



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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UNIVERSITY EXAMINATIONS 2024/2025

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR
OF COMMERCE

BFC 3431: FINANCIAL MODELLING AND FORECASTING

DATE: DECEMBER 2024

TIME: 2 HOURS

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

- a) Discuss the six steps of forecasting process (6marks)
- b) Explain the decomposition/characteristics of time series (4marks)
- c) Describe the following classification of models:
- i. Physical models (2 Marks)
 - ii. Descriptive models (2 Marks)
 - iii. Normative models (2 marks)
- d) Moving averages are often used in an effort to identify movements in share prices. Approximate monthly closing prices (in Sh. per share) for Mascan Toys Ltd. from December 2022 through November 2023 are shown below:

Month		Price (Sh)
December	2022	40
January	2023	38
February	2023	39
March	2023	41
April	2023	36
May	2023	41
June	2023	34
July	2023	37
August	2023	35
September	2023	37
October	2023	40
November	2023	41



Required:

- i. Use a 3-month moving average to forecast the closing price for December 2023. (4 marks)
- ii. Use a 3-month weighted moving average to forecast the closing price for December 2023. Use weights of 0.5 for most recent period, 0.3 for the second period back and 0.2 for the third period back. (4 marks)
- iii. Use exponential smoothing with a smoothing constant of $\alpha = 0.25$ to forecast the closing price for December 2023. (4 marks)
- iv. Which of the three methods do you prefer? Give reasons for your choice? (2 marks)

QUESTION TWO (20 MARKS)

A company has a fleet of vehicles and is trying to predict the annual maintenance cost per vehicle. The following data have been supplied for a sample of vehicles.

Vehicle number	Age in years	Maintenance cost Per annum Sh.'000"
	(x)	(y)
1	2	60
2	8	132
3	6	100
4	8	120
5	10	150
6	4	84
7	4	90
8	2	68
9	6	104
10	10	140

Required:

- a) Using the least squares technique calculate the values of a and b in the equation $y = a + bx$, to allow managers to predict the likely maintenance cost, knowing the age of the vehicle. (10 marks)
- b) Prepare a table of maintenance costs covering vehicles from 1 to 10 years of age, based on your calculations in (a). (8 marks)
- c) Estimate the maintenance costs of a 12-year-old vehicle and comment on the validity of making such an estimate. (2 marks)

QUESTION THREE (20 MARKS)

- a) Modelling is the process of finding a solution to a problem or making a good decision with the aid of a model. Describe the modelling process (5 marks)
- b) Discuss any four applications of forecasting in an enterprise (4 marks)
- c) Describe the three determinant of a forecast. (3 marks)
- d) Budgets are plans expressed in financial and/or quantitative terms for a specified period of time in the future in setting up a budgetary control system.
 - i. Describe any four types of budget. (4 marks)
 - ii. Essentials of effective budgetary control system (4 marks)

QUESTION FOUR (20 MARKS)

- a) Discuss the following techniques used in forecasting:
 - i. Grass root. (2 Marks)
 - ii. Historical Analogy (2 Marks)
 - iii. Delphi Method (2 Marks)
- b) The data below relate to machine hours and the corresponding maintenance cost of ABC Co. Ltd.

Months	Machine hours	Maintenance cost
Jan	400	960
Feb	240	880
Mar	80	480
April	400	1200
May	320	200
June	240	640
July	160	560
Aug	480	1200
Sept	320	880
Oct	160	440

Required;

- i. Using OLS formulate the mathematical expression describing the relationship between machine hours and the maintenance costs (7 marks)
- ii. Determine the strength of the relation between the machine hours and maintenance costs (3 marks)

- iii. Determine the goodness to fit of the regression model developed in (i) above. (2 marks)
- iv. Forecast the maintenance cost that would be incurred if the machine hours were 380 hours using the regression model formulated (2 marks)

QUESTION FIVE (20MARKS)

- a) Differentiate between additive model and the multiplicative model as used in time series analysis. (2 marks)
- b) The sales data of ABC Ltd. (in millions of shillings) for the years 2020 and 2023 inclusive are as given below:

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2020	40	64	124	58
2021	42	84	150	62
2022	46	78	154	96
2023	54	78	184	106

Required:

- i. Calculate the trend in the data using the least squares method. (7 marks)
- ii. Estimate the sales for each quarter using the regression formula established in (i) (3 marks)
- iii. Calculate the percentage variation of each quarter's actual sales from the estimates, obtained in (ii) (3 marks)
- iv. Establish the average seasonal variations and prepare forecast based on trend percentage seasonal variations (3 marks)
- v. Estimate the sales for the next year (2024) (2 marks)

