JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATION (MAIN CAMPUS)

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 9/11/20   **TIME :7.00-10.00 AM**

DURATION: TWO HOURS

INSTRUCTIONS

This paper contains FIVE (5) questions.

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

2.   Candidates are advised to write on the text editor provided, or to write on a foolscap, scan and upload alongside the question

3.   Candidates must ensure they submit their work by clicking "finish and submit attempt" button at the end.

Q1.

a)   Explain Monte Carlo simulation process and state FOUR areas of application in management and manufacturing processes   (6 marks)

b) Kericho plumbing and heating systems maintains a stock of 30- gallon hot water that it sells to home owners and installs for them. The owner likes the idea of having large supply on hand so as to meet all customer demand, but he also realizes that it is expensive to do so. He examines the hot heater sales over the first 60 weeks and notes the following in *table 1:*

Hot water heater sales per week	Number of weeks this number was sold
4	10
5	5
6	8
7	12
8	10
9	8
10	7
Total	**60**

Table:1

The following random numbers were given to be used for simulation:

10,   24,   03,   32,   23,   59,   95,   34,   34,   51,
08,   48,   66,   97,   03,   96,   46,   74,   77,   44

Required: Using the random numbers given, simulate demand for 20 weeks

  i) If Kericho plumbing works maintains a supply of 10 hot water heaters in any given week. How many times will the company be out of stocks during the 20- week interval.
  ii) What is the average number of heaters demanded per week over the 20- week period?
                                                                        (12 marks)

c) The demand for sweets is correlated to the price of sugar. The past data is given in **Table 3**

Table2.

SNo.	Price of sugar (Kshs per kg)	Demand (kg per month)
1	10.00	440
2	10.80	420
3	12.20	380
4	12.60	320
5	13.20	300
6	14.00	260
7	14.50	250
8	15.00	200
9	15.40	180
10	16.10	120

Required:
   i)   Formulate the regression equation
   ii) Forecast the demand if the price of sugar is Kshs 16.50   (12 marks).

Q2.

 a) Kaluma service station has five mechanics that services scooters in 2 hours, the

scooters are registered in a single station then sent for servicing to different mechanics. The

scooters arrive at an average of 2 scooters per hour. Assuming the scooter arrivals are

poison distributed and the servicing time are exponentially distributed. Determine:

   i)   The expected number of scooters waiting in the queue.

   ii)   Expected waiting time in the queue.

   iii)   The time the scooters take in the service system.   (10 marks)

b)   Suppose that the manager of the service station question (a) is considering to

        engage two more mechanics in the service station, advice whether the idea is
        economical if the cost of customers waiting in the system is costed at Kshs 150.00
        per customer per hour, while each mechanic is to be paid Kshs 60.00 per hour. If the
        probability of there being an idle time in the facility is given by **(Po) =0.0130**

(10Marks)

Q3.

Kogelo transport company ships truck loads of grain from 3 silos in Kisumu, Eldoret and Kitale to

four mills in Buaia,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 3.

Calculate the shipping schedule for the transport company.

Table 3.

To mills/ From silos	MILLS				SUPPLY
	Busia	Kakamega	Homabay	Migori	
Kisumu	10	2	20	11	15
Eldoret	12	7	9	80	25
Kitale	4	14	16	18	10
DEMAND	5	15	15	15	50

Using the least cost method determine the following:

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

      ii)   The minimum transport cost of shipping the bath tabs to the various warehouses in Kenya shillings.   (20 marks)

Q4.   A firm produces three products XY and Z with contributions of £30, £25 and £16 respectively, the production data is given in **table 2.**

    Table 3.

Products	Machine Hours	Labour hours	Materials in Kgs
X	5	2	8
Y	3	5	10
Z	6	3	3
Total hours available	3000	2500	10000

Required:

  i.   Formulate the problem as an LPP and determine the optimal production schedule for this firm using simplex method.

  ii.   Interpret the result for this solution and advice the management   (20 marks)

Q5.

  a) Explain assignment as a linear programming model and outline how it can be used to facilitate human resource capital optimization.   (6 marks).

b) The following cost matrix is given for a machine shop that produces parts for sugar factories in western Kenya as illustrated in **Table 4.**

Machinist	1	Job 2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

Required; Determine:

     i)   The optimal job assignment
     ii)   The cost of assignment   (14 marks}

END! THANK YOU.