JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BUSINESS AND ECONOMICS

DEGREE IN BUSINESS ADMINISTRATION WITH IT

COURSE TITLE: MANAGEMENT MATHEMATICS II

COURSE CODE: ABA 205

END OF SEMESTER EXAM (SEPT –DEC 2018)

NAIROBI LEARNING CENTER

VENUE: 9TH FLOOR ROOM 2

DATE: 06 /12/2018 **EXAM SESSION 2PM-4PM**

TIME: 2 HOURS

Instructions

1. Answer question 1 (compulsory) and ANY other 2 questions.
2. Candidates are advised not to write on the question paper.
3. Candidates must hand in their answer booklets to the invigilator while in the examination room.

SECTION A

Question One

(a) Solve the following simultaneous equations using matrix method

$$3x + 2y = 106$$
$$2x + 4y = 92$$

(5 marks)

(b) Identify and explain the salient features of operations research (5marks)

(c) State the steps used in operations research (5 marks)

(d) What are the main assumptions of Linear Programming? (5 marks)

(e) Using calculus, find the stationary point in the equation below:
$Y=3X^2 -2X +4$ (4 marks)

(f) Explain the following terms as used in linear programming:
- (i) Duality
- (ii) Optimal solution
- (iii) Tableau (6 marks)

SECTION B

Question Two

(a) Explain the following terms as used in Markov Analysis
- (i) Transient Analysis
- (ii) Steady state
- (iii) Absorbing state
- (iv) Transition Probability (8 marks)

(b) Two manufacturers M and N are competing with each other in a very restricted market. The state transition matrix for the market summarizes the probabilities that customers will move from manufacturer to the other in any one month as shown below:

	To	
From	**M**	**N**
M	0.7	0.3
N	0.1	0.9

Required:
Interpret the state transition matrix in terms of:

(i) Retention and loss

(ii) Retention and gain (12 marks)

Question Three

(a) Identify any four types of mathematical programming (4 marks)

(b) Integrate the following equation in respect of X

$8X^3 – 3X^2 +8X -10$ (4 marks)

(c) A factory produces X calculators per day. The total daily cost in shillings incurred is 5X +700X +500. If the calculators are sold for sh. (1000-10X) each, find the number of calculators that would maximize the daily profit. (12 marks)

Question Four

A company makes two products X and Y; each product requires time on two machines A and B. The specifications for each product are as follows:

	PRODUCT X	PRODUCT Y
Processing time on Machine A(hrs/unit)	2	2
Processing time on Machine B(hrs/unit)	1	2
Material and labour cost (sh/unit)	14	15
Selling price (sh/unit)	16	18
Maximum possible sale (units)	130	150

The amount of time available on machine A is 360hours and on machine B is 260 hours.

The company would like to maximize profits.

Required;

(a) Formulate the linear programming problem

(b) Solve the LP using graphical method. (20 marks)

Question Five

(a) Outline the main assumptions of Leontief,s Model as used in input-output analysis. (4 marks)

(b) Pebo Ltd makes two products Q and M. The cost of making 15units of Q and 10 units of M is sh 600. The cost of making 5 units of Q and 8 units of M is sh 340.

Required:

(i) Express the above in simultaneous equations

(ii) Use matrix method to establish the cost of making one unit of Q and M respectively.

(iii) Determine the price at which each of the products are to be sold at 50% margin.

(16 marks)