Strathmore
UNIVERSITY

STRATHMORE BUSINESS SCHOOL
MASTER OF MANAGEMENT IN AGRIBUSINESS
MAIN EXAM - SPECIAL
MMA 8301 ADVANCED TECHNOLOGIES APPLICATION IN AGRIBUSINESS

DATE: Tuesday, 7th April 2026 **Time: 2.5** Hours

Instructions
a) The examination consists of FIVE Questions**.**
b) Answer ANY THREE questions.

QUESTION ONE: (20 MARKS)

"An integrated agribusiness firm—operating a large-scale farm, a processing plant, and a distribution network—decides to implement both an **Enterprise Resource Planning (ERP) system** and a suite of **precision farming technologies** (GPS, VRT, remote sensing). The CEO envisions a seamless digital thread from field to customer."

Required:
(a) Synthesize how data generated by precision farming technologies (e.g., yield maps, soil sensors, NDVI imagery) could be integrated into the ERP system to create value across *at least two* functional modules (e.g., procurement, production planning, logistics, finance) (**6 marks**)

(b) Evaluate three potential *organizational tensions* that could arise when attempting to integrate these two technological domains, considering differences in data culture, departmental incentives, and decision-making authority. For each tension, propose a managerial intervention. (**8 marks**)

(c) Judge whether the combined implementation is likely to yield *synergistic* benefits or merely *additive* benefits. Justify your position with reference to both technological and organizational factors. (**6 marks**)

QUESTION TWO:

A specialty coffee cooperative sources from 5,000 smallholder farmers and exports to premium roasters in Europe. Consumers increasingly demand *full traceability* and *ethical sourcing verification*. The cooperative is considering a **blockchain-based traceability system** integrated with its existing **Supply Chain Management (SCM)** systems.

Required:

(a) Apply the concept of *supply chain visibility* to design a blockchain solution that addresses the specific needs of this context. In your design, explain how data would flow from farmer to exporter and how different stakeholders (farmers, cooperatives, roasters, consumers) would interact with the system. (**7 marks**)

(b) Analyze the *trade-offs* between implementing a permissioned (private) blockchain versus a permissionless (public) blockchain for this use case. Your analysis should consider cost, trust, scalability, and inclusivity of smallholder farmers. (**6 marks**)

(c) Judge whether blockchain alone is sufficient to deliver credible ethical sourcing claims, or whether it must be accompanied by complementary investments (e.g., in auditing, farmer training, governance structures). Defend your judgment with reasoned arguments. (**7 marks**)

QUESTION THREE:

A large-scale vegetable farming operation faces two interrelated challenges: (1) a persistent labor shortage for harvesting delicate crops like strawberries and tomatoes, and (2) increasing pest pressure that has led to heavy pesticide use, which conflicts with its sustainability commitments. The farm is evaluating two distinct technological pathways:

- **Pathway A:** Invest in **harvesting robots** (e.g., Agrobot, Harvest CROO) to address labor shortages while maintaining current crop varieties.
- **Pathway B:** Adopt **genetically edited crop varieties** (e.g., CRISPR-edited tomatoes with improved pest resistance and uniform ripening) to reduce pesticide use and simplify harvest logistics, while continuing with manual labor.

Required:

(a) Analyze the *operational, financial, and risk implications* of each pathway, considering that the farm cannot afford to pursue both simultaneously. (**8 marks**)

(b) Evaluate which pathway offers a more *resilient long-term solution* in a context of climate uncertainty, evolving consumer preferences, and potential regulatory changes. Your evaluation must include a justification based on explicit criteria. (**8 marks**)

(c) Propose a *hybrid strategy* that combines elements of both pathways in a phased manner, explaining how sequencing and integration would mitigate the weaknesses of each standalone approach. (**4 marks**)

QUESTION FOUR:

An agribusiness conglomerate processes 500,000 tons of agricultural waste annually (crop residues, fruit peels, husks) across its operations. Currently, most waste is landfilled or burned. The company wants to transition toward a *circular economy model* by converting waste into energy, animal feed, or biofertilizers. However, the optimal use varies by location, waste type, seasonality, and market demand.

Required:

(a) Synthesize how a **Decision Support System (DSS)** enhanced with **Business Intelligence (BI)** capabilities could be designed to support investment and operational decisions in this circular economy transition. Describe the *data inputs*, *analytical models*, and *dashboard outputs* that would be essential. (**8 marks**)

(b) Judge the claim that *"having the technology to process waste is less important than having the decision intelligence to match waste streams with value pathways."* Support your judgment with arguments drawn from both technological and managerial perspectives. (**6 marks**)

(c) The company must decide whether to centralize waste processing in a large-scale biogas facility or deploy distributed, smaller-scale solutions across multiple sites. Apply the DSS framework you described in (a) to evaluate these two strategic options, identifying the key decision criteria the system would need to weigh. (**6 marks**)

QUESTION FIVE:

A mid-sized agribusiness firm sells premium organic inputs (seeds, fertilizers, biopesticides) to both large commercial farms and smallholder farmers. The company has historically treated all customers similarly. However, new competitors are using digital platforms to offer personalized recommendations, dynamic pricing, and loyalty rewards based on individual customer data. The firm wants to leverage its existing **IT infrastructure** and implement a modern **Customer Relationship Management (CRM)** system to compete.

Required:

(a) Apply the concept of *customer-centric culture* to design a CRM-enabled strategy that differentiates service delivery between large commercial farms and smallholder farmers. Explain how data collection, analytics, and engagement channels would differ for each segment. (**6 marks**)

(b) Evaluate the *IT infrastructure implications* of this CRM transformation. Specifically, analyze the challenges related to *data integration* (e.g., linking CRM with existing ERP, farm management systems, and external data sources), *scalability*, and *cybersecurity* when managing sensitive customer data across heterogeneous segments. (**8 marks**)

(c) The firm's leadership is divided: some argue that the CRM investment should focus on *retaining high-value commercial clients*, while others advocate for *building long-term loyalty among smallholders* as a growth strategy. Judge which strategic orientation is more defensible, using both business and technological considerations to support your judgment. (**6 marks**)