



**THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE**

**(A Constituent College of JKUAT)**

(A Centre of Excellence)

# **Faculty of Engineering & Technology**

**DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY**

**DIPLOMA IN INFORMATION TECHNOLOGY  
(DIT 2K 11M)**

**ECT 2211: QUANTITATIVE TECHNIQUES**

**END OF SEMESTER EXAMINATION**

**SERIES: DECEMBER 2012**

**TIME: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

### Question One (Compulsory)

- a) The following table are recorded data showing the test scores made by salesmen on an intelligence test and their weekly sales.

| Salesmen         | 1   | 2  | 3  | 4  | 5  | 6   | 7   | 8  | 9   | 10 |
|------------------|-----|----|----|----|----|-----|-----|----|-----|----|
| Test Score       | 40  | 70 | 50 | 60 | 80 | 50  | 90  | 40 | 60  | 60 |
| Sales ('000 shs) | 2.5 | 6  | 4  | 5  | 4  | 2.5 | 5.5 | 3  | 4.5 | 3  |

Required:

- (i) Calculate coefficient of correlation ( $r$ ) of above. (15 marks)  
(ii) Calculate the regression line of sales on Test scores and estimate the probable weekly sales volume if a salesman makes a score of 100 (15 marks)

### Question Two

- a) From the following data, calculate index numbers for 1996 taking 1989 as the base and using the following formulae. (20 marks)
- (i) Laspeyrs index number  
(ii) Paasches index number  
(iii) Fisher ideal index number  
(iv) Marshall Edge worth method.

| Yr/Commodities | 1989 |    | 1996 |    |
|----------------|------|----|------|----|
| Maize          | 65   | 20 | 135  | 30 |
| Wheat          | 95   | 8  | 160  | 7  |
| Beans          | 150  | 5  | 320  | 8  |

### Question Three

- a) A company produces three (3) types of washing machines. It produces castings of the parts from a local foundry and finishes the parts on drilling, shaping and polishing machines. The selling prices of part A, B, and C are shs 8, shs 10 and shs 14 respectively. All parts made can be sold. Casting for part A, B, C, cost shs 5, shs 6 and shs 10 respectively. The company posses only one of each type of machine cost per hour to run each of three machines are shs 20 for drilling, shs. 30 for shaping and shs 30 for polishing. The capacity for each part on individual machine are shown below:

| Machine   | Capacity Per Hour |        |        |
|-----------|-------------------|--------|--------|
|           | Part A            | Part B | Part C |
| Drilling  | 25                | 40     | 25     |
| Shaping   | 25                | 20     | 20     |
| Polishing | 40                | 30     | 40     |

The manager of the company wants to know how many parts of each type to produce per hour in order to maximize profit for an hour's run.

Required:

Formulate the above as a linear programming problem. (20 marks)

#### Question Four

- a) An office contains 10 clerks. The longer-serving clerk feel that they should have a seniority increment based on length of service built into their salary structure. An assessment of their efficiency by their department manager and the personnel department produces a ranking of efficiency. This is shown below.

|   |   |   |   |    |   |   |   |   |   |    |
|---|---|---|---|----|---|---|---|---|---|----|
| <b>Ranking According to Leng of Service</b> | 1 | 2 | 3 | 4  | 5 | 6 | 7 | 8 | 9 | 10 |
| <b>Ranking Based on Efficiency</b>          | 2 | 5 | 3 | 10 | 6 | 4 | 8 | 9 | 7 | 1  |

Required:

- (i) Ascertain whether the data support the clerk's claim for seniority increment
- (ii) Give comments on your answer

#### Question Five

Solve by simplex method:

$$Z = 5x_1 + 4x_2$$

Maximize

$$3x_1 + 2x_2 \leq 50$$

$$x_1 + x_2 \leq 22$$

Subject to