KABARAK UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: **BMGT 410**

COURSE TITLE: **OPERATIONS RESEARCH**

STREAM: **Y4S1**

DAY: **THURSDAY**

TIME: **9.00 – 11.00 A.M.**

DATE: **26/03/2009**

INSTRUCTIONS:

- Answer questions **ONE** and any other **TWO** questions
- Begin every question on a separate page
- Show your working clearly

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

a) What do you understand by the following;

i) Lead time **(2 marks)**

ii) Crashing projects **(2 marks)**

iii) Slack variables **(2 marks)**

iv) Optimization **(2 marks)**

b) Describe graphically;

i) The relationship between level of service and cost of waiting time **(3 marks)**

ii) The relationship between level of service and cost of providing service **(3 marks)**

c) Outline various types of replacement Decisions and Replacement Problems **(6 marks)**

d) Describe how supermarkets use the laser scanner that reads a universal product code(UPC) or bar code printed on the item tag or on packaging to enhance the efficiency of inventory management **(4 marks)**

e) Find the solution of the following linear programming problem using graphical method;

$$\begin{aligned} &\textit{Maximize} && z = 5x_1 + 6x_2 \\ &\textit{Subject to} && 3x_1 + 2x_2 \le 120 \\ & && 4x_1 + 6x_2 \le 260 \\ & && x_1, x_2 \ge 0 \end{aligned}$$

(6 marks)

QUESTION TWO (20 MARKS)

Solve the following linear programming problem using simplex method

$$\begin{aligned} &\textit{Minimize } z = 5x_1 + 6x_2 \\ &\textit{Subject to } x_1 + x_2 \ge 10 \\ & \quad 2x_1 + 4x_2 \ge 24 \\ & \quad x_1, x_2 \ge 0 \end{aligned}$$

QUESTION THREE (20 MARKS)

a) Describe the objectives of inventory control **(3marks)**

b) In cost information associated with inventories, describe

i) Holding or carrying cost **(3 marks)**

ii) Ordering cost **(3 marks)**

iii) Shortage cost **(3 marks)**

c) A local distributor for a national tire company expects to sell approximately 9600 steel-belted radial tires of a certain size and tread design next year. Annual carrying cost is $16 per tire, and ordering cost is $75. The distributor operates 288 days a year

i) What is EOQ **(2 marks)**

ii) How many times per year does the store reorder **(2 marks)**

iii) What is the length of an order cycle **(2 marks)**

iv) What is the total annual cost if the EOQ quantity is ordered **(2 marks)**

QUESTION FOUR (20 MARKS)

a) A fleet owner finds from his past records that the cost per year of maintaining a truck whose purchase price is Ksh 1,600,000 are given below;

Year	**Maintenance cost (Ksh)**	**Resale price (Ksh)**
1	80,000	1,450,000
2	90,000	1,320,000
3	105,000	1,220,000
4	130,000	1,140,000
5	150,000	1,090,000
6	200,000	900,000
7	250,000	700,000
8	300,000	500,000

At what age is replacement is due **(10 marks)**

b) A company employs service engineers based at various locations throughout the country to service and repair their equipment installed in customer's premises. Four requests for service have been received and the company finds that four engineers are available. The distances each of the engineers from various customers is given in the following table and the company wishes to assign engineer to customer to minimize the total distance to be traveled

		Customers			
		W	X	Y	Z
Service engineers	kimutai	25	18	23	14
	Rose	38	15	53	23
	Margaret	15	17	41	30
	Elijah	26	28	36	29

(**10marks**)

QUESTION FIVE (20 MARKS)

The following table contains information related to the major activities of a research project;

Activity	**precedes**	**expected Time (days)**
a	c,b	5
c	d	8
d	i	2
b	i	7
e	f	3
f	m	6
i	m	10
m	end	8
g	h	1
h	k	2
k	end	17

i) Draw a network diagram **(4 marks)**

ii) Determine the expected length of the project **(3 marks)**

iii) Find the total float **(4 marks)**

iv) Find the critical path **(2 marks)**

v) Find the free float **(4 marks)**