MERU UNIVERSITY COLLEGE
OF SCIENCE & TECHNOLOGY
P.O. Box 972-60200 Meru - Kenya. Tel: 020-2092048, 020 2069349
Fax: 020-8027449

University Examinations 2012/2013

SECOND YEAR, FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN APPLIED STATISTICS

STA 3113: DECISION THEORY

DATE: AUGUST 2012 **TIME: 3 HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions.*

QUESTION ONE – (30 MARKS)

a) Define the following terms/phrases as used in Mathematical Statistics.
   i. Choice
   ii. Alternatives
   iii. Preference
   iv. Utility
   v. Lottery
   vi. Consequence(s) (6 Marks)

b) Distinguish decision making under risk from decision making under uncertainty. (6 Marks)

c) Explain the Anscombe and Aumann model and briefly explain a scenario in which it can be applicable. (6 Marks)

d) Show that a 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. (6 Marks)

e) For any lotteries F and G, F first-order stochastically dominates G if and only if the decision maker weakly prefers F to G under every weakly increasing utility function u that is $\int u(x)\, dF \geq \int u(x)\, dG$. (6 Marks)

QUESTION TWO (20MARKS)

a) Explain briefly what sensitivity analysis seeks to achieve in project appraisal and the procedure therein.

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.

PROJECT X

Cash flows (dollars)	4,000	11,000	7,000	6,000	2,000
Probability	0.2	0.4	0.1	0.2	0.1

PROJECT Y

Cash flows (dollars)	12,000	10,000	8,000	6,000	4,000
Probability	0.1	0.15	0.5	0.15	0.1

QUESTION THREE (20 MARKS)

a) Give a brief highlight of what the following methods of project appraisal entail and give the advantages of each method; (i) Net Present Value (NPV) (ii) Internal Rate of Return (IRR) (iii) Payback Period.

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 kshs 10,000 kshs. 12,000, kshs. 14,000, kshs.16,000 and kshs. 20,000. Assuming a 40% tax rate and a depreciation of kshs. 6,000 on a straight line basis, compute the Accounting rate of Return (ARR).

QUESTION FOUR (20 MARKS)

a) In the insurance practice, risks can't be modeled by purely discrete random variables, nor by purely continuous random variables. Construct a random variable with distribution that is a mixture of a discrete and a continuous distribution reflecting the insurance case. Hence derive CDF of this random variable.

b) Losses form a portfolio of policies are believed to follow exponential distribution with parameter θ, which is unknown. A reinsurance arrangement is in place, under which the reinsurer pays the amount of each loss in excess of 800 dollars. The last four payments made by the reinsure in respect in respect of these policies were: 760,954,1201 and 1158. Assuming that a suitable prior distribution for θ is an inverse gamma prior with parameters 2 and 2800, determine the Bayesian estimator of θ under $0/1$ loss.