

**CHUKA****UNIVERSITY****UNIVERSITY EXAMINATIONS****SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF BUSINESS ADMINISTRATION****MSOM 825: BUSINESS FORECASTING****STREAMS: MSOM Y2S1****TIME: 3 HOURS****DAY/DATE: THURSDAY 08/04/2021****8.30 A.M. – 11.30 A.M.****INSTRUCTIONS:**

- **Answer question ONE and any other TWO questions.**

- (a) In what ways do forecasts contribute to decision making process of organizations? (10 marks)
- (b) Discuss the criteria for selecting a good forecasting method. (10 marks)
- (c) Company A and B operate mobile phone industry. Currently, the two firms A and B command the market in the ratio of 60% to 40% respectively. If in every year, 70% of company A's subscriber are retained but 30% switch to company B. Over the same period, 80% of company B's subscribers are retained but 20% percent switch to company A. It is estimated that the number of subscribers on mobile phone in the industry in the next two years will be 5.0 million. Use Markov analysis to forecast the number of subscribers in company A then. (6 marks)
- (d) The prevailing interest rate is believed to predict loan applications in the financial sector. A manager at EQTY bank in charge of operations has gathered the following historical data on number of loan applicants 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 forecast the number of applications if the monthly interest rate is 2.5%. (2 marks)
- (iii) At 9% confidence level, determine the confidence interval for the forecast in (ii) above. (6 marks)

marks)

**QUESTION TWO**

- (a) Discuss the main forces that responsible for fluctuations in a time series data. (8 marks)
- (b) Explain the following qualitative decision models.
  - (i) Sales force polling (2 marks)
  - (ii) Jury of executive opinion. (2 marks)
- (c) Omena Ltd is a city seaford company whose products are sold at Muthurwa market in Nairobi. The following are recorded monthly sales (in tonnes) for its high demand cod fish for the previous one year.

	Quarter	Quantity (Tonnes)
2015	1	362
	2	381
	3	317
	4	297
2016	1	399
	2	402
	3	375
	4	349
2017	1	386
	2	328
	3	389
	4	345

**Required:**

- (i) Centered four quarterly moving average (4 marks)
- (ii) Average seasonal index for each quarter using multiplicative model. (4 marks)

**QUESTION THREE**

- (a) Explain the meaning of the following pair of terms used in business forecasting
- (i) Qualitative and quantitative forecasts. (4 marks)
  - (ii) Short-range and long-range forecasts. (4 marks)
- (b) The table below display data on annual 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  $Y'_4$  as the initial forecast based on three 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 you recommend and why? (4 marks)
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marks)

**QUESTION FOUR**

- (a) Outline the basic considerations when selecting the right forecasting model. (4 marks)
- (b) Forecasting precision may be affected by factors within and outside control of the business. Discuss any two internal and two external determinants of business forecasts.
- (c) Sales data (in units) of a microwave oven manufacturer 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 company is comparing the accuracy of two forecasting methods. Forecasts using both methods are shown below along with the actual values for January through May. The company also uses a tracking signal (TS) with  $\pm 4$  limits to decide when a forecast should be reviewed. Which forecasting method is the best? Explain. (8 marks)

### QUESTION FIVE

- (a) Under what conditions would a forecaster choose to use simple exponential smoothing instead of Holt's Trend Corrected exponential smoothing model? (4 marks)
- (b) Discuss the considerations that would limit application of business forecasts in decision making. (4 marks)
- (c) The sales data for recently introduced "Z" plant pots from China are shown in the table below:

Week	1	2	3	4	5	6	7	8	9	10
Quantity Sold (000's)	29	24	27	25	26	28	30	28	28	27

Given that the usual form of Holt's two parameter exponential smoothing procedure for calculation purposes is as follows:

$$L_T = \alpha y_T + (1 - \alpha)(l_{T-1} + b_{T-1})$$

$$b_T = l_T - l_{T-1} + (1 - \gamma)b_{T-1}$$

(Assume  $l_0 = 24.5$ ,  $b_0 = 0.4167$ ,  $\alpha = 0.2 \wedge \gamma = 0.1$ )

- (i) Interpret the meaning usually given to  $l_T$  and  $b_T$
- (ii) Obtain the estimates for the level and growth rate for the first 5 weeks. (8 marks)
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