



# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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## UNIVERSITY EXAMINATIONS 2023/2024

FIRST YEAR SECOND SEMESTER AND FIRST YEAR FIRST SEMESTER  
EXAMINATION FOR DEGREE OF MASTERS OF SCIENCE IN APPLIED STATISTICS

### SMS 5226: DECISION THEORY

**DATE: APRIL 2023**

**TIME: 2 HOURS**

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**INSTRUCTIONS: Answer Question ONE and any other Two questions.**

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#### QUESTION ONE (30 MARKS)

- (a) Distinguish decision making under risk from decision making under uncertainty. (6 marks)
- (b) Briefly explain the meaning of admissible test. (4 marks)
- (c) Explain the Anscombe and Aumann model and briefly explain a scenario in which it can be applicable. (6marks)
- (d) Discern between randomised and non-randomised minimax decision rules. (4 marks)

#### QUESTION TWO (20 MARKS)

- (a) Discuss the Ellsberg Paradox and Ambiguity Aversion as used in decision making. (10 marks)
- (b) Show that the decision maker becomes less risk averse against the changes in his wealth ( $z$ ) when his initial wealth increases if and only if he has decreasing absolute risk aversion. (10 marks)

#### QUESTION THREE (20 MARKS)

- (a) Discuss the sequential probability ratio test. (8 marks)
- (b) The following are possible net cash flows for projects X and Y and their associated probabilities over 1 year period. Both projects have a discount rate of 10% and an



initial cost of 5250 dollars. Using the idea of Expected Net Present Value, determine which project is preferable. (12 marks)

PROJECT X	Cash flows (dollars)	4000	11000	7000	6000	2000
	Probability	0.2	0.4	0.1	0.2	0.1
PROJECT Y	Cash flows (dollars)	12000	10000	8000	6000	4000
	Probability	0.1	0.15	0.5	0.15	0.1

**QUESTION FOUR (20 MARKS)**

- (a) By explaining the meaning of a decision function, discriminate between a loss function and risk function. (8 marks)
- (b) Give a brief highlight of what the following methods of project appraisal entail and give the advantages of each method; (12 marks)
- i. Net Present Value (NPV)
  - ii. Internal Rate of Return (IRR)
  - iii. Payback Period

**QUESTION FIVE (20 MARKS)**

- (a) State and prove the Hunt-Stein theorem. (8 marks)
- (b) A project will cost kshs. 40,000. Its stream of earnings before depreciation, interest and taxes (EBDIT) during the first year through 5 years is expected to be kshs10,000 kshs12,000, kshs14,000, kshs16,000 and kshs 20,000. Assuming a 40% tax rate and a depreciation of Kshs. 6000 on a straight line basis, compute the Accounting Rate of Return (ARR). (12marks)

