JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BUSINESS & ECONOMICS

UNIVERSITY EXAMINATION FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

1ST YEAR 1ST SEMESTER 2018/2019 ACADEMIC YEAR

KISII CAMPUS-PART TIME

COURSE CODE: MBA 805

COURSE TITLE: QUANTITATIVE METHODS

EXAM VENUE: **STREAM: (MBA)**

DATE: 23/4/19   **EXAM SESSION: 9.00 – 12.00 NOON**

TIME: 3.00 HOURS

Instructions:

1. Answer ANY FOUR questions
2. Candidates are advised not to write on the question paper.
3. Candidates must hand in their answer booklets to the invigilator while in the examination room.

QUESTION ONE (15 MARKS)

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

    (i) Proper subset   (1mark)

    (ii) Finite set   (1mark)

(b) Given that a universal set is defined as U={ x: x is an integer from 5 to 30}
      And   A={ x: x is a prime number}
             B={ x: x is a multiple of 3}

Required:

    (i) A n B   (1mark)

    (ii) U\(AUB)   (1 mark)

    (ii) B^c U A   (1 mark)

(c) Determine the power of set B in (b) above (3 marks)

(d) (i) Explain an equilibrium state as used in matrix algebra   (1 mark)

    (ii) Nakumatt, Taskys and Uchumi are the tree major Suppermarkets operating in Kisii Town. A market research involving shoppers over a ten week period indicated that Nakumatt retains 85% of its shopers while 10% and 5% shift to Taskys and Uchumi respectively each subsequent week. Taskys lose 20% to Nakumatt and 5% to Uchumi. Of those who shop in Uchumi, 15% and 10% shift to Nakumat and Taskys respectively. The total suppermarket customers in Kisii Town are estimated at 10,000. Each shopper generates revenue of about Ksh. 500 per week. What are the projected weekly revenues for each supermarket at equilibrium?   (6 marks)

QUESTION TWO (15 MARKS)

(a) (i) Use relevant examples to differntiate between mutually exclusive events and indepence of events as used in probability theory.   (2 marks)

    (ii) A problem in accountancy is given to five students. Their chances of solving it are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ and $\frac{1}{6}$ respectively. What is the probability that the problem will be solved?

                                                                    (2 marks)

(b)(i) if $Z = \dfrac{X - \mu}{\grave{o}}$, show that Z is a normal variate with mean zero and standard deviation unity   (3 marks)

    (ii) The average monthly sales of 5,000 firms are normally distributed with mean Ksh. 36,000 and Standard deviation Ksh. 10,000. Find the percentage of firms with sales between Ksh 38,500 and Ksh. 41,000   (3 marks)

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

$$x + y + 2z = -3$$
$$3x - y - z = 11$$
$$2x + 3y + 3z = 0 \qquad \text{(5 marks)}$$

QUESTION THREE (15 MARKS)

(a) (i) What is a binomial probability distribution? .   (2 mark)

(ii) Heritage sells policies to 6 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 50 years hence is 2/3. Find the probability that in 50 years
 (I) none of the men will be alive,   (2 marks)

 (II) at least 4 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 for $y = a + bx$ using ordinary least squares method

and identify the fixed cost and unit cost   (7 marks)

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

QUESTION FOUR (15 MARKS)

(a) Solve for x by completing square method: $4x^2 - 5x - 6 = 0$ (3 marks)

(b) (i) Evaluate $^9C_4$ (1 mark)

(ii) A committee of five people is to be selected from twenty people of which 8 are women and 12 are men. How many selections are possible if at least one woman has to be included? (3 marks)

(c) During the second edition of Open day at JOOUST Kisii Campus, 420 undergraduate students were asked to state their preferences of the three soft drinks made by Kisii bottlers. 120 preferred Coke, 172 preferred Fanta and 128 preferred Sprite. 64 of them preferred Coke and Fanta, 76 preferred Coke and Sprite while 68 preferred 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 (4 marks)

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

II Fanta only (1 mark)

III Sprite only (1 mark)

QUESTION FIVE (15 MARKS)

a. By use of appropriate examples explain the following concepts as used in matrix algebra:

(i) Transpose of a matrix (1 mark)

(ii) Singular matrix (1 mark)

b. 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 (3 marks)
ii. Solve the matrix equation in (i) above using cofactors method (8 marks)

iii. Write the function of output in terms of labour and capital hence determine the output when 16 units of labour and 20 unit of capital are used (2marks)

QUESTION SIX (15 MARKS)

(a) Find the derivative of the following functions:

i. $y = (5x^2 + 3x - 2)(2x + 1)$ using the product rule (3marks)

ii. $y = (3x^2 - 4x + 2)/(x^2 - 2)$ using the quotient rule (3marks)

(a) " **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 (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)