



KABARAK

UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMMERCE

COURSE CODE: BMGT 410

COURSE TITLE: OPERATIONS RESEARCH.

STREAM: Y4S1

DAY: TUESDAY

TIME: 2.00 – 4.00 P.M

DATE: 14/12/2010

INSTRUCTIONS:

- Answer question **ONE** and any other **TWO** questions

PLEASE TURNOVER

1. (a) Describe the following terms

(i) Slack variable.

(ii) Surplus variable

(iii) Shadow prices.

(iv) Free float

(8 marks)

(b) In a supermarket, the average arrival rate of a customer is 10 every 30 minutes following Poisson process. The average time taken by a cashier to list and calculate the customers Purchase is 2.5 minutes following exponential distribution.

(i) What is the probability that the queue length exceeds 6?

(6 marks)

(ii) What is the expected time spent by a customer in the system?

(5 marks)

(c) A firm has available 240kg, 370 kg and 180 kg of wood, plastic and steel respectively.

The corresponding requirement for each unit of B are 3, 4 and 1 respectively. If A sells for kshs 4 and B for kshs 6, determine how many units of A and B should be produced in order to obtain the maximum gross income. Use the graphical method.

(8 marks)

(d) Name and explain any three types of inventories .

(3 marks)

2. (a) Describe the characteristics of the Assignment model

(4 marks)

(b) A production company has four jobs that must be filled. Five applicants have been

Shortlisted. The recruitment consultant has test data which affects rating for each of the five applicants for each job. If the policy of the firm is that on individual does one

Job .You as a business manager formulate the model that will provide the optimal

Job assignment using the following data. Which applicant is successful.

(12 marks)

Jobs	1	2	3	4
Applicant A	13	25	3	17
B	6	20	6	8
C	12	18	12	8
D	4	4	22	6
E	6	6	17	9

(b) Describe the characteristics of linear programming as discussed in class (4 marks)

3. (a) Kenya wildlife service has a current transport schedule which is being questioned by the management as to whether it is optimal or not. KWS has 3 lodges and 4 warehouses. The details of the availability in the lodges, the requirements in the destinations and unit are given in the table below.

Warehouse lodges	d ₁	d ₂	d ₃	d ₄	Total availability
S1	5	2	4	3	60
S2	6	4	9	5	60
S3	2	3	8	1	90
Total requirement	50	65	65	30	

Using the least cost method to solve and showing your work clearly

(i) Determine the initial basic feasible solution (10 marks)

(ii) Find total cost. (5 marks)

(b) Given the dual problem find the primal problem.

$$\text{Min } C = 36z_1 + 40z_2 + 28z_3$$

$$\text{Subject to } 6z_1 + 5z_2 + 2z_3 \geq 5$$

$$2z_1 + 5z_2 + 4z_3 \geq 3$$

$$z_1, z_2, z_3 \geq 0.$$

(5 Marks)

4. Assume that the management of Kenya power and lighting company has been delegated the task of developing a strategy to follow during negotiations with labour unions. After

Considering past experiences the management has come up with four strategies for the company and for the union. The choice of the the strategy to be used by the company will dependent or the strategy adopted by the union. Collective bargaining is based on the following table.

		Company strategies			
		C ₁	C ₂	C ₃	C ₄
Union	U ₁	0.25	0.14	0.15	0.32
Strategy	U ₂	0.40	0.17	0.13	0.16
	U ₃	0.30	0.05	0.12	0.15
	U ₄	0.01	0.05	0.11	0.13

- (i) Determine whether or not a saddle point exists (4 marks)
- (ii) Using the Algebraic method determine who between the union and the company wins the game and at what pay off (11 marks)
- (b) Explain the steps used in critical path method. (5 marks)