CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

CHUKA, EMBU & THARAKA

EXAMINATION FOR THE AWARD OF DIPLOMA IN PROCUREMENT AND LOGISTICS MANAGEMENT

DPLM 0161: OPERATIONS RESEARCH

STREAMS: DPLM **TIME: 2 HOURS**

DAY/DATE: MONDAY 10/12/2018 **8.30 AM – 10.30 AM**

INSTRUCTIONS:

- **Answer Question One and any other Two**
- **Do not write on the question paper**

QUESTION ONE

(a) Operations research has been used to solve fairly limited number of managerial problems in contemporary Kenyan business enterprises. Discuss any five reasons for this trend.
[10 marks]

(b) Operations research is the application of scientific methods to arrive at the optimal solutions to the problems. Discuss the salient features of operations research.
[10 marks]

(c) XYZ ltd employ service engineers based at various locations throughout the country to service and repair the equipment installed in customers' promises. Four requests for services have been received and the company finds four engineers are available. The distances for each of the engineers from the various customers is as shown on the table below and the company wishes to assign engineers to customers in a way that minimizes the total distances travelled.

		Engineers			
		W	X	Y	Z
Customers	A	25	18	23	14
	B	38	15	53	23
	C	15	17	41	30
	D	26	28	36	29

Required:

(i) Allocate each customer one engineer in a manner that minimizes the total distance travelled. [8 marks]

(ii) Calculate the total distance of the final assignment. [2 marks]

QUESTION TWO

(a) Discuss any five assumptions of linear programming. [10 marks]

(b) A firm produces two products A and B whose profit contributions are ksh. 8 and ksh. 10 per unit respectively. Their production data is as follows

Product	labour hours/unit	Material X units	Material Y units
A	3	4	6
B	5	2	8

There are only 500 labour hours available for production. The available materials are 350 units and 800 units of x and Y respectively

Required:

(i) Formulate a linear programming problem [6 marks]
(ii) Express the problem in (i) above in standard form. [4 marks]

QUESTION THREE

(a) The following data relates to cement usage in kokoto construction company in a particular week

Normal usage 750 bags per week
Minimum usage 300 bags per week
Maximum usage 1050 bags per week
Minimum lead time 10 weeks
Maximum lead time 15 weeks
Economic order quantity 15000 bags

Required: determine

(i) The reorder level [3 marks]
(ii) The minimum level [2 marks]
(iii) the maximum level [2 marks]
(iv) Average stock level [3 marks]

(b) Discuss any five operating characteristics of a queuing system. [10 marks]

QUESTION FOUR

(a) Define the following terms as used in network planning and analysis

(i) Slack [2 marks]
(ii) Total floats [2 marks]
(iii) Normal cost [2 marks]
(iv) cost slope [2 marks]
(v) Crash time [2 marks]

(b) The following information relates to a certain construction project.

Activity	Preceding Activity	Times estimates (weeks)
S	-	4
T	-	12
U	S	9
V	S	15
W	S	7.5
X	T, U	9
Y	V	3.5
Z	W, X, Y	5

Required:

(i) Draw a network diagram for the project [8 marks]

(ii) Determine the critical path [2 marks]
