



*"Investing in Africa's Future"*

**COLLEGE OF BUSINESS PEACE LEADERSHIP AND GOVERNANCE**

**MMS 204: QUANTITATIVE METHODS 2**

**END OF SECOND SEMESTER EXAMINATIONS**

**April/May 2018**

**LECTURER: (P TARAMBAWAMWE)**

**DURATION: (3 HRS)**

---

***INSTRUCTIONS***

Answer **all** questions.

---

The marks allocated to **each** question are shown at the end of the question.

---

**Show all your workings.**

---

Credit will be given for logical, systematic and neat presentations.



Q1. Give

- i. Two example of index numbers[ 2 marks]
- ii. Two uses of index numbers[ 2 marks]

Q2

- a. A coach must choose five starters from a team of 12 players. How many different ways can the coach choose the starters? [1 mark]
- b. The local Family Restaurant has a daily breakfast special in which the customer may choose one item from each of the following groups:

Breakfast Sandwich	Accompaniments	Juice
egg and meat egg and bacon egg and cheese	breakfast potatoes apple slices fresh fruit cup pastry	orange cranberry tomato apple grape

- i) How many different breakfast specials are possible? [2 marks]
- ii) How many different breakfast specials without meat are possible? [2 marks]
- c. There are 5 novels and 4 biographies. In how many ways can 4 novels and 2 biographies can be arranged on a shelf? [3 marks]

Q3 The blood pressure p and the age of 7 patients are recorded in the below

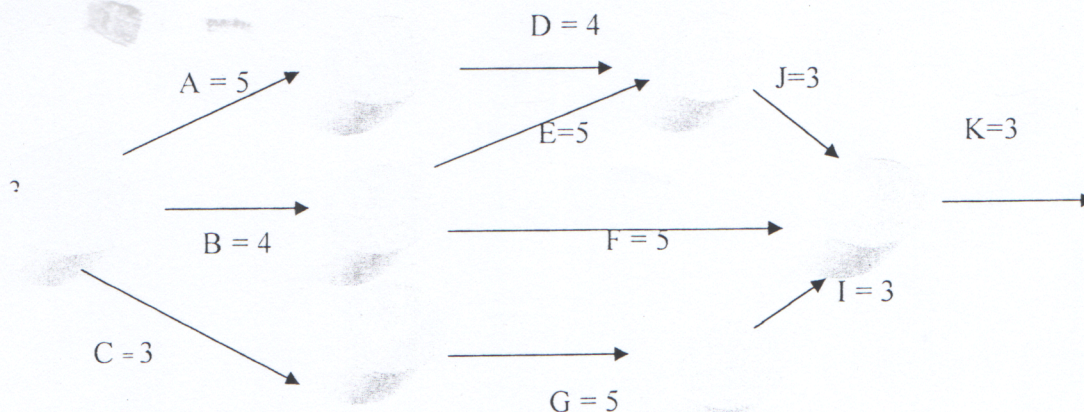
Patient	A	B	C	D	E	F	G
T	42	74	48	35	56	26	60
P	98	130	120	88	182	80	135

- i. Calculate Pearson's correlation coefficient for the data and interpret it.[4 marks]
- ii. Find the equation of regression line of p on t in the form  $P = a + bt$ . [4 marks]
- iii. Give a practical interpretation of a and b. [3 marks]
- iv. Use your regression line to estimate the blood pressure of a 40 year old patient, and comment about the reliability of your estimate. [3 marks]



Q4

The following network summarises a project in the manufacturing industry.



- Expand the above network to reflect earliest event time and latest event time. [8 marks]
- Represent the above information in a precedence table and show the slack for each activity. [8 marks]
- What is the project completion time? [2 mark]
- Mark the critical path. [2 mark]

Q5.

a. Finding the sum of a Geometric Series

$$-2, \frac{1}{2}, -\frac{1}{8}, \dots, -\frac{1}{37268} \quad [4 \text{ marks}]$$

- A shopkeeper's sales of goods decreased by \$100 every day in month of Dec. If sales on Dec 15 were \$ 3000, find out the total sales of good in month of Dec and sales on Dec 1. [4 marks]
- Consider two G.P.s as,  $a, am, am^2, am^3, \dots$  and  $am, a^2m, a^3m, \dots$ . If the third term of first G.P. is twice the third term of the second G.P. and fourth term of first G.P. is thrice the fourth term of second G.P. then find the first three terms of each G.P. [6 marks]

END OF PAPER





**AFRICA  
UNIVERSITY**

(A United Methodist-Related Institution)

"Investing in Africa's Future"

F M A

## Formulae Sheet Quantitative Methods

### Regression and Correlation

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

$$a = \frac{\sum y - b\sum x}{n}$$

### Pearson Correlation Coefficient

$$r = \frac{n\sum xy - \sum x \cdot \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}}$$

### Spearman's Rank Coefficient

$$r = 1 - \frac{6\sum D^2}{n(n^2-1)}$$

### Decision Analysis

An Expected Value (EV) =  $\sum p_i x_i$

$$EOQ = \sqrt{0.5CoD/Cc}$$

### Simple Queue Formulae

Utilization factor =  $\lambda / \mu$

Average number of customers in a queue =  $\lambda^2 / (\mu^2 - \lambda\mu)$

Average number of customers in a system =  $\lambda / (\mu - \lambda)$

Average time a customer is in the queue =  $\lambda / (\mu^2 - \lambda\mu)$

Average time a customer is in the system =  $1 / (\mu - \lambda)$

Probability of 0 units in system  $P_0 = 1 - (\lambda / \mu)$

Probability of more than k units in the system:  $P_{n>k} = (\lambda / \mu)^{k+1}$

### Time series

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

$$a = \frac{\sum y - b\sum x}{n}$$

### Financial Mathematics

AP:  $T_n = a_1 + (n-1)d$   
 $S_n = \frac{1}{2}n[2a_1 + (n-1)d]$

GP:  $T_n = ar^{n-1}$   
 $S_n = a(1-r^n)/(1-r)$

Compound interest:  $P_t = P_0 (1+r)^t$   
 Annuity :  $V_{anu} = A_0 [(1+r)^t - 1] / r$

### Index Numbers

$$I_t = (\sum p_t \cdot q_0) / (\sum p_0 \cdot q_0)$$

$$I_p = (\sum p_t \cdot q_t) / (\sum p_0 \cdot q_t)$$