UGANDA MARTYRS UNIVERSITY

FACULTY OF BUSINESS ADMINISTRATION AND MANAGEMENT

FINAL EXAMS FOR BACHELOR OF BUSINESS ADMINISTRATION AND MANANGEMENT: YEAR 1

BAM Day (Nkozi, Lubaga), BAM Evening Lubaga

Quantitative Methods 1

QM 1201

DATE: 06/5/2019

TIME: 9:30 am – 12:45 pm

DURATION: 03Hrs:15Mins

Instructions

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1. Carefully read through ALL the questions before attempting
2. **Attempt** <u>**FOUR**</u> **questions**
3. Ensure that your **Registration number** is indicated on all pages of your answer sheets.
4. Ensure your work is **clear** and **readable**. Untidy work shall be penalized

Question one

(a) Define the following terms as used in Markov application of matrices
  i.   State vector   **[01 marks]**
  ii.   Markov chain   **[01 marks]**
  iii. Transition probability matrix   **[02 marks]**

 (b) Three commercial banks Equity, Finca, DFCU are competitors for an array of loan customers . The table below shows the flow of customers between 1st March and 1st April 2019

Company	Cust.1st MARCH	M/kt share	GAINS FROM			LOSSES TO			Cust. 1st APRIL	M/kt share
			E	F	D	E	F	D		
EQUITY(E)						0	40	48	1732	
FINCA(F)						80	0	68	3232	
DFCU(D)						100	60	0	3836	

  i.   State the number of customers for each company in March.   **[06 marks]**
  ii.   State the market shares for the months of March and April. **[06 marks]**
  iii. Obtain the matrix of Transition probabilities   **[03 marks]**
  iv.   Predict the market shares of 1st May and 1st June.   **[06marks]**

Question two

(a) With relevant business concepts, define the following terms

(i) Linear programming   **[03 marks]**

(ii) Constraints   **[03 marks]**

(iii) Objective function   **[03 marks]**

(b) The following table shows the components of making a cake for Jane's business

	Types of cakes		Total available units
	X	y	
Floor (kg)	I	6	120
Sugar (kg)	1	3	66
Butter (kg)	3	2	86

Cake x earns a profit of $20 each while cake y earns a profit of $30 each.

 (i) Find the maximum profit using graphical or Simplex method   **[12 marks]**

(iii) State how Jane can reduce costs so as to maximize profits   **[04 marks]**

Question three

(a) JMK Company has accumulated the following data for the past 10 months.

Month	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct
Orders	120	90	100	75	110	50	75	130	110	90

Compute 3 month weighted moving average with a weight of 50% for October data, 33% for September data and 17% for the August data   **[10 marks]**

(b) A Company manufactures and sells a single product in shillings. Estimated sales, costs and selling prices for the coming year are as follows.

Sales units	Probability	Selling price per unit	Probability
20,000	0.4	900	0.3
25,000	0.4	850	0.6
30,000	0.2	800	0.1
Variable cost per unit	Probability	Fixed costs for the year	Probability
600	0.1	1,200,000	0.4
650	0.2	1,500,000	0.6
680	0.5		
700	0.2		

Determine
  i.   The expected annual profit   **[10 marks]**
  ii.   The worst possible scenario for the coming year   **[05 marks]**

Question four

(a) Three workers of a diary corporation Adam, Betty and Carol seal milk packets. Adam seals 45%, Betty seals 30% and Carol seals 25%. The probability that Adam seals wrongly is 0.3 while the probabilities for Betty and Carol to seal wrongly are 0.2 and 0.1 respectively.

(i) Draw a probability tree diagram for the above scenario **[05 marks]**

(ii) A packet is picked at random; determine the probability that it is not faulty **[05 marks]**

(b) Software Development Corporation (SDC) has developed a new encryption software to facilitate secure commercial transactions over the Internet. The feasibility of the product has been proven, but each sale will require significant customer support. SDC must make a decision regarding the level of sales and development resources that must be allocated to this product next year. The least expensive decision alternative (d1) is to start selling the new product through existing sales channels and provide customer support as needed. The next alternative (d2) is to assign one full-time sales person and one software specialist to focus on this product. The third alternative (d3) is to have a team of six people dedicated to this product. Finally, a complete division (d4) consisting of about twelve people may be created to fully automate the product and engage in an extensive marketing campaign. The potential profit from each decision alternative depends on the market acceptance or demand for this product which may be high, moderate or low. If market acceptance is high, each of the four decision alternatives, d1 through d4 will yield a profit of -200, 0, 300, and 900 thousand dollars respectively. If there is a moderate demand, the profits are likely to be 100, 100, 200, and -200 thousand dollars respectively. If the demand turns out to be low, then the profits will be 200, 150, -200, and -500 thousand dollars respectively. The industry experience with such products provides a probability estimate of demand to be high, moderate and low as 0.3, 0.5, and 0.2 respectively.

    (i) Develop a decision tree for the company **[05 marks]**

    (ii) Identify which of the four decision alternatives should be selected by SDC

Question five

a) John's beginning salary is UGX3,600, 000. The annual increase is 52,000 p.a. Determine how much john will earn from the company in the 12 years of service.   **[05 marks]**

b) You need to borrow money from a bank. Bank A charges 8% compounded semiannually. Another bank B charges 7.9% compounded monthly. At which bank will you pay the lesser amount of interest?   **[05 marks]**

c) Calculate the present value of an ordinary annuity of amount $1000 payable quarterly for 10 years at the annual rate of interest of 8% convertible quarterly.   **[06 marks]**

d) You have a choice between 2 mutually exclusive investments Carpentry and Restaurant. If you require a 15.5% return, which investment should you choose?   **[09 marks]**

	Carpentry	**Restaurant**
Year	**Cash Flow**	**Cash Flow**
0	−UGX10, 000,000	−UGX12, 500,000
1	2,000,000	7,500,000
2	4,000,000	4,500,000
3	8,000,000	4,000,000

Question six

A Marketing Manager is attempting to derive a sales-output relationship for the company. The following data has been collected over the past two years.

Units of sales output	10	20	40	25	30	40	50	45
Cost of sale (Shs'000)	32	39	58	44	52	61	70	64

a) Using linear regression analysis, derive the relationship between the variables (sales units and cost of sales) and interpret your answer.   [**13 marks**]

b) Estimate the strength of the relationship between the variables (sales units and cost of sales) and explain the principle of the co-efficient of determination   **[08 marks]**

c) Using relevant examples explain the time series components   **[04 marks]**

Question seven

(a) Given the revenue function in shillings $R(x) = -3x^3 + 600x^2$ and the cost function in shillings $C(x) = 357x^2 + 1800x$; find:

(i) The marginal profit at x = 10 units. Interpret the result.   **[05 marks]**

(ii) The marginal profit at x = 100 units. Interpret the result.   **[05 marks]**

(b) If an investment company pays 6% compounded semiannually, how much you should deposit now to have Ugx10,000,000 in 10 years from now?   **[05 marks]**

(c) The marginal cost and marginal revenue functions of a company in millions of Shillings are 14 – 12Q and 54 – 18Q respectively. If fixed costs are Ugs1, 600,000 when production is zero; Find:-

(i) The profit function   **[05 marks]**

(ii) The output to give maximum sales revenue   **[05 marks]**

FORMULA SHEET

1. Straight line depreciation: $S = P_0 + (n - 1) d$

2. Compounding at various interval: $A = P(1 + \frac{r}{m})^{mn}$

3. $EAR = (1 + \frac{n}{m})^m - 1$

4. $PV_{OA} = \dfrac{F[1 - (1 + r)^{-n}]}{r}$

5. $S_n = \dfrac{n}{2}[2a + (n - 1)d]$

END