INTERNATIONAL UNIVERSITY OF EAST AFRICA

'Learning to Succeed'

FACULTY OF SCIENCE AND TECHNOLOGY

END OF SEMESTER EXAMINATIONS - MAY 2024/2025

PROGRAMME: MIT

YEAR/SEM: YEAR 1/SEMESTER 2

COURSE CODE: MIT721

NAME: BUSINESS INTELLIGENCE & DATA MINING

DATE: 2025-08-04

TIME: 2:00-5:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A Attempt all questions

Question 1:

KabalagalaKing Hardware Ltd., a construction materials and hardware supply company based in Kampala, is integrating an AI-powered analytics system to enhance its business decision-making processes. This system is intended to help the company analyze large volumes of data related to product sales, customer orders, inventory levels, and market trends.

The AI tool is expected to perform various tasks, such as predicting future demand for building materials, categorising customer inquiries, and segmenting clients based on their purchasing behaviour. As the system is being developed, KabalagalaKing's data analytics team is evaluating which machine learning approaches are most suitable for each task and which algorithms should be used accordingly.(a) Explain the fundamental difference between supervised and unsupervised learning. Provide one example of how each approach could be applied within the business intelligence system at KabalagalaKing Hardware Ltd. (8 marks)(b) One module of the AI system is aimed at forecasting future revenue based on past sales trends, while another is developed to sort customer emails into categories such as quotations, complaints, deliveries, or technical support. Use these examples to distinguish between a regression problem and a classification problem. Clarify the module to be handled as a classification task and a regression one. (8 marks) (c) Identify and explain one practical business problem that KabalagalaKing Hardware Ltd. might face which would require: (i) A regression algorithm (5 marks),(ii) A classification algorithm (5 marks)(iii) A Classification algorithm (5 marks)(d) Suggest and briefly explain one specific data mining algorithm that could be implemented to solve:(i) Regression problem (3 marks),(ii) For solving a classification problem (3 marks) (iii) Clustering problem (3 marks) for KabalagalaKing Hardware Ltd.

Section B Attempt a maximum of 3 questions.

Question 1:

(a) Describe the concept of Business Intelligence. (4 marks)**(b)** Using a diagram, illustrate the Business Intelligence framework. (10 marks) **(c)** Discuss any three key components of the Business Intelligence framework you presented in part. (6 marks)

Q Consider the following dataset collected in Figure 1 to predict whether a mobile phone user is likely to renew their monthly subscription. Answer the following questions based on the dataset provided below:

Age	Monthly_Usage_GB	Subscription Renewed
25	12.5	Yes
40	2.3	No
33	8.9	Yes
22	15.0	Yes
47	1.2	No
29	10.4	Yes
35	3.5	No
31	6.8	Yes

Figure 1: Predicting whether a mobile phone user is likely to renew their monthly subscription.

(i) What is the target attribute. Why ? (4 marks(ii) Based on the nature of the target variable, determine whether this is a classification or regression problem. Justify your answer. (4 marks)(iii) Identify the input features

in the dataset and state how many features are used. (4 marks)(iv) How many records (instances) are present in this dataset? (4 marks) (v) List the possible outcomes (labels) that the model will predict. (4 marks

Question 3:

(a) What does K mean in the K-means algorithm clustering algorithm (3 marks)(b) Draw a flowchart to illustrate steps in the K-means algorithm (10 marks) (c) Explain each step in the K-means clustering algorithm (7 marks)

Question 4:

(a) Explain the importance of data preprocessing in data mining. (8 marks)(b) Describe any two data techniques for scaling data (8 marks) (c) How is missing data handled in data mining (4 marks)?

Question 5:

(a) Explain the difference between data, information, and knowledge in the context of data mining and business intelligence. Give one example of each. (12 marks) (b) Explain any four data mining elements (8 marks)

Question 6:

(a) With the aid of examples, define the following key concepts in data mining, clearly highlighting their purposes and how they differ from each other: (5 marks each)

(i) Regression

(ii) Classification

(iii) Clustering(b) For each of the three data mining tasks listed in part (a), name one common algorithms that are typically used. (1 mark each)(c) Briefly explain the significance of data mining in modern data analysis and decision-making processes. (4 marks)