Strathmore UNIVERSITY

STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES

BBS ACTUARIAL SCIENCE; FINANCIAL ECONOMICS; FINANCIAL ENGINEERING

SPECIAL EXAMINATION

BSF 4230 ADVANCED PORTFOLIO MANAGEMENT

DATE: 1st April 2026 Time: 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

QUESTION ONE [30 marks]

a) Explain any two broad approaches to asset allocation. (4 marks)

b) "Bottomline, investment outcomes are inherently linked to the economy." Do you agree? Explain. (5 marks)

c) Explain the application of Macaulay duration in portfolio management (5 marks)

d) Discuss any two approaches to immunizing a portfolio of multiple liabilities. (4 marks)

e) Consider the following relating to equity portfolio. You have been tasked with performance evaluation.

Sector	Portfolio Weight	Benchmark Weight	Portfolio Return	Benchmark Return
Agriculture	50%	50%	18%	10%
Transport	30%	20%	-3%	-2%
Manufacturing	20%	30%	10%	12%

Required

Calculate and interpret:

(i) Allocation effect (4 marks)
(ii) Selection effect (4 marks)
(iii) Interaction effect (4 marks)

QUESTION TWO [20 marks]

a) An investor has made the following return projections of each of three possible outcomes with an equal likelihood of occurrence:

Asset	Outcome 1 (%)	Outcome 2 (%)	Outcome 3 (%)	Expected return (%)
1	12	0	6	6
2	12	6	0	6
3	0	6	12	6

Required

i) Which pair of assets is perfectly negatively correlated? (4 marks)

ii) If the investor constructs two-asset portfolios that are equally weighted, which pair of assets has the lowest expected standard deviation? (4 marks)

iii) If the investor constructs two-asset portfolios that are equally weighted, which pair of assets provides the least amount of risk reduction? (4 marks)

b) Suppose you want to construct a two-asset portfolio given expected returns, standard deviations, and covariance of the two assets. The returns of the two assets are perfectly positively correlated. Show that optimal weight is $W1 = \sigma 2 / (\sigma 2 - \sigma 1)$ (8 marks)

QUESTION THREE [20 marks]

A portfolio manager uses Arbitrage Price Theory as a basis for evaluating strategies. She knows that portfolios [X] and [Y] are well diversified but has not encountered portfolio [Z]. The expected returns and factor sensitivity are as follows:

Portfolio	Expected Return	Factor Sensitivity
X	2%	0.5
Y	4%	1.5
Z	3%	0.9

Required

a) Does arbitrage opportunity exist? If yes, demonstrate how this can be exploited. (10 marks)

b) The portfolio manager now uses the following 2-factor model

Portfolio	Expected Return	Factor Sensitivity	
		Inflation	GDP growth
X	2%	0.5	1.0
Y	4%	1.6	0.0
Z	3%	1.0	1.1

Suppose the inflation forecast was 2% while actual value was 2.2% and GDP growth forecast was 1.5% while actual value was 1.0%. The error term for X, Y and Z is 1%, 0% and 0.5% respectively. Calculate the actual return of an equal weighted portfolio consisting of X and Y. (10 marks)

QUESTION FOUR [20 marks]

An investor is in the process of projecting stock market returns in Uganda based on the following assumptions:

- Stock volatility – 35%
- Stock correlation with global market – 0.6
- Segmented market Sharpe ratio – 0.25
- Global market Sharpe ratio – 0.20
- Risk free rate – 10%
- Degree of market integration – 0.55

Required

(i) Estimate the expected return for the stock using Singer and Terhaar Model (15 marks)

(ii) How can the investor use shrinkage estimation to validate the expected returns? (5 marks)

QUESTION FIVE [20 marks]

a) An investor is considering investing in certain portfolios of assets and would like some help in portfolio selection.

Required

(i) Should they choose portfolios on the CAL or on the efficient frontier. Explain clearly. (6 marks)

(ii) How should the investor determine the optimal portfolio? (4 marks)

b) Explain any five constraints in portfolio construction for an individual investor. (10 marks)