



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE

ACTUARIAL

3RD YEAR 1ST SEMESTER 2015/2016 ACADEMIC YEAR

MAIN REGULAR

COURSE CODE: SAC 307

COURSE TITLE: FINANCIAL ECONOMICS

EXAM VENUE: LR 7

STREAM: BSc. Actuarial Sc.

DATE: 29/04/16

EXAM SESSION: 9.00 – 11.00 am

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 ONE (30 marks)

1. An investor is considering investing her total wealth in one of the two portfolios, A and B. The total return on A, R_A is uniformly distributed on the interval [0.9, 1.3]

The total return on B, R_B has the discrete distribution:

$$R_B = \begin{cases} 0.9, & \text{probability } 0.4 \\ 1.2, & \text{probability } 0.2 \\ 1.5, & \text{probability } 0.4 \end{cases}$$

a) Calculate the mean and standard deviation of R_A and R_B [4 marks]

b) The investor makes decisions using the utility function

$$u(x) = 1 - \exp(-5x) ; -\infty < x < \infty$$

Determine in which of the two portfolios she will invest [4 marks]

c) Comment briefly on your answers to parts (a) and (b) [2 marks]

2) State the shortcomings of Capital Asset pricing model [5 marks]

3) Using the standard Black Scholes put option price formula, calculate the price of a European put on a dividend paying –paying stock with the following features: [5 marks]

Risk free rate :6% pa (continuously compounded)

Volatility 20% pa

Dividends:3%(continuously compounded)

Time to expiry :3 months

Current price of underlying 450 kshs

Strike price 400kshs

3.) What do the terms: In-the money, Out –of –the money and at –the money refer to in regards to European call option and a European put option (6marks)

4) Suppose the expected returns and variances of

$$E(R_A) = 0.2 , E(R_B) = 0.3 , Var(R_A) = 0.1 \text{ and } Var(R_B) = 0.2$$

- i. Calculate the expected return and variance of a portfolio that is composed of 60% A and 40% B, when the correlation coefficient between the stocks is -0.5. (2 marks)
- ii. Calculate the expected return and variance of a portfolio that is composed of 60% A and 40% B when the correlation coefficient between the stocks is -0.6. (2 marks)
- iii. How does the correlation coefficient affect the variance of the portfolio? (1 marks)

QUESTION TWO (20 marks)

1..What are differences between a future contract and a forward contract. (4 marks)

b.Differentiate between the terms long position and short position in regards to the futures contract (2 marks)

2.a.) Suppose that you enter into a 6 month forward contract on a non dividend paying stock when the stock price 30 and risk –free interest rate (continuously compounded) is 12% pa.What is the forward price (3 marks)

b.A stock index currently stands at 350.The risk free interest rate is 8% pa (continuously compounded) and the dividend yield on the yield on the index is 4% pa.Calculate the future price of a 4 month contract (4 marks)

3) Company X issues 6- month European call option on its own shares with a strike price of 120 kshs.They are currently priced at 35 kshs.per share.The current share price is 123 kshs and the current force of interest is $\delta = 6\% pa$. If dividends are payable continuously at a rate of $q=12\%$ pa then calculate the fair price for put options on the share price at the same strike price. (4 marks).

4) Suppose that Matheka plans to invest 200 percent of his wealth in the market portofolio.Current rate of treasury bills is 6% and expected market return and risk 14 and 20 % respectively. What would be the return and risk of Matheka's portfolio [3 marks]

QUESTION THREE (20 marks)

The quarterly returns of mutual funds and stock market were as below

DATE	Returns of fund X	Returns of fund Y	Stock Market
2005/Q1	6.4%	7.9%	9.2%
2005/Q2	8.5	9.5	7.3
2005/Q3	3.4	-6.6	-6
2005/Q4	13.7	31.3	17.3
2006/Q1	14.5	17.5	14.0
2006/Q2	3.2	11.6	5.9
2006/Q3	-0.9	-14.7	-6.9
2006/Q7	4.5	6.7	5.6

Required:

- i. Correlation of returns for fund X and market (6 marks)
- ii. Correlation of returns for fund Y and the market (6 marks)
- iii. Beta of each fund (4 marks)
- iv. Percentage of risk (systematic and unsystematic) in each fund (4 marks)

QUESTION FOUR (20 marks)

3. The CAPM model is assumed to hold in a particular investment market. The total return on a unit invested in asset A in this market has mean 1.15 and standard deviation 0.10. The return on a unit invested risk free asset is 1.05 and the expected return on a unit invested in the market portfolio is 1.08. You are given that A is an efficient portfolio

- a) Derive the equation for the capital market line [3 marks]
- b) Calculate the standard deviation of the return on the market portfolio [3 marks]
- c) Calculate the beta for asset A [3 marks]
- d) Asset B has a beta of 4 and the standard deviation of return is 0.15. Determine whether B is an efficient portfolio. Give reasons for your answer [3 marks]

2) You are given that assets X and Y are perfectly correlated such that $R_Y = 6 + 0.2 R_X$ and the probability distribution of X is

Probability	Return on X, R_X %
0.1	30
0.2	20
0.4	15
0.2	10
0.1	-50

- i. Graph the portfolio opportunity set (3 marks)
- ii. What is the percentage of your wealth to put into asset X to achieve zero variance? (5 marks)

QUESTION FIVE (20 marks)

- 1.) Discuss the three forms of market efficiency [9 marks]
- 2.) Define risk and discuss methods of mitigating risk and how are they evaluated [7 marks]
- 3.) Define time premium of an option (2 marks)
- 4.) State what is meant by put- call parity (2 marks)