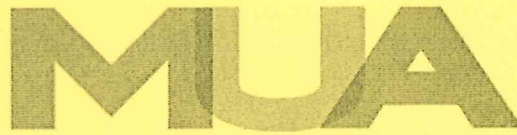**The Management University of Africa**

Sponsored by the Kenya Institute of Management

POST GRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF MASTER OF BUSINESS ADMINISTRATION/ MASTER OF MANAGEMENT AND LEADERSHIP/ MASTER OF ARTS IN DEVELOPMENT STUDIES

MBA 505/ MML 5102/ MDE 517:　　**QUANTITATIVE TECHNIQUES FOR BUSINESS/ STATISTICAL DECISIONAL ANALYSIS/ SOCIAL STATISTICS**

DATE:　　　　　　　　　　　　*30th March, 2022*

DURATION: 3 HOURS

MAXIMUM MARKS: 60

INSTRUCTIONS:
1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **FOUR (4)** questions.
4. Question **ONE is compulsory.**
5. Answer any other **TWO** questions.
6. Question **ONE** carries **30 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided**

QUESTION ONE

a) Consider the following distribution of CAT marks obtained by 7 students in MBA class

MBA 500	24	25	30	16	21	20	24
MBA 505	20	22	25	25	27	21	23

Required: Calculate the Rank Coefficient of Correlation and comment on the answer

(5 Marks)

b) Consider the following data from XYZ Company. Formulate the linear programming model and obtain the dual program **(5 Marks)**

Products	Labour hours	Machine hours	Raw materials	Cost {Ksh. 000)
Blue Band	5	3	1	15
Cooking Oil	4	7	1	22
Maximum Available	60	84	18	

c) State two assumptions of Analysis of Variances **(2 Marks)**

d) Giving examples in each case, explain four levels of measurement **(4 Marks)**

e) Explain any four properties of a good estimator **(4 Marks)**

f) Explain any two methods of probability sampling **(2 Marks)**

g) An analysis of the monthly wages paid to workers of two firms A and B belonging to the same industry gives the following results:

	Firm A	Firm B
No. of wage earners	586	648
Average monthly wage	52.5	47.5
Standard deviation	10	11

Compute the combined standard deviation **(3 Marks)**

h) The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with a standard deviation of 5 months. Random samples of 6 such bulbs have the following values: Life of bulb in months: 24, 20, 30, 25,

21, 18. Can you regard the producer's claim to be valid at 1% level of significance?

(5 Marks)

QUESTION TWO

a) A random sample of 16 fully grown turkeys had a mean weight of 20.8kgs. If we can assume from past experience that $\delta = 2.8$ kgs, construct 90% confidence interval for μ, the true mean weight **(6 Marks)**

b) Using a well labeled diagram show the relationship between positive and negative skewness of a distribution relative to normal distribution **(6 Marks)**

c) Explain any three decision making environments **(3 marks)**

QUESTION THREE

a) A personnel manager wants to find out if a test carried out during an employee's interview and a skills assessment at the end of basic training is a guide to performance after working for the company for one year. The table below shows the results of the interview test of 10 employees and their performance for one year:

Employee	A	B	C	D	E	F	G	H	I	J
Interview test, x%	65	71	79	77	85	78	85	90	81	62
Performance after one year, y%	65	74	82	64	87	78	61	65	79	69

i. Determine the least square regression line and interpret it. **(6 Marks)**

ii. Find the correlation coefficient and coefficient of determination. Interpret the answer **(3 Marks)**

iii. Test the hypothesis that there is correlation between the interview test marks and performance of employees at 1% level of significant **(4 Marks)**

b) Explain four functions of statistics **(2 Marks)**

QUESTION FOUR

a) A cigarette company is interested finding out in the effect of gender on the type of cigarettes smoked and has collected the following data from a random sample of 150 persons.

Cigarette	Gender		Total
	Male	Female	
A	25	30	55
B	40	15	55
Total	56	45	100

Test whether the type of cigarette smoked and gender are independent.   **(5 Marks)**

b) Differentiate between the following terms as used in statistics

   i.   Sample and census   **(1 Mark)**

   ii.   Parameter and statistics   **(2 Marks)**

   iii. Estimator and estimate   **(2 Marks)**

   iv.   Type I error and type II error   **(2 Marks)**

c) The life times of electric components manufactured by Raman Industries Ltd are normally distributed with mean of 2500 hours and standard deviation of 600 hours. If the daily production is 500 components, how many are expected to have a life time between 2350 hours and 2580 hours   **(3 Marks)**

FORMULAS

$$\text{Mean} = \frac{\sum X}{n}$$

$$\text{Mean}, = \frac{\Sigma FX}{\Sigma F}$$

$$\text{Z-Formula} = \frac{\text{Mean Value}}{\text{standard deviation}}$$

$$\text{Mode} = L + \frac{F1}{F1+F2} \times i \qquad \text{or} \qquad \text{Mode} = L + \left(\frac{D_1}{D_1+D_2}\right).c$$

$$\text{Median} = L + \frac{i}{F}(m - c) \qquad \text{or} \qquad \text{Median} = L + \left(\frac{\frac{N}{2}-F_{m-1}}{f_m}\right).c$$

$$\text{Variance} = \frac{\Sigma F(X - \text{mean})^2}{\Sigma F} \qquad \text{or} \qquad \text{Variance, } S^2 = \frac{\sum fx^2}{\sum f} - \overline{x}^2$$

$$S = \sqrt{\frac{\Sigma F(x - mean)^2}{\Sigma F}} \qquad \text{or} \qquad S \; \sqrt{\frac{\sum fx^2}{\sum f} - \overline{x}^2}$$

$$CV = \frac{SD}{\text{Mean}} \times 100 \qquad\qquad SKp = 3 \times \frac{(\text{mean - median})}{\text{Standard deviation}}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad\qquad \overline{X}_{12} = \frac{N_1\overline{X}_1 + N_2\overline{X}_2}{N_1 + N_2}$$

$$\delta_{12} = \sqrt{\frac{N_1\delta_1^2 + N_2\delta_2^2 + N_1 d_1^2 + N_2 d_2^2}{N_1 + N_2}}$$

$$\mu = x_1 p(x_1) + x_2 p(x_2) + \ldots x_n p(x_n)$$
$$= \sum_{i=1}^{n} x_i p(x_i)$$

$$Var(X) = \sum_{i=1}^{n} (x_i - \mu)^2 \cdot p(x_i)$$

$$\overline{x} - z_{\alpha/2} \frac{\delta}{\sqrt{n}} < \mu < \overline{x} + z_{\alpha/2} \frac{\delta}{\sqrt{n}}$$

$$\overline{x} - t_{n-1,\alpha/2} \frac{S}{\sqrt{n}} < \mu < \overline{x} + t_{n-1,\alpha/2} \frac{S}{\sqrt{n}}$$

$$Z = \frac{\overline{x} - \mu_0}{\delta/\sqrt{n}}$$

$$\chi^2 = \sum_{i=1}^{6} \frac{(O_i - E_i)^2}{E_i}$$

$$F = \frac{MSB}{MSW}$$

$$MSB = \frac{SSB}{k-1}$$

$$MSW = \frac{SSW}{n-k}$$

$$SSB = \sum_{j=1}^{k} \frac{T_j^2}{n_j} - \frac{T^2}{N}$$

$$SSW = \sum_{j=1}^{k} \sum_{i=1}^{n_j} X_{ij}^2 - \sum_{j=1}^{k} \frac{T_j^2}{n_j}$$

$$T = \frac{\overline{x} - \mu_0}{S/\sqrt{n}}$$

$$r = \frac{n\sum XY - \sum X \sum Y}{\sqrt{\left[n\sum X^2 - \left(\sum X\right)^2\right]\left[n\sum Y^2 - \left(\sum Y\right)^2\right]}}$$

$$r = 1 - \frac{6\sum d^2}{n(n^2-1)} \qquad\qquad r\sqrt{\frac{n-2}{1-r^2}}.$$

$$\hat{b} = \frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} \qquad\qquad \hat{a} = \frac{1}{n}\left(\sum Y - \hat{b}\sum X\right) \quad = \quad \bar{Y} - \hat{b}\bar{X}$$