

JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS 2014/2015

FIRST YEAR SEMESTER ONE EXAMINATION FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

(KISII LEARNING CENTRE)

COURSE TITLE: QUANTITATIVE METHODS

COURSE CODE: MBA 805:

DATE: AUG. 2014

DURATION: 3HOURS

DAY:

TIME:

INSTRUCTIONS

- 1. Answer ANY FOUR questions**
- 2. Show clearly and neatly all the workings**
- 3. Do not write anything on the question paper**

QUESTION ONE (15 MARKS)

(a) (i) Find the derivative of $y = (3x^2 - 4x + 2)/(x^2 - 2)$ using Quotient rule (3 mks)

(ii) "Foresight" Company have recently started to give business advice to their clients. Acting as consultants, they have estimated the demand curve of a client's firm to be; $AR = 600 - 3Q$ Where AR is average revenue in millions of shillings and Q is the output in units.

Investigations of the clients firm's cost profile shows that marginal cost (MC) is given by:

$$MC = 3Q^2 - 84Q + 633 \text{ (in thousands of shillings)}$$

Further investigations have shown that the firm's cost when not producing output is Sh.30,000

Required: Determine:

- i) The equation of total revenue (1 mark)
- ii) The equation of total cost. (3 marks)
- iii) The level of output that maximizes profit. (5 marks)

(b) (i) What is a combination? (1mk)

(ii) Evaluate ${}^{15}C_{10}$ (2 marks)

QUESTION TWO (15 MARKS)

(a) (i) if $Z = \frac{X - \mu}{\sigma}$, show that Z is a normal variate with mean zero and standard deviation unity (4 marks)

(b) The average monthly sales of 5,000 firms are normally distributed with mean Ksh. 36,000 and Standard deviation Ksh. 10,000. Find;

(i) The number of firms with sales of over Ksh. 40,000 (3 marks)

(ii) The percentage of firms with sales between Ksh 38,500 and Ksh. 41,000 (3 marks)

(b) (i) State Bayes theorem (1mk)

(ii) As accounts manager in your company, you classify 75% of your customers as "good credit" and the rest as "risky credit" depending on their credit rating. Customers in the "risky" category allow their accounts to go overdue 50% of the time on average, whereas those in the "good" category allow their accounts to become overdue only 10% of the time. What percentages of overdue accounts are held by customers in the "risky credit" category? (4 mks)

QUESTION THREE (15 MARKS)

(a) (i) Briefly explain a binomial probability distributions. (2 mark)

(ii) An insurance salesman sells policies to 5 men all of identical age and good health. According to the actuarial tables, the probability that a man of this particular age will be alive 30 years hence is $\frac{2}{3}$. Find the probability that in 30 years

(I) at most 1 man will be alive, (2 marks)

(II) at least 3 men will be alive. (2 marks)

(b) A bakery bakes cakes under the brand name 'super cakes'. Irene, the manageress does not know the cost of each cake. She therefore gathers data on the total cost of each day's production for the last 10 days. The results are shown in the table below;

Day	Number of cakes ('000' units)	Total cost (Kshs'000')
1	24	236
2	20	210
3	28	262
4	22	223
5	30	275
6	20	210
7	24	236
8	26	249
9	18	197
10	18	197

(i) Estimate the total cost function in the form $y = a + bx$ using ordinary least squares method and identify the fixed cost and unit cost (7 marks)

(ii) If the bakery management projects a production level of 200 units on a particular day due to demand for weddings, how many would the bakery incur in terms of costs? (2Marks)

QUESTION FOUR (15 MARKS)

(a) Use relevant examples to explain the following concepts as used set theory:

(i) Singleton (1Mark)

(ii) Power set (2 marks)

(b) Given that a universal set is defined as $U = \{ x: x \text{ is an integer from } 5 \text{ to } 30 \}$

And $A = \{ x: x \text{ is a prime number} \}$

$B = \{ x: x \text{ is a multiple of } 3 \}$

Required:

(i) $A \cap B$ (1mk)

(ii) $U \setminus (A \cup B)$ (2 mks)

(ii) $B^c \cup A$ (2 mks)

(c) Out of three soft drinks produced by Kisii Bottlers Company, 420 students in JOOUST Kisii L.C were asked to state their preferences. 120 preferred Coke, 172 preferred Fanta and 128 preferred Sprite. 64 of them liked Coke and Fanta, 76 liked Coke and Sprite while 68 liked Fanta and Sprite.

Required:

(i) By letting y be the number of students who preferred the three drinks, illustrate the information in a venn-diagram (3 marks)

(ii) Find how many students liked:
all the three drinks (2 marks)

Fanta only (1mk)

Sprite only (1mk)

QUESTION FIVE (15 MARKS)

(a) Explain the following terms as used in Markov analysis:

- i) Transition matrix. (1mk)
- ii) Equilibrium state (1mk)

(b) Equity bank calculates the credit ratings of its credit card customers on a monthly basis. The ratings are poor, good and excellent depending on the payment history. The following matrix shows how the customers change from one category to the other in one month:

		TO		
		Poor	Good	Excellent
FROM	Poor	0.8	0.18	0.02
	Good	0.2	0.75	0.05
	Excellent	0.0	0.16	0.84

Given that in August 2013, from customer base of 100,000 the accounts were classified as

Poor	30,000
Good	50,000
Excellent	20,000

Required:

- i. The expected classification of the accounts in October (3 marks)
- ii. The equilibrium state proportion of customers classified as poor, Good and Excellent (3 marks)

(c) Research has shown that output Y of a firm is related to labour (L) and capital (K) as follows.

$$Y = aL + bK + cKL.$$

From previous observations, the following was recorded: the output was 1610 when labour was 9 units and capital was 4 units; the output was 2100 when labour was 10 units and capital 5 units. Finally output was 3260 when labour was 12 units and capital 7 units

- i. Formulate a 3x3 system of linear equations hence a matrix equation (2 marks)
- ii. Solve the matrix equation in (i) above using Cramers rule (3 marks)
- iii. Write the function of output in terms of labour and capital hence determine the output when 8 units of labour and 10 unit of capital are used (2 marks)

QUESTION SIX (15 MARKS)

- a) (i) Solve for y by completing square method: $12y^2 - 15y = 18$ (3mks)
(ii) Determine the nature of the roots of the equation $392x^2 + 952x = -578$: (2mks)

(b) By way of elimination, provide a solution set to a system of linear simultaneous equations below

$X_1 + 2X_2 + 3X_3 = 5$i

$2X_1 + 4X_2 + 5X_3 = 4$ii

$3X_1 + 5X_2 + 6X_3 = 9$iii (5 mks)

(c) (i) Evaluate: $\int (100 + 20x + 3x^2) dx$ (1 mrk)

(ii) The marginal cost of producing 'Tosha soap' is given by $MC = \frac{60}{x^2} + 10$ Kshs Millions Where x is the units of Tosha soap produced. Find the total cost of production when between 100 and 150 units are produced. (4mks)

END

