KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR
FIRST YEAR FIRST SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

COURSE CODE: MBA 804

COURSE TITLE: QUANTITATIVE ANALYSIS

DATE: 03/06/2022   TIME: 9.00AM – 12.00AM

INSTRUCTIONS TO CANDIDATES

- ANSWER QUESTION **ONE** (COMPULSORY) AND ANY OTHER **THREE** QUESTIONS
- QUESTION **ONE** ATTRACTS **40 MARKS**
- ALL OTHER QUESTIONS ATTRACT EQUAL MARKS **20 MARKS**
- TIME ALLOWED IS **THREE** HOURS

QUESTION ONE (40 MARKS)

a) Outline key steps in hypothesis testing (2mks)

b) The data below shows ages (X) and blood pressure (Y) of 8 patients.

X:	52	63	45	36	72	65	47	25
Y:	62	53	51	25	79	43	60	33

Required, obtain the

    i) Correlation coefficient using the product method (4mks)

    ii) Regression equation of Y against X. Find the expected blood pressure of a patient aged 49 years (5mks)

c) Use the data below to construct a frequency distribution (2mks)

57	67	72	57	83	76	74	56	68	67
74	76	79	72	61	72	73	76	67	49
71	53	67	65	98	83	69	61	72	68
65	75	68	75	66	77	61	64	74	51

Using the frequency distribution obtained above, calculated;

    i) Mean (2mks)

    ii) Median (2mks)

    iii) Standard deviation (2mks)

    iv) Degree of skewness (2mks)

d) Suppose that 100 tyres made by a certain manufacturer lasted on average 21, 809 km with a standard deviation 0f 1295 km. Test the null hypothesis that $\mu = 22,000$ km against the alternative hypothesis $\mu < 22,000$ km at 0.05 level of significance. (6mks)

e) Find $\frac{dy}{dx}$ for the following functions

    i) $y = (x^2 + 11)(5 - 2x^3)$ (2mks)

    ii) $y = (5 - 10x - 25x^2)^7$ (2mks)

f) For the following cost function
$c = 1000 + 100Q - 15Q^2 + Q^3$, Compute

    i) Total cost and average cost when output is 10 (3mks)

    ii) Marginal cost of the 8th output (2mks)

g) Solve the following simultaneous equations by using cramers rule (4mks)

$$-3x + 4y = 13$$

$$3 = -x - 2y$$

QUESTION TWO (20 MARKS)

a) The table below shows monthly sales of 10 – outlets of khetia drapers and their associated advertising costs

Outlets	Bgm	Ktl	Mumias	Eld	Kk	Ksm	Wby	Malava	Kdy	Mbale
Adv Cost (x)	6	8	12	12	2	8	16	15	14	20
Monthly sales (y)	220	230	240	340	420	460	520	600	720	800

Required

   i) Compute the moment correlation coefficient   (5mks)

   ii) Test whether the correlation between sales and advertising costs is significant at 5% level of significance   (5mks)

b) Job performance of 10 employees at Kibabii University was ranked by two supervisors in relation to their work as follows

					Employees					
Supervisors	A	B	C	D	E	F	G	H	I	J
1	5	6	3	9	4	8	1	7	10	2
2	3	4	1	8	5	10	6	7	9	2

Required

   i) Compute the Spearman's rank correlation   (5mks)

   ii) Is it significantly less than zero at 0.025 level of significance   (5mks)

QUESTION THREE (20 MARKS).

a) The fish net manufacturing company produces nets that have the breaking strength that is normally distributed with a mean of 5 kg per square meter and a standard deviation of 1.5 kg per square meter.
What is the probability that the nets produced have a breaking strength?

   i) Between 5 kgs and 5.5 kgs   (4mks)

   ii) At least 3.6 kgs per square meter   (3mks)

   iii) Below what value of strength per meter will 95% of the nets fall   (4mks)

b) The binomial probability function can be applicable to any binomial experiment if we are satisfied that the situation demonstrates the properties of a binomial experiment. Give four properties that are exhibited by a binomial experiment   (2mks)

c) The University found out that 20% of the students withdraw without completing the introductory Statistics course. Assume that 15 students registered for the course, calculate the probability that
    i) Two or less withdraw   (2mks)
    ii) At least three will withdraw   (2mks)

d) On average 0, 85 customers enter a service point in a minute. Find the probability that at least three customers will enter the service point in a given minute   (3mks)

QUESTION FOUR (20 MARKS)

a) Differentiate between a co factor matrix and a singular matrix   (2mks)

b) Find PQ given that

$$Q = \begin{Bmatrix} 2 & 4 & 1 \\ 1 & 2 & 0 \\ 5 & 9 & 6 \end{Bmatrix} \text{ and } P = \begin{Bmatrix} 8 & 0 & 2 \\ 1 & 3 & 5 \\ 2 & 1 & 6 \end{Bmatrix}$$
    (2mks)

c) Given matrix Q, find its determinant and hence its inverse   (8mks)

$$Q = \begin{pmatrix} 10 & 2 & 6 \\ 0 & 5 & 0 \\ 14 & 11 & 8 \end{pmatrix}$$

d) Solve the following linear simultaneous equations using the cramers rule

$$2x + 4y - 3z = 12$$
$$3x - 5y + 2z = 13$$
$$-x + 3y + 2z = 17$$
    (8mks)

QUESTION FIVE (20 MARKS)

a) A group of consultants have estimated the demand curve of client's firm to be: AR = 200 − 8Q. Where AR is average revenue in millions of shillings and Q is the output units. Investigation of the client firm's cost profit shows that marginal cost (MC) is given by MC = $Q^2 - 28Q + 211$ (in millions of shillings). Further investigations have shown that the firm's cost when not producing output is KSh.. 10 million.

Required

    i) The equation of total cost   (2mks)

    ii) The equation of total revenue   (2mks)

    iii) An expression for profit   (2mks)

    iv) The level of output that maximizes the profits   (3mks)

    v) The equation of marginal revenue   (2mks)

b) Kayebe maize mills' Total cost function was found as TC = 3x + 10 and its sales function as TR = 20 – x. Determine the maximum profit of Kayebe maize mills   (3mks)

c) Differentiate the following functions

$$y = \frac{2x + 1}{3x^3 - 6}$$ (3mks)

d) Evaluate

$$\int_{1}^{3} (x^2 - 10)\,dx$$

                    (3mks)