JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN ACTUARIAL SCIENCE

3RD YEAR 1ST SEMESTER 2017/2018 ACADEMIC YEAR

MAIN REGULAR

COURSE CODE: SAC 307

COURSE TITLE: FINANCIAL ECONOMICS

EXAM VENUE: **STREAM: (BSc. Actuarial)**

DATE: **EXAM SESSION:**

TIME: 2.00 HOURS

Instructions:

1. **Answer question 1 (Compulsory) and ANY other 2 questions**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION 1 [COMPULSORY] [30 Marks]

(a) Investor A, B, and C are risk-averse, risk-neutral and risk loving respectively. Draw diagrams to indicate the shape of each investors' indifference curves in the utility-wealth space. [**6 Marks**]

(b) Define the Arrow-Pratt measures of absolute risk aversion and relative risk aversion [**4 Mark**]

(c) Jason has an initial wealth of Kshs. 100,000 and a utility function of the form

$$U(w) = -w^{-\frac{1}{2}}$$

Suppose that he accepts a gamble in which an unbiased coin is tossed once. If it lands on heads up he wins Kshs.10,000, but if it lands on tails up he loses Kshs.10,000.

Determine the certainty equivalent for this gamble [**6 Marks**]

(d) Consider two risky assets A and B with the cummulative distribution function

$$F_A(w) = w$$

$$F_B(w) = w^{\frac{1}{2}}$$

In both cases $0 \leq w \leq 1$.

Show that A is preferred to B on the basis of first order stochastic dominance. [**8 Marks**]

(e) Show that in the single-index model of asset returns

$$E_i = \alpha_i + \beta_i E_m$$

and

$$V_i = \beta_i^2 V_m + V_{i\epsilon}$$

Where

$V_{i\epsilon}$ is the variance of ϵ

E_i is the return of an asset i

V_i is the variance of asset i

[6 Marks]

QUESTION 2 [20 Marks]

A portfolio of investments is 40% invested in security X and 60% is invested in security Y. The returns from security X is equally likely to be 8% or 13%. The return from security Y will be 10% with a 70% probability and 16% with a 30% probability.

(a) Calculate the expected of return and variance of return for each individual security **[8 Marks]**

(b) Calculate the expected return and variance of return on the whole portfolio, assuming that the coefficient of correltion is

(i) 1 **[6 Marks]**

(ii) -1 **[6 Marks]**

QUESTION 3 [20 Marks]

Jayne's preferences can be represented by a quadratic utility function

$$U(w) = w - aw^2 \qquad (a > 0)$$

where $0 < w < \frac{1}{2a}$ is her wealth

(a) Show that Jayne's expected utility is a function of only the mean and variance of wealth offered by an investment and comment briefly upon how her expected utility depends upon each of the mean and variance.

[12 Marks]

(b) Show that her absolute risk aversion is increasing at any level of wealth.

[8 Marks]

QUESTION 4 [20 Marks]

Consider an investment in which the:

- risk-free rate of return on Treasury bill is 4%
- expected return on the market as a whole is 8%
- standard deviation of the return on the market as a whole is 30%
- assumptions of the capital asset pricing model (CAPM) hold.

(a) Consider the efficient portfolio Z that consists entirely of Treasury bills and shares. If Z yields an expected return of 7% what is its Beta. ?

[**10 Marks**]

(b) Calculate the standard deviation of the return for the portfolio Z.

[**10 Marks**]

QUESTION 5[20 Marks]

(a)State the equation of the security market line relationship and, assuming that the market portfolio offers a return in excess of the risk-free rate, use it to derive the betas of the market portfolio and the risk-free asset.

[**7 Marks**]

(b) Draw a diagram of the security market line relationship and use it to derive the relationship itself. [**6 Marks**]

(c) What does the securuty market line indicate about the relationship between risk and return? [**7 Marks**]