

CHUKA**UNIVERSITY****UNIVERSITY EXAMINATIONS****THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF COMMERCE****BCOM 463: BUSINESS FORECASTING****STREAMS: BCOM Y4S1****TIME: 2 HOURS****DAY/DATE: MONDAY 29/03/2021****8.30 A.M. – 10.30 A.M.****INSTRUCTIONS:**

- Answer question ONE and any other TWO questions.

- (a) Highlight areas where forecasts aid in decision making process of organizations. (10 marks)
- (b) Explain the following qualitative decision models highlighting the strength and weakness of each
- (i) Delphi method (2 marks)
 - (ii) Market research (2 marks)
 - (iii) Jury of executive opinion (2 marks)
- (c) The prevailing interest rate is believed to predict loan application in the financial sector. A manager at EQTY bank in charge of operations has gathered the following historical data on number of loan applications per year and monthly interest rate charged on the loans over a span of 12 years.

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Applicants	15	20	14	16	25	20	20	23	14	22	18	18
Rate %	0.9	1.9	1.1	1.4	2.3	1.2	1.2	2.2	0.7	1.3	1.5	1.7

Required:

- (i) Fit the regression equation on the data using least squares method. (6 marks)
- (ii) Hence forecasting the number of applications if the monthly interest rate is 2.5% (2 marks)

- (iii) At 95% confidence level, determine the confidence interval for the forecast in (ii) above
(4 marks)

QUESTION TWO

- (a) Discuss the considerations that could limit application of business forecasts in decision making.
(6 marks)
- (b) Explain why exponential smoothing models are preferred over simple moving averages
(2 marks)
- (c) The table below displays data on manual output in (000 units) of product Q produced by XYZ Ltd.

Year (t)	Output (Y_t)
1	30.0
2	31.5
3	29.0
4	34.5
5	32.0
6	36.0
7	37.5
8	36.5
9	39.5
10	38.0

Suppose you wish to apply exponential smoothing model to predict future output levels using $\alpha = 0.4$ as the exponential constant and Y'_5 as the initial forecast based on four year average data.

Required:

- (i) Obtain the predicted output for period 5 upto 10. (4 marks)
- (ii) Calculate the Mean Squared Error (MSE) for the model. (4 marks)
- (iii) In order to adjust predictions to large fluctuations in the data, you wish to try a higher value of exponential constant, $\alpha = 0.5$. Which of the two constants would you recommend and why? (4 marks)

QUESTION THREE

- (a) Explain the meaning of the following pair of terms used in business forecasting (in each case provide a supporting examples)
- (i) Time series and cross-sectional data (4 marks)

- (ii) Seasonal variation and random variation (4 marks)

(b) The sales of product “X” from a B&Q store in Mombasa are as follows:

Year	January	February	March	April
Quantity sold (000’s)	100	85	105	95

Given that the algorithm for simple exponential smoothing is defined by the following equation;

$$\hat{y}_t = \alpha y_t + (1 - \alpha)\hat{y}_{t-1}$$

(Assuming $\hat{y}_0 = 100$ and $\alpha = 0.2$)

- (i) Calculate the estimates underlying demand for January, February, March and April (8 marks)
- (ii) Using Theil-U statistics, comment on the accuracy of the model. (4 marks)

QUESTION FOUR

- (a) Outline the basic principles underlying forecasting. (4 marks)
- (b) The following information relates to quarterly demand for Ndimu product over a three year period.

Year	Q1	Q2	Q3	Q4
2018	5.8	5.1	7.0	7.5
2019	6.8	6.2	7.8	8.4
2020	7.0	6.6	8.5	8.8

Required:

Calculate the trend in the data using centered four quarterly moving average. (6 marks)

(c) Monthly sales of eggs (in trays) for poultry farmer are given below.

		Method A	Method B
Month	Actual sales (A)	Forecast (F)	Forecast (F)
January	30	28	27
February	26	25	25
March	32	32	29
April	29	30	27
May	31	30	29

A management scientist is comparing the accuracy of two forecasting methods. Forecasts using both methods are shown along with the actual values for January through May. The scientist uses a tracking signal (TS) with ± 4 limits to decide when a forecast should be reviewed. Which forecasting methods is the best? Explain. (10 marks)