KABARAK **UNIVERSITY**

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR
FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: BMGT 410

COURSE TITLE: OPERATIONS RESEARCH

STREAM: Y4S1

DAY: TUESDAY

TIME: 9:00 – 11:00 A.M.

DATE: 08/12/2009

INSTRUCTIONS:

1. Read instructions on the answer booklet carefully.
2. The paper contains FOUR questions
3. Attempt question ONE and any other TWO questions.
4. Do NOT write anything on this question paper.
5. Graph papers are provided.

PLEASE TURNOVER

QUESTION ONE

(a) What contributions has Operation Research made to business and Government in Kenya. (5 marks)

(b) Why is it important to keep an open mind in utilizing OR techniques. (5 marks)

(c) Explain the advantages and disadvantages of models in operations research. (5 marks)

(d) Given max Z= 10A+12B
Subject to: 2A+ 3B =1500
                3A + 2B =1500
                  A + B =600
And A, B > 0
Obtain the dual problem. (5 marks)

(e) A factory follows an Economic Order Quantity System for maintaining stocks of one of its component requirements. The annual demand is for 24,000 units, the cost of placing an order is kshs 300 and the component cost is Kshs. 60 per unit. The factory has imputed 24% as the inventory carrying rate.
Find the optimal interval for placing orders, assuming a year is equivalent to 360 days. (5 marks)

(f) A TV repairman finds that the time spent on his job has an exponential distribution   with a mean of 30 of minutes. If he repairs sets on the first-come-first served basis and if the arrival of sets is with an average rate of 10 per eight-hour day, what is repairman's expected idle time each day? (5 marks)

QUESTION TWO

(a) Briefly explain the characteristics of linear programming. (5 marks)

(b) For the following transportation problem, obtain initial feasible solution by;
(i)   North West corner rule. (3 marks)
(ii)   Least cost method and, (3 marks)
(iii)   Vogels Approximation method. (3 marks)

The entries in the matrix indicate the cost in shillings for transporting a unit from a particular source to a particular destination.

| | Destinations | | | | |
Origin	1	2	3	4	Availability
1	10	8	11	7	20
2	9	12	14	6	40
3	8	9	12	10	35
Requirement	16	18	31	30	95.

(c) ABC Company is engaged in manufacturing five brands of packed snacks. It is having five manufacturing set-ups, each capable of manufacturing any of its brands one at the time. The cost to make a brand on these set-ups varry according to the following table.

	S_1	S_2	S_3	S_4	S_5
B_1	4	6	7	5	11
B_2	7	3	6	9	5
B_3	8	5	4	6	9
B_4	9	12	7	11	10
B_5	7	5	9	8	11

Assuming five set-ups are S_1 S_2 S_3 S_4 and S_5 and five brands are B_1, B_2, B_3, B_4 and B_5 find the optimum assignment that minimizes costs (6 marks)

QUESTION THREE

The commerce department of a university is considering to hold a faculty development programme. It has planned the following activities within the expected times.

	Activity Description	Immediate predecessor	Expected time (weeks)
A	Design conference meetings and theme	-	6
B	Design front cover of the conference proceedings.	A	4
C	Prepare brochure and send request for papers	A	8
D	Prepare list of distinguish speakers/guests	A	3
E	Finalise brochures and print it	C, D	2
F	Make travel arrangements for distinguished speakers/guest	D	5
G	Dispatch brochures	E	4
H	Receive papers for conference	G	3
I	Edit papers and assemble proceedings	F, H	4
J	Print proceedings	B, I	6

(i) Draw a network diagram to represent the above information. (4 marks)

(ii) Determine the critical path and the project time. (4 marks)

(b) A publisher has just signed a contract for the publication of a book. The tasks given in the table are involved with time estimates in weeks is as follows;

	Task	Precedence	Likely	Optimistic	Pessimistic
A	Appraisal of book by reviewers	-	8	4	10
B	Initial pricing of book	-	2	2	2
C	Assessment of marketability	A, B	2	1	3
D	Revisions by Author	A	6	4	12
E	Editing of final draft	C, D	4	3	5
F	Typesetting of text	E	3	3	3
G	Plates for artwork	E	4	3	5
H	Designing and printing of Jacket	C, D	6	4	9
I	Printing and binding book	F, G	8	6	16
J	Inspection and final assembly	I, H	1	1	1

(i) For this PERT network, find the expected task duration and variances of task duration. (4 marks)

(ii) Draw a network diagram and find the critical path and project duration. (4 marks)

(iii) What is the probability that the length of the critical path does not exceed 32 weeks (4 marks)

QUESTION FOUR.

(a) Explain the concept of replacement Theory in an organization. (5 marks)

(b) Determine the age at which the following type of machine be replaced. (5 marks)
Cost price = Kshs 8,000
Operating cost =1,000 for the first year, increasing by Ksh. 500 every year.
Resale value = KShs 4, 000 for the first year decreasing by Kshs 500 every year.
(10 marks)

(c) Explain the behaviour of calling units in a queue. (5 marks)