Strathmore UNIVERSITY

STRATHMORE BUSINESS SCHOOL

MASTER OF MANAGEMENT IN AGRIBUSINESS

MAIN EXAM

MMA 8301: ADVANCED TECHNOLOGIES APPLICATION IN AGRIBUSINESS

DATE: Friday, 14th November 2025 **TIME:** 09:00 – 11:30am

Instructions

a) The examination consists of FIVE Questions**.**
b) Question ONE is compulsory.
c) Answer ANY other TWO questions.

QUESTION ONE (30 MARKS)

(a) A farm manager is considering an investment in new technology. For each of the following concepts, explain its core function and justify its potential value by describing a specific, practical application on a farm struggling with inconsistent soil quality.

(i) Variable Rate Technology (VRT) **(2 marks)**
(ii) Actuators **(2 marks)**
(iii) Global Positioning System (GPS) **(2 marks)**
(iv) Normalized Difference Vegetation Index (NDVI) **(2marks)**

(b) Critically analyze how Artificial Intelligence (AI) and Machine Learning (ML) can be leveraged to close the loop in agricultural waste streams, thereby advancing a circular economy. In your response, compare and contrast the role of AI/ML with traditional methods in at least two of the following areas: optimizing compost from crop residues, managing water re-use in aquaponics, or creating dynamic markets for imperfect produce. **(10 marks)**

(c) "The adoption of advanced agri-tech is less about the technology itself and more about the pressing drivers forcing the industry to evolve." Synthesize a coherent argument that supports this statement. In your argument, prioritize what you believe are the **three** most critical drivers (e.g., economic, environmental, social) and for each, propose a viable agri-tech solution, explaining how it addresses the specific driver. **(12 marks)**

QUESTION TWO (20 MARKS)

With reference to the Digital Field Force case study, answer the following questions:

(a) Applying Lewin's Change Management Model, diagnose the most significant "restraining forces" a smallholder farm would likely face during the "Unfreezing" stage when transitioning to precision agriculture. Identify at least **three** such forces, and propose one specific action to mitigate each force you identify. **(6 marks)**

(b) "The Digital Field Force model promises significant benefits, but its implementation is not a simple plug-and-play process". Develop a strategic implementation plan for a smallholder farmers' co-operative. In your plan, evaluate the critical success factors across technological, human, and operational dimensions, and argue why these factors are most pivotal in the smallholder context. **(9 marks)**

(c) You are designing a digitization project. Formulate **five** guiding principles for the project, ensuring they are specifically tailored to address the unique challenges of integrating AI, IoT, and predictive analytics, rather than being generic project management rules. For each principle, explain how it mitigates a specific integration risk. **(5 marks)**

QUESTION THREE (20 MARKS)

(a) Compare and contrast smart irrigation with traditional scheduled irrigation. In your response, evaluate which system provides a more sustainable solution for a region facing increasingly frequent droughts, justifying your judgment with at least **two** key benefits of your chosen system. **(5 marks)**

(b) Assess the claim that harvesting robots are a comprehensive solution to agricultural labor shortages. In your assessment, analyze one specific benefit and one significant limitation of robotic harvesting, using a named example. Conclude with a reasoned judgment on the validity of the claim. **(5 marks)**

(c) In the context of AI in crop prediction:

(i) Define "predictive analytics for yield forecasting." **(1 mark)**

(ii) Categorize the key data inputs for predictive analytics into *historical*, *real-time in-situ*, and *remote sensing* groups. For one data type in each category, explain its specific contribution to forecast accuracy. **(3 marks)**

(iii) A farmer is skeptical of "black box" models. Using a relevant example, explain how a specific type of machine learning (e.g., regression, decision trees) translates data inputs into a yield forecast, focusing on the logic of the process rather than just the outcome. **(3 marks)**

(iv) Beyond simple prediction, defend how predictive analytics can create a strategic advantage for a agri-business. Propose and explain three ways the forecasts can be used to make superior operational or financial decisions. **(3 marks)**

QUESTION FOUR (20 MARKS)

Enterprise Resource Planning (ERP) systems are critical for modern agribusinesses.

a. Evaluate the strategic impact of a well-implemented ERP system on an integrated agribusiness firm (e.g., one involved in farming, processing, and distribution). **(10 marks)**
b. Discuss its influence on two of the following: supply chain visibility, operational efficiency, and sustainability reporting. Use relevant concepts or other MIS frameworks. **(10 marks)**

QUESTION FIVE (20 MARKS)

"In agribusiness, data is the new crop." From a manager's perspective,

a. Argue for why building a robust data strategy—focused on collection, integration, and analytics—is now as important as traditional strategies like cost leadership or product differentiation for achieving competitive advantage. **(10 marks)**

b. Support your answer with examples. **(10 marks)**