TECHNICAL UNIVERSITY OF MOMBASA

UNIVERSITY EXAMINATIONS 2018/2019
DEGREE OF MBA, MSC FINANCE, MSC HRM, MPSM
BMS 5102: QUANTITATIVE TECHNIQUES

DATE: AUGUST 2019 **DURATION:** 3 HOURS

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER THREE

QUESTION ONE

a. Outline five advantages of Quantitative Techniques

(5 marks)

b. Given the following matrices

$$A = \begin{pmatrix} 1 & 0 \\ 0 & -1 \\ 2 & 1 \end{pmatrix} \qquad B = \begin{pmatrix} 1 & 3 \\ 0 & 1 \\ 4 & 1 \end{pmatrix} \qquad C = \begin{pmatrix} 3 & 2 & 4 \\ 1 & 0 & -1 \end{pmatrix}$$

Find
i) A-3B ii) $2C^T+A$ iii) A.C

(6 marks)

c) Find the inverse of $\begin{pmatrix} 4 & -7 & 6 \\ -2 & 4 & 0 \\ 5 & 7 & -4 \end{pmatrix}$

(7 marks)

d) Solve the system of linear equations by Gaussian or Gauss-Jordan elimination method

$$x_1 + x_2 + 2x_3 = 8$$
$$-x_1 - 2x_2 + 3x_3 = 1$$
$$3x_1 - 7x_2 + 4x_3 = 10$$

(7 marks)

QUESTION TWO

a) State the binomial formula and discuss the distinctive features of the binomial distribution. When does a binomial distribution tend to become a normal distribution?

(7 marks)

b) In a large city, 50% of the people choose a movie, 30% choose a dinner and a play, and 20% choose shopping as a leisure activity. If a sample of five people is randomly selected, find the probability that three are planning to go to a movie, one to a play, and one to a shopping mall.

(3 marks)

c) A sales firm receives, on average, three calls per hour on its toll-free number. For any given hour, find the probability that it will receive the following:

i) At most three calls

ii) At least three calls

iii) Five or more calls

(15 marks)

QUESTION THREE

a) With an aid of example, illustrate how we can measure hypothesis using multiple regression equation with three independent variables.

(10 marks)

b) A study was conducted to determine whether there is a relationship between strength and speed. A sample of 20-year-old males was selected. Each was asked to do push-ups and to run a specific course. The number of push-ups and the time it took to run the course (in seconds) are given in the table.

Push-ups, X	5	8	10	10	11	13	15	18	23
Time, Y	61	65	43	56	62	73	48	49	50

i) Determine the Least Squares regression line of Fuel consumed on Journey length.
ii) Determine the coefficient of correlation.
iii) Determine the coefficient of determination.

(15 marks)

QUESTION FOUR

a. A hospital finds that 25% of its bills are at least one month in arrears. A random sample of forty-five bills was taken.

i. What is the probability that less than ten bills in the sample were at least one month in arrears?

ii. What is the probability that the number of bills in the sample at least one month in arrears was between twelve and fifteen (inclusive)?

(14 mark)

b. What is statistical decision theory?

(2 mark)

c. Explain the differences between decision-making under certainty, risk and uncertainty by giving suitable examples.

(9 marks)

QUESTION FIVE

a. The total cost function of a firm is $C=\frac{1}{3}x^3 - 5x^2 + 28x + 10$, where C is total cost and x is output. A tax at the rate of \$.2 per unit of output is imposed and the producer adds it to his cost. If the market demand function is given by $P = 2530 - 5x$, where P is the price per unit of output, find the profit maximizing output and price.

(15 marks)

b. Integrate the following functions

i) $\int_1^2 4\,e^{2x}dx$ ii) $\int_1^4 \frac{3}{4u}du$

Each correct to 4 significant figures

(10 marks)

QUESTION SIX

a) The following data presents the number of units production per day turned out by 5 different workers using 4 different types of machines

	Machine Type			
Workers	A	B	C	D
1	44	38	47	36
2	46	40	52	43
3	34	36	44	32
4	43	38	46	33
5	38	42	49	39

i. Test whether the mean productivity is the same for different machine types
ii. Test whether the 5 workers differ with respect to mean productivity

NB: You may apply coding method by subtracting 40 from all observations

(12 marks)

b) The Tictoe watch company claim that they have 25% of the market share. In a survey of 900 people some 200 people were found to wear a Tictoe watch. Use these data to test Tictoe's claim against the alternative that they have less than a 25% market share

(13 marks)