# JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

## UNIVERSITY EXAMINATION 2016

## 4TH YEAR 1ST SEMESTER EXAMINATION FOR THE DEGREE OF THE BACHELORS OF BUSINESS ADMINISTRATION

## SCHOOL OF BUSINESS AND ECONOMICS

COURSECODE:     ABA 402

COURSE TITLE:     QUANTITATIVE METHODS II.

DATE:…………………………………     TIME :…………………..

DURATION: TWO HOURS

INSTRUCTIONS

This paper contains FIVE(5) questions.

Answer question one (1) and  any other TWO questions.

Write all the answers in the booklet provided.

## QUESTION ONE

a) Explain FIVE basic assumptions made in linear programming (5 marks).

b) A manufacturing company has one plant in the outskirts of a city. Its production is limited to two products; Ammonia and Urea. The profit realised per unit of each product produced is KSh 50.00 for ammonia and KSh 60.00 for urea. The time requirement for each product and total time available in each department is given in table 1.1

| Department | Hours required | | Hours available in a month |
| --- | --- | --- | --- |
| | Ammonia | Erea | |
| 1 | 2.0 | 3.0 | 1500 |
| 2 | 3.0 | 2.0 | 1500 |

Required:

i) Formulate this problem as a linear programming model

ii) Use graphical method to find the maximum profit that can be realised as a result of this production mix. (10 marks)

c) i) Outline FOUR reasons why assignment model is important for decision making in management.

ii) A small garment unit has five tailors stitching five different types of garment. All the five tailors are capable of stitching all the firm garments. The output per tailor and profit is given in table 1.2

| Tailors | Types of garments | | | | |
| --- | --- | --- | --- | --- | --- |
| | 1 | 2 | 3 | 4 | 5 |
| A | 7 | 9 | 4 | 8 | 6 |
| B | 4 | 9 | 5 | 7 | 8 |
| C | 8 | 5 | 2 | 9 | 8 |
| D | 6 | 5 | 8 | 10 | 10 |
| E | 7 | 8 | 10 | 9 | 4 |
| **Proft in Ksh./garment** | **2** | **3** | **2** | **3** | **4** |

i) Determine the optimal assignment for each tailor to maximize profit.

ii) Calculate the profit level for the production. (15 marks)

## QUESTION TWO

a) Explain the reasons why you should adopt simulation on system modelling other than other known mathematical models (5 marks).

b) Outline Four limitation of using simulations (2 marks).

c) A leading dealer of consumer goods is planning to apply scientific approaches to its policies so as to minimize the investment on stocks. One of the items is electric fan whose daily demand is random and unstable.(varies from day to day in unpredictable

pattern). Previous sales records the pattern of daily demand conform to a stable probability distribution as in table 2

| Daily demand | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| Probability | 0.06 | 0.14 | 0.18 | 0,17 | 0.16 | 0.12 | 0.08 | 0.06 | 0.03 |

The reorder point is 40 units and the re-order quantity is 50 units. This means that any time at the end of the day if the units are 40 units in stock, the manager will call the firm and place an order of 50 units of the item. If the lead time for an order is 5days i.e every time an order is placed it takes 5 days and the inventory at hand is 75 units at the beginning of the period.

i) Simulate the daily demand for 15 days, if the random numbers given are ; 63, 05, 42, 93, 24, 61, 55, 97, 67, 86, 36, 18, 52, 17, 30.
ii) Determine the number of orders made during the duration
iii) Determine the average daily for the fifteen days in question
iv) Establish the loss in sales if an item costs 1200 shillings.           (13 marks)

## QUESTION THREE

The monthly demand for a production for last year is given in table 4

| MONTH | JAN. | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DEMAND | 4200 | 4300 | 4000 | 4400 | 5100 | 4700 | 5300 | 4900 | 5400 | 5700 | 6300 | 6800 |

Required:

i) Using regression analysis, determine the demand for the product in January, February and March the following year.
ii) Establish the standard error of estimate for this product sales revenue analysis.
                                                                    (20mks).

## QUESTION FOUR

a) Outline SIX assumptions made in a single channel queuing model           (6 marks)
b) A tax consulting firm has four service points in its office to receive a person who has problems and complaints about their income, wealth and sales tax. Arrivals average is 80 persons a week in 8 hours working day. Each tax adviser spends a random amount of time attending to customers which have been found to have exponential distribution. If the average service time is 20 minutes and $P_{(0)}$ is given as 0.0213. Find
   i) Average number of customers in the system.
   ii) Average number of customers in the queue
   iii) Average time a customer spends in the system before being served.

iv) Total time spent by each tax adviser each week doing the work (14marks).

## QUESTION FIVE

Kogelo transport company ships truck loads of grain from 3 silos in Kisumu, Eldoret and Kitale to four mills in Busia, Kakamega,Homabay and Migori. The supply (in truck loads) and the demand (also in truckloads) together with the unit transportation cost per truck load on the different routes are summarized in **table 2.**

Calculate the shipping schedule for the transport company.

*Table 2.*

| To mills/ From silos | MILLS | | | | SUPPLY |
|---|---|---|---|---|---|
| | Busia | Kakamega | Homabay | Migori | |
| Kisumu | 10 | 3 | 20 | 11 | 20 |
| Eldoret | 12 | 7 | 9 | 25 | 30 |
| Kitale | 4 | 14 | 16 | 18 | 10 |
| DEMAND | 10 | 15 | 15 | 20 | 60 |

Using the North West corner rule method determines the following:

i) The routes that will result into optimal cost of shipping.

ii) The minimum transport cost of shipping the track loads of grains to the various destinations (20 marks)