



STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES
BBS ACTUARIAL SCIENCE, FINANCIAL ENGINEERING AND FINANCIAL
ECONOMICS
SPECIAL EXAMINATION
BSF 2206: PORTFOLIO MANAGEMENT

DATE: 9th 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

- a) Assume that as a US investor, you decide to hold a portfolio with 80 percent invested in the S&P 500 US stock index and the remaining 20 percent in the MSCI Emerging Markets index. The expected return is 9.93 percent for the S&P 500 and 18.20 percent for the Emerging Markets index. The risk (standard deviation) is 16.21 percent for the S&P 500 and 33.11 percent for the Emerging Markets index. What will be the portfolio's expected return and risk given that the covariance between the S&P 500 and the Emerging Markets index is 0.5 percent or 0.0050? Note that units for covariance and variance are written as %² when not expressed as a fraction. These are units of measure like squared feet and the numbers themselves are not actually squared.

Requirements:

Calculate the portfolio return and risk if the correlation.

(5 marks)

- b) Alpha Natural Resources (ANR), a coal producer, buys a large but privately held coal producer in China. As a result of the cross-border acquisition of a private company, ANR's standard deviation of returns is reduced from 50 percent to 30 percent and its correlation with the market falls from 0.95 to 0.75. Assume that the standard deviation and return of the market remain unchanged at 25 percent and 10 percent, respectively, and that the risk-free rate is 3 percent.

Requirements:

- (i) Calculate the beta of ANR stock and its expected return before the acquisition.
(3 marks)
 - (ii) Calculate the expected return after the acquisition.
(3 marks)
 - (iii) Calculate Apple's expected return.
(3 marks)
- c) Suppose the risk-free rate is 3 percent, the expected return on the market portfolio is 13 percent, and its standard deviation is 23 percent. A German company, Mueller Metals, has a standard deviation of 50 percent and a correlation of 0.65 with the market.

Requirements:

Calculate Mueller Metal's beta and expected return. (5 marks)

- d) While giving examples distinguish between systematic risk and unsystematic risk; explain clearly the implications of these risks when making investment decisions. (5 marks)
- e) Considering systematic and non-systematic risk, answer the following questions:
- (i) Describe the systematic and nonsystematic risk components of the following assets:
 - A risk-free asset, such as a three-month Treasury bill. (2 marks)
 - The market portfolio, such as the S&P 500. (2 marks)
 - (ii) Consider two assets, A and B. Asset A has twice the amount of total risk as Asset B. For Asset A, systematic risk comprises two-thirds of total risk. For Asset B, all of total risk is systematic risk. Which asset should have a higher expected rate of return? (2 marks)
- (Total: 30 marks)

Question Two

- a) Assume that two stocks have the same return and risk (standard deviation): 10 percent return with 20 percent risk. You form a portfolio with 50 percent each of Stock 1 and Stock 2 to examine the effect of correlation on risk.

Requirements:

Calculate the portfolio return and risk if the correlation is 1.0. (5 marks)

- b) You invest 20 percent of your money in the risk-free asset, 30 percent in the market portfolio, and 50 percent in RedHat, a US stock that has a beta of 2.0. Given that the risk-free rate is 4 percent and the market return is 16 percent.

Requirements:

What is the portfolio's beta and expected return. (5 marks)

- c) GlaxoSmithKline Plc is examining the economic feasibility of developing a new medicine. The initial investment in Year 1 is \$500 million. The investment in Year 2 is \$200 million. There is a 50 percent chance that the medicine will be developed and will be successful. If that happens, GlaxoSmithKline must spend another \$100 million in Year 3, but its income from the project in Year 3 will be \$500 million, not including the third-year investment. In Years 4, 5, and 6, it will earn \$400 million a year if the medicine is successful. At the end of Year 6, it intends to sell all rights to the medicine for \$600 million. If the medicine is unsuccessful, none of GlaxoSmithKline's investments can be salvaged. Assume that the market return is 12 percent, the risk-free rate is 2 percent, and the beta risk of the project is 2.3. All cash flows occur at the end of each year.

- (i) Calculate the expected annual cash flows using the probability of success.

(3 marks)

- (ii) Calculate the expected return.

(2 marks)

- (iii) Calculate the net present value.

(5 marks)

(Total: 20 marks)

Question Three

- a) Separation theorem is important in finance as it allows management of a corporation to make investment decisions without reference to the utility preferences of individual owners; discuss the concept of separation theorem. **(4 marks)**
- b) Consider the following information of asset A, B and C

State of Economy	Probability	RA (%)	RB (%)	RC (%)
Recession	0.25	32	24	12
Average	0.50	24	16	16
Boom	0.25	16	20	24

Assume that the investor wishes to have 50% of both A and B.

Requirements:

- Compute individual securities return and risk. **(6 marks)**
 - Compute the covariance between A and B. **(2 marks)**
 - Compute the portfolio risk of A and B. **(4 marks)**
- c) Mr. Miles approaches his broker to borrow money against securities held in his portfolio. Even though Mr. Miles' loan will be secured by the securities in his portfolio, the broker's rate for lending to customers is 7 percent. Assuming a risk-free rate of 5 percent and a market return of 15 percent with a standard deviation of 20 percent.

Requirements:

Estimate Mr. Miles' expected return and risk if he invests 25 percent and 75 percent in the market and if he decides to borrow 25 percent and 75 percent of his initial investment and invest the money in the market. **(4 marks)**

(Total: 20 marks)

Question Four

- a) Personal investment choices should align with an individual's goals, risk tolerance, and stage in the life cycle.

Requirements:

Identify at least **three major investment options** an individual may consider. For each, describe **one key advantage** and **one key disadvantage**, and briefly state the type of investor or life-cycle stage for which it is most appropriate. **(6 marks)**

- b) Explain briefly how Beta is calculated including its interpretation. **(4 marks)**
- c) Assume that the investor invests Shs. 100,000 in a mutual fund at the beginning of the first year, adds another Shs. 30,000 at the beginning of the second year and withdraws Shs. 40,000 at the end of the second year. The return of this investment is negative 30% for year 1, positive 40% for year 2 and positive 20% for year 3.

Requirements:

Using the information above, compute the money-weighted return for this investment.

(10 marks)

(Total: 20 marks)

Question Five

- a) Portfolio management is not a one-time activity; it requires ongoing monitoring and periodic adjustments.

Requirements:

Explain the purpose of an **Investment Policy Statement (IPS)** and discuss three key reasons why it is essential in guiding the portfolio management process. **(5 marks)**

- b) Assume that as a Kenyan investor, you decide to hold a portfolio with 70 percent invested in the NSE stock index and the remaining 30 percent in the real estate under REITs. The expected return is 14 percent for the NSE stock index and 20 percent for REITs. The risk (standard deviation) is 18 percent for the NSE stock index and 26 percent for REITs.

Requirements:

What will be the portfolio's expected return and risk given that the correlation between the NSE stock index and REITs is -0.5 (negative zero point five)? **(10 marks)**

- c) Assume you are a UK investor holding a portfolio invested 60% in UK large-capitalization equities (as proxied by the FTSE 100 Index) and 40% in local medium duration Treasury bonds ("gilts"). The expected return on the FTSE 100 is 5.5% and on the medium-duration gilts it is 0.7%. The risk (standard deviation of returns) is 13.2% and 4.2%, respectively. The correlation between the two assets is -0.01.

Requirements:

Calculate the portfolio return and risk.

(5 marks)

(Total: 20 marks)