EMBU UNIVERSITY COLLEGE

(A CONSTITUENT COLLEGE OF THE UNIVERSITY OF NAIROBI)

TRIMESTER EXAMINATIONS 2013/2014

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT

AEB 204: OPERATIONS RESEARCH

DATE: AUGUST 6, 2014 **TIME: 11.00AM – 1.00PM**

INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions.

QUESTION ONE

a) Using examples from agribusiness write short notes on the following terms/concepts used in Operations Research:

i.) Dual of a Linear Programming model. (3 marks)

ii.) Nonbinding constraint. (3 marks)

iii.) Feasible region. (3 marks)

iv.) Optimization. (3 marks)

v.) Degenerate solution. (3 marks)

b) Discuss the elements of queuing system. (5 marks)

c) Discuss five properties that situations must possess in order for them to be termed as games. 5 marks)

d) Discuss the classification of inventory items in accordance to their rate of usage.

(5 marks)

QUESTION TWO

Farmers Choice produces a hot dog mixture in 1000 kg batches. The mixture contains two ingredients: chicken and beef. The cost per kg of chicken is Kshs. 300; the cost per kg of beef is Kshs. 200. Each batch has the following recipe requirements:

i) At least 500 kg of chicken

ii) At least 200 kg of beef

The ratio of chicken to beef must be at least 2 to 1. The company wants to know the optimal mixture of ingredients that will minimize cost.

From the above stated problem:

a) Describe the decision variables. (5 marks)

b) What is the objective function? (5 marks)

c) Define the constraints. (5 marks)

d) A company has three warehouses A, B, C and four stores W, X, Y and Z. The warehouses have altogether a surplus of 150 units of a given commodity as follows:

A 50

B 60

C 40

The four stores together need also 150 units of the commodity as follows:

W 20

X 70

Y 50

Z 10

Formulate a model which can be solved by the Simplex method for this transportation problem.

(5 marks)

QUESTION THREE

a) Define Operations Research. (5 marks)

b) Using agribusiness examples briefly explain five applications of Operations Research. (5 marks)

c) Explain slack variables with an example. (5 marks)

d) Discuss five important benefits of inventory control system. (5 marks)

QUESTION FOUR

a) Explain seven basic assumptions of Linear Programming. (14 marks)

b) Briefly explain the steps involved in formulating a Linear Programming model. (6 marks)

QUESTION FIVE

a) Briefly describe the simplex method of solving a Linear Programming problem. (5 marks)

b) Write out the dual of the following Linear Programming problem.

Maximize: $Z = 6X_1+2X_2$

Subject to: $4X_1+X_2 \leq 5$

$3X_1+2X_2 \leq 7$

$X_1+X_2 \leq 3$

$X_1, X_2 \geq 0$ (15 marks)

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