small size and I/O speed is fast. But it stops the Flash memory usage for storing the data. Different methods need to be developed for space usage optimization without changing the performance of the query to a high quantity. This project seeks to find a suitable compression technique for data storage on Flash memory without influencing the query act beyond a particular threshold.”

- i) Give a suitable title for the project (1 mark)
 - A Data Compression Technique for Flash Memory Storage
- ii) What are the TWO artefacts that are expected from this project? (2 marks)
 - The project report, and
 - The application that demonstrates the compression technique.
- iii) When designing objectives, they should be SMART. Briefly highlight what this means clearly outlining each itinerant aspect of SMART. (5 marks)
 - Specific: Ensure that the objectives are specific and narrow for more effective planning.
 - Measurable: Define what evidence will prove you are making progress and reevaluate when necessary.
 - Attainable/Achievable: Ensure that you can reasonably accomplish your objectives within a certain timeframe.
 - Relevant/Realistic: The objectives should align with your values and long-term objectives and should also address a need that has been identified.
 - Time-based: Set a realistic, ambitious end date for task prioritization and motivation.
- iv) Develop ONE suitable general objective and AT LEAST THREE specific objectives and show how they conform to “M” under the SMART principles (8 marks)
 - i. Possible General Objective (2 marks)
 - To develop a suitable data compression technique for data storage on Flash Memory that does not influence the querying process beyond a particular threshold. → This can be measured by looking at the final product (the technique at work)
 - ii. Possible Specific Objectives (6 marks)
 - To study the different data compression techniques suitable for flash memory. → This can be measured by analyzing the literature review of the report.



Registration No.....

- To design a suitable data compression technique based on a suitable baseline technique. → Measured by looking at the designed algorithm (or technique) as presented in the report.
 - Implement and validate (or test) the technique. → Check the application and test its efficacy.
- b) List any TWO reference and citation styles with the exception of the American Psychological Association (APA) format. (2 marks)
- IEEE
 - American Medical Association (AMA)
 - American Chemical Association (ACS)
 - Chicago Manual Style
 - Elsevier – Harvard
 - ACM
- c) Name any TWO reference management softwares. (2 marks)
- Zotero
 - Citavi
 - EndNote
 - JabRef
 - Mendeley Reference Manager
 - Paperpile
 - Papers

QUESTION 4 (20 marks)

- a) Discuss the two main areas of concern when carrying one is carrying out a feasibility study. (4 marks)
- *Project significance*: make sure you know the severity and significance of the problem you are trying to solve with your project.
 - *Project resources*: strive to discover whether your project can be developed single-handedly or if others must be involved.
- b) Whatever you decide to do in producing your capstone project there are a number of areas to consider. These are broken down into the criteria, processes and written elements.
- i) In terms of criteria, success in producing the capstone project depends on five considerations of one's ability. Briefly discuss these five considerations. (5 marks)
- Have sincere interest in the problem or issue to be addressed.
 - Review your qualifications to handle the issue or problem.
 - Gather and synthesize the necessary data and assisting resources.



Registration No.....

- Understand the unique writing requirements of the capstone project documents.
 - Work effectively with stakeholders, users, team members, and others.
- ii) In terms of processes, producing the capstone project encompasses a unique set of activities that require you to do certain tasks. Enumerate any five of these tasks. (6 marks)
- Produce a project title and project description
 - Define your project topic and check feasibility
 - Define your project objectives
 - Perform a risk assessment
 - Produce a prototype
 - Develop a project timeline
 - Produce a project proposal
 - Kick off the project
 - Track project progress
 - Present your project results to the stakeholder
 - Develop a final project report
 - Reflect and celebrate
- iii) In terms of written elements, the capstone project requires a written proposal as well as a final project report. List any five distinctive elements that may be included in these documents. (5 marks)
- Title
 - Description
 - Rationale
 - Objectives
 - Procedures
 - Research
 - Evaluation

QUESTION 5 (20 marks)

A literature review may consist of simply a summary of key sources, but in the social sciences, a good literature review usually has an organizational pattern and combines both summary and synthesis, often within specific conceptual categories. A summary is a recap of the important information of the source, but a synthesis is a re-organization, or a reshuffling, of that information in a way that informs how you are planning to investigate a research problem.

- a) Briefly discuss three reasons for conducting a literature review (6 marks)
- Know what to do (before starting research): Helps in identifying the gaps in the literature



Registration No.....

- Know where to start (starting): This will assist in identifying where to carry on from where others have already reached, or position your work relative to previous work. In addition, it also helps to identify information, methods and ideas that may be relevant to your work (i.e. avoid reinventing the wheel)
- Know what you have done (finishing): This increases your breadth of knowledge of your subject area and also helps in putting your work into perspective
- It also helps to identify opposing views
- It is useful in identifying other people working in the same fields

b) Discuss any two types of reviews. (4 marks)

- Integrative: Draws conclusions from many separate studies, for example, "...study A, B, C and D concluded that..."
- Theoretical: Presents different theories to explain a certain phenomenon, comparing breadth, consistency and predictions, for example, "...this phenomenon is partially explained by the "A" theory which is summarized a..."
- Methodological: Examines methods that have been applied to a problem, for example, "...the A, B and C algorithms have been applied to this problem..."

c) Discuss the FIVE stages you would follow as a researcher when conducting literature review. (10 marks)

- Specifying: Formulating the problem by considering the subject to be reviewed, the type, breadth and depth of the review.
- Searching: Collecting the data paying attention to the primary, secondary and controversial sources of information.
- Collating: evaluating the data to decide that to keep in terms of the practicality to the research area and the quality of the material.
- Analyzing: interpretation of the data to find out what the data tells us, its application to the topic of review, possible conclusions that can be drawn out, and if there are any major disagreements between different sources.
- Writing: presentation of results in a systematic manner.