TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF BUSINESS

DEPARTMENT OF MANAGEMENT SCIENCES

DIPLOMA IN PROCUREMENT AND MATERIALS MANAGEMENT

DIPLOMA IN LOGISTICS AND TRANSPORT MANAGEMENT

DIPLOMA IN BUSINESS MANAGEMENT

DIPLOMA IN HUMAN RESOURCE MANAGEMENT

(DPMM, DLTM, DBM, DHRM)

BAC 2201: QUANTITATIVE TECHNIQUES

END OF SEMESTER EXAMINATIONS

SERIES: APRIL 2016

TIME: 2 HOURS

INSTRUCTIONS:

- This paper consists of Sections **A** and **B.**
- **-**Section **A** is Compulsory. Answer any **TWO** questions in Section **B**.
- **-**Mobile phones are not allowed into examination room.
- **-**Cheating leads to disqualification.
- **-*This paper consists of Five printed pages.***

Question one

a) Discuss and give examples of the applications of linear programming in business industry

(5mks)

b) A firm has analyzed their operating conditions, prices and costs and have developed the

following functions:

$$\text{Revenue (R)} = 200Q - Q^2$$

$$\text{Cost (c)} = 40Q + 100$$

Where Q refers to the number of units sold.

Required:

    i.   Determine the maximum total revenue obtainable (5mks)

    ii.   The quantity and price which maximize profit (5mks)

    iii.   What happens if the fixed costs rise to sh.200 (5mks)

c) ABC Ltd selling develop the following function

$$P = 8K - 0.0001K^2 + 0.05KT - 77.5T^2 - 10,000$$

Where P = profits in shs.

    K = number of kits

    T=number of tools in each kit

How many tool kits containing, how many tools should be sold to maximize profits.

(5mks)

d)   Solve the following simultaneous equation using matrix method:

    4x + 2y= 100

    4x + 6y= 180

(2.5mks)

e) find the value of the 14th term and the sum of the first 30 terms of the progression:

4, 8, 16, 32, 64…………… (2.5mks)

Question Two

a) A Company makes two products (Alpha and Beta). Each product requires time on two machines (X and Y). The specifications for each of the product are as follows:-

	Alpha	**Beta**	
Processing time on machine X	4	2	hrs/unit
Processing time on machine Y	3	5	hrs/unit
Material and labor cost	18	20	hrs/unit
Selling price	25	28	hrs/unit
Maximum possible sales	230	450	units

The amount of time available on Machine X is 460hrs, Machine Y is 280hrs.

(i) Formulate the LP problem in standard form

(ii) Solve using the graphical method (10mks)

b) i. Calculate the various levels given the following information:

Normal usage	1,300 per day
Minimum usage	900 per day
Maximum usage	2,000 per day
Load time	15 – 20 days
EOQ	30,000 (5mks)

ii. a) Explain **FIVE** advantages of a periodic review system (5mks)

Question Three

a). Tum Ltd has listed the following activities in respect of a project

Activity	Preceding Activity	Duration (days)
1	-	4
2	1	7
3	1	5
4	1	6
5	2	2
6	3	3
7	5	5
8	2, 6	11
9	7, 8	7
10	3	4
11	4	3
12	9, 10, 11	4

Required:

Draw a Network Diagram and determine the critical path using EST/LSTs

(10mks)

b) A company has three factories producing a homogeneous product. The factories X, Y and Z have capacities of 800, 400 and 800 units respectively. The product is consumed at four

locations Mombasa, Malindi, Nairobi and Lamu whose estimated demands are 500, 600, 700 and 200 units respectively. The costs of transporting the units from the three factories to the four locations are given in the matrix below, the variable costs per unit at I, II, III are sh. 3 and 2 sh. 4 respectively.

	Mombasa	Malindi	Nairobi	Lamu
X	4	7	9	2
Y	2	5	3	9
Z	4	6	3	5

Determine the production schedule that will minimize the transportation costs for the company using the Least Cost method.   (10mks)

Question Four

Safaricom Company Ltd takes a sample of 1,000 people in Kenya and finds that 200 know about Mpesa services. After an advertising and promotion campaign a further sample of 1,091 is taken and it is found that 240 knows of Mpesa.

Conduct a significance test at:-

i.   5% level of significance
ii.   1% level of significance   (20mks)

Question Five

a) Find the inverse of:-

A $\begin{pmatrix} 2 & 1 & 4 \\ 3 & 5 & 1 \\ 2 & 0 & 6 \end{pmatrix}$ (10mks)

b) The product X and Y currently share the market with shares of 60% and 40% each respectively. Each week some brand switching taken place of those who bought product X previous week, 70% buyer it again while 30% switch to product Y. Of those who bought Y the previous week 80% buys it again while 20% switch to product X. Predict the market share in the following week.   (10mks)