CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF MASTER OF SCIENCE IN FINANCE

MSCF 822: FINANCIAL MODELING

STREAMS: MSCF Y2S1   **TIME: 3 HOURS**
DAY/DATE: FRIDAY 09/7/2021   **2.30 P.M. – 5.30 P.M.**

INSTRUCTIONS: Answer question ONE and any other THREE questions

QUESTION ONE (40 MARKS)

(a)   Explain what financial modeling is and identify areas of application of financial models

[10 marks]

(b)   The following information and statement of financial position relates to ABC ltd, a company that deals with warehousing and selling of perishable farm produce, for the   current year ended 31ˢᵗ December 2020

Assets	
Current Assets	
Cash	4,250,000
Accounts receivables	120,000
Total current assets	**4,370,000**
Non-current Assets	
Folk-lifts	40,000
Accumulated depreciation	(10,000)
Net non-current assets	**30,000**
Total assets	**4,400,000**
Liabilities	
Account payable	75,000
Differed revenue	25,000
Total current liabilities	**100,000**
8% long term debt	3,000,000
Total liabilities	**3,100,000**
Equity	
Common stock	50,000
Retained earnings	1,250,000
Total shareholders' equity	**1,300,000**
Total liabilities and shareholders' equity	**4,400,000**

An analyst wishes to develop financial projections for the year 2021 given the following model assumptions

1. The sales units are projected to grow annually by 37.5% p.a of the previous year's sales The sales were 75,000 units in the current year
2. Average order value will remain constant at sh. 40 per unit of sales
3. Refund on sales are estimated at 5% of gross sales revenue
4. Cost of sales (all variable) = 0.08* Gross Sales Revenue
5. Operating expenses = 100,000 + 0.1* Gross sales revenue
6. Corporation tax = 21%
7. The policy of the firm on depreciation is straight line for all fixed assets held at the end of the year. No disposals are expected in the next two years.
8. The company plans to acquire further debt facility of Ksh. 1.5 million next year at 8% p.a interest rate. The company's annual debt repayment will be sh. 900,000 from next year.
9. Accounts receivables and payables are respectively 5% and 6% of net revenue
10. Capital expenditure:

    The folk lift held in the company books at the end of year 2020 has remaining useful life of 4 years. Other details on future capital expenditure are summarized in the following schedule

	Useful life (in years)	Year 2021 (ksh)	Year 2022 (kshs)
Computer	5	75,000	-
Refrigerator	3	50,000	100,000

Use a three statement model approach to project the income statement, statement of financial position and cash flow statement for XYZ ltd for the year 2021 [30 marks]

QUESTION TWO (20 MARKS)
(a)   Distinguish between qualitative and quantitative modeling techniques   [4 marks]
(b)   The table below displays data on demand in (000 units) of materials Q used by XYZ ltd

Year (t)	Demand $\left(Y_t\right)$
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

A model developer wishes to apply simple exponential smoothing model to predict future demand levels using three year average to initialize the data. Given a choice

between $\alpha=0.5$ and $\alpha=0.8$, recommend the exponential constant that would give   more reliable results on the basis of

(i)	Mean Squared Error (MSE)	[4 marks]
(ii)	Theil-U statistic	[4 marks]

(c)   XYZ department store divides its accounts receivable into two classifications: 0 to 30   days old and 31 to 60 days old. Accounts that are more than 60 days old are declared   uncollectible by XYZ. Currently, XYZ holds kshs 100,000 in accounts receivable, 70%   of which are in the 0-30 day old category

Based on an analysis of its past records, the following matrices of transition   probabilities are supplied

	Collectible	Uncollectible
0-30 days	0.3	0
31-60 days	0.5	0.1

	0-30 days	31-60 days
0-30 days	0.3	0
31-60 days	0.5	0.1

Use Markov model to:

(i) Determine the probability that an accounts receivable in the 0-30 days and 31-60 days category will end up as collectible   [6 marks]

(ii) Estimate the allowance for bad debts in the 31-60 days category   [2 marks]

QUESTION THREE (20 MARKS)

(a)   Explain the following types of financial models

(i)	Simulation models	[4 marks]
(ii)	Optimization models	[4 marks]

(b)   Liberty Kenya Holdings ltd wishes to prepare a four month projection of cash collection   using a lagged model structure:

$$C.C = a * sales + b * sales(-1) + c * sales(-2)$$

Where: CC = Cash collection from customers

The firm will maintain the following credit collection policy

(i)   60% percent is received in the month of sale

(ii)   20% in the month following the sale

(iii) The balance in the second month following the sale

The table below shows estimated sales for the first five months of the year 2021

Month	Estimated credit sales ksh.
1	120,000
2	100,000
3	140,000
4	150,000
5	160,000

15% of the cash collection expected in the second month following the sale in deemed doubtful, prepare a schedule showing cash flow projections for the first four months of   the year 2021. Assume that credit sales in the last month of the year 2019 were ksh.   80,000

[12 marks]

QUESTION FOUR (20 MARKS)

(a)   Explain by use of examples, the following variables used in the development of   financial models

(i)   Policy variables   [2 marks]

(ii)   External variables   [2 marks]

(iii) Performance variables   [2 marks]

(b)   The prevailing interest rate is believed to predict loan applications in the financial sector. A manager at ECO 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	1	2	3	4	5	6	7	8	9	10	11	12
Applications	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) Estimate the standard error of the regression coefficient and test whether it is statistically significant at 95% confidence level   [6 marks]

QUESTION FIVE (20 MARKS)

(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)   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:

$$l_T = \propto y_T + (1 - \propto)(l_{T-1} + b_{T-1})$$

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

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

(i)   Interpret the meaning usually given to l_T and b_T [4 marks]

(ii)   Obtain the estimates for the level and growth rate for the first 4 weeks
                [12 marks]