UGANDA INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

END OF SEMESTER II EXAMINATIONS

ACADEMIC YEAR 2025/2026

DEPARTMENT:	ICT & ENGINEERING
YEAR OF STUDY:	ONE
PROGRAMME:	DSWE/DSMA/EGDT
COURSE:	RESEARCH & INNOVATION METHODS
COURSE CODE:	BSM 1201
DATE:	24th June 2026
TIME:	9:00AM: 12:00PM
DURATION:	3 Hours

INSTRUCTIONS:

(a) This paper consists of two Sections
(b) **Attempt All** questions in Section A and **Only Three** questions in Section B
(c) Study it carefully and attempt all questions
(d) Credit will be given for use of relevant examples and logical reasoning

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SECTION A (40 MARKS)

PART I: Multiple Choice Questions (20 Marks)

Answer all questions. Each question carries 1 marks.

1. A Data Science researcher discovers that previous studies on AI-based disease prediction have focused mainly on developed countries, with limited evidence from Uganda. This situation represents:

A. Sampling error

B. Research gap

C. Research bias

D. Research objective

2. A software engineering team wishes to determine whether a newly developed mobile application improves customer satisfaction compared to an existing system. Which research design would be most suitable?

A. Experimental design

B. Historical research

C. Ethnographic research

D. Documentary research

3. During a study on software usability, respondents are asked to describe their experiences while interacting with a mobile banking application. The data collected is mainly:

A. Numerical data

B. Secondary data

C. Qualitative data

D. Time-series data

4. Which statement best represents a research hypothesis?

A. Mobile applications are important.

B. AI is useful in healthcare.

C. User interface design significantly influences adoption of mobile applications.

D. Software systems require testing.

5. Which of the following would be the most reliable source of secondary data when conducting research on cybersecurity trends?

A. Social media comments

B. Personal opinions

C. Peer-reviewed journal articles

D. Informal discussions

6. A researcher divides software developers into junior, mid-level, and senior categories before selecting participants randomly from each category. Which sampling technique is being used?

A. Cluster sampling

B. Stratified sampling

C. Convenience sampling

D. Snowball sampling

7. Which research ethical principle is violated when respondents' personal information is disclosed without their permission?

A. Reliability

B. Validity

C. Confidentiality

D. Transparency

8. A startup develops an AI-powered chatbot capable of providing automated customer support and successfully deploys it in several organizations. This is an example of:

A. Discovery

B. Innovation

C. Observation

D. Literature review

9. In a study investigating the impact of internet connectivity on adoption of cloud-based applications, internet connectivity is:

A. Dependent variable

B. Independent variable

C. Extraneous variable

D. Sampling variable

10. Which chapter of a research proposal explains the methods used for data collection, sampling, and analysis?

A. Introduction

B. Literature Review

C. Methodology

D. References

11. A final-year Software Engineering student is developing a mobile application for reporting road accidents in real time. During the literature review, the student copies several paragraphs from a published journal article into the project report without citing the original author. Which research misconduct has occurred?

A. Fabrication

B. Falsification

C. Plagiarism

D. Peer review

12. A team of E-governance students develops a questionnaire to investigate factors influencing the adoption of mobile banking services. Before distributing the questionnaire to 500 respondents, they administer it to 20 individuals from the target population to identify ambiguous questions and estimate the time required for completion. This activity is known as:

A. Data validation

B. Pilot testing

C. Data cleaning

D. Sampling

13. A researcher proposes the objective: *"To investigate the impact of machine learning algorithms on fraud detection in mobile money systems in Uganda."* Which characteristic makes this objective suitable for research?

A. It is vague and difficult to understand

B. It focuses on a specific issue that can be investigated

C. It contains multiple unrelated variables

D. It provides the final conclusion of the study

14. A software company collects user feedback from its online platform. The collected responses include user ratings, comments, frequency of system usage, and error reports. Before making conclusions, the company organizes, cleans, and summarizes the data to identify trends and patterns. This process is referred to as:

A. Data collection

B. Data dissemination

C. Data analysis

D. Data storage

15. During requirements gathering for a university management system, users specify that the system should allow students to register courses, view examination results, and pay tuition fees online. These requirements are best classified as:

A. Non-functional requirements

B. Functional requirements

C. Operational constraints

D. Performance metrics

16. A researcher develops two machine learning models for predicting customer churn and wishes to determine which model performs better under identical conditions. Which research design would be most appropriate?

A. Experimental research

B. Historical research

C. Descriptive research

D. Exploratory research

17. A telecommunications company records the number of active subscribers, monthly revenue, average data consumption, and number of network failures over a one-year period. Which of the following represents quantitative data?

A. Customer opinions about network quality

B. Interview responses from subscribers

C. Number of active subscribers per month

D. Observations recorded during field visits

18 A researcher includes citations throughout a study on cybersecurity threats and references all sources used in developing the literature review and theoretical framework. The primary purpose of these citations is to:

A. Increase the length of the report

B. Demonstrate ownership of all ideas presented

C. Acknowledge sources and enable verification of information

D. Reduce the need for data collection

19. An innovation hub has funded the development of a smart attendance management system. After developing a prototype, the innovators deploy it in selected universities to evaluate its performance, usability, and reliability before introducing it to the wider market. This stage of innovation is known as:

A. Idea generation

B. Commercialization

C. Prototype testing and validation

D. Opportunity identification

20. After completing a study on factors affecting e-learning adoption among university students, the researcher recommends subsidized internet access, improved system usability, and user training programs. The purpose of these recommendations is to:

A. Present raw research data

B. Propose practical actions based on the study findings

C. Replace the study conclusions

D. Justify the research methodology

PART II: Short Answer Questions (20 Marks)

1. Explain four characteristics of a good research problem in E-governance or Software Engineering. (4 Marks)

2. Differentiate between applied research and basic research using ICT-related examples. (4 Marks)

3. Explain four ethical issues that should be considered when collecting user data for machine learning applications. (4 Marks)

4. Distinguish between reliability and validity of research instruments. (4 Marks)

5. Outline four ways innovation contributes to growth of the software industry. (4 Marks)

SECTION B (60 MARKS)

ANSWER ANY THREE (3) QUESTIONS

QUESTION ONE (20 MARKS)

A local government authority in Uganda has introduced an online citizen service portal that allows citizens to apply for trading licenses, submit complaints, pay local taxes, and access public information. Despite significant investment in the platform, usage remains low, particularly among citizens in rural areas.

Preliminary reports indicate challenges such as limited digital literacy, poor internet connectivity, lack of awareness of the platform, concerns about data privacy, and resistance to moving from traditional service delivery channels.

The local government wishes to conduct a study to identify factors affecting adoption of the digital platform and develop strategies for improving citizen uptake and satisfaction

Required

a) Formulate an appropriate research title for the study. (2 Marks)

b) Develop one general objective and three specific objectives. (4 Marks)

c) Formulate two research questions and hypotheses that would guide the study. (4 Marks)

d) Identify the dependent variable and any three independent variables in the study. (4 Marks)

e) Recommend and justify two suitable data collection methods for this study. (4 Marks)

f) Explain two ethical considerations that should be observed while collecting data from students. (2 Marks)

QUESTION TWO (20 MARKS)

A team of final-year Data Science students has developed a machine learning model capable of predicting equipment failures in electrical substations using historical maintenance records, sensor measurements, weather data, and operational logs. Initial laboratory tests achieved an accuracy of 94%.

The students intend to commercialize the solution and deploy it within electricity distribution companies. However, utility companies have raised concerns regarding reliability, scalability, cybersecurity risks, integration with existing systems, and the financial viability of the solution.

Required

a) Explain the stages of innovation that should be followed from prototype development to commercialization. (8 Marks)

b) Discuss four challenges that may arise during deployment of the solution. (4 Marks)

c) Identify four stakeholders involved in the innovation process and explain their roles. (4 Marks)

d) Suggest four strategies that could improve adoption of the innovation among utility companies. (4 Marks)

QUESTION THREE (20 MARKS)

Research findings are only valuable when they are effectively communicated to the intended audience. Researchers in Data Science, E-governance and Software Engineering often produce technical reports, journal articles, conference papers, software documentation, and project proposals to disseminate their work.

Required

a) Explain four purposes of a literature review in a research study. (4 Marks)

b) A researcher intends to conduct a study on the use of predictive analytics in healthcare. Outline the main sections that should appear in the research proposal and briefly explain the purpose of each section. (8 Marks)

c) Explain four criteria that can be used to evaluate the credibility and relevance of published research articles. (4 Marks)

d) Discuss four benefits of presenting research findings at conferences, workshops, or seminars. (4 Marks)

QUESTION FOUR (20 MARKS)

A university innovation hub has invested over UGX 500 million in supporting student-led technology startups over the last five years. The supported startups operate in areas such as fintech, health-tech, agri-tech, cybersecurity, and software development.

While a few startups have successfully launched products and secured investment, many have failed due to inadequate funding, poor market research, weak business models, lack of technical expertise, and poor customer acquisition strategies.

The university management wishes to conduct a study to identify factors that influence the success or failure of technology startups emerging from the innovation hub.

Required

a) Develop three research objectives suitable for this study. (3 Marks)

b) Explain an appropriate research design and justify why it would be suitable. (5 Marks)

c) Describe two data analysis methods that could be used to obtain necessary information from all the collected data. (4 Marks)

d) Discuss four indicators that may be used to measure startup success. (4 Marks)

e) Explain two ways in which the findings of the study could benefit the innovation hub. (4 Marks)

QUESTION FIVE (20 MARKS)

Organizations increasingly invest in software systems and data-driven technologies to improve efficiency, enhance customer satisfaction, and support decision-making. However, many ICT projects exceed their budgets, fail to meet user requirements, or are abandoned before completion. Researchers and innovators play a key role in identifying project risks, evaluating project outcomes, and recommending improvements.

Required

a) Explain four factors that contribute to the success of ICT research and innovation projects. (4 Marks)

b) A software development team plans to undertake a research project before developing a nationwide digital payment platform. Describe four activities that should be performed during the project planning phase. (4 Marks)

c) Explain four risks that may affect the successful implementation of Data Science or Software Engineering projects and suggest one mitigation measure for each. (8 Marks)

d) Discuss four indicators that can be used to evaluate whether an ICT project has achieved its intended objectives. (4 Marks)

END