

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2015/2016**

**SECOND YEAR SECOND SEMESTER EXAMINATION FOR**

**THE DEGREE OF BACHELOR OF COMMERCE**

 **HBC 2210: OPERATION RESEARCH**

**DATE: APRIL, 2016 TIME: 2 HOURS**

**INSTRUCTIONS: ATTEMPT QUESTION ONE COMPULSORY AND ANY**

 **OTHER TWO**

**QUESTION ONE**

a. Mwea Company Limited deals with so many projects. The company

 considers the use of CPM and PERT very vital in the management of the

 projects. Recently in a meeting the manager wanted to hire consultants to

 train employees.

 He consultant was to give proper and precise information about net working

 and as well speak on the CPM and PERT as the techniques of project

 management.

Required:

a) Name the three time estimates and show how necessary the estimates are

 linked to the activity time (te). [3 marks]

b) Give a brief elaboration on the following

 (i) Immediate predecessor

 (ii) Dummy activity

 (iii) Critical path

 (iv) Standard Deviation of an activity

 [4 marks]

c) An OR Model is of the form

 Z = f (x1, x2 …xn, y1 y2 …yn),, what does the following imply



 (i) Z

 (ii) x1 x2 …xn

 (iii) y1, y2 …yn

 [3 marks]

d) Game theory as a concept have the following;

 (i) Zero - Sum Game

 (ii) Two person, Zero - Sum Game

 (iii) Saddle point

 (iv) Rules for dominance

 Elaborate on the above terms. [6 marks]

e) Under transputation, one of the method used in process is vogel’s

 approximation method.

 Elaborate on the steps involved under this particular method. [5 marks]

d) Determination of float in a project analysis always considers the following:

 (i) Total float

 (ii) Interfering float

 (iii) Free float

 (iv) Independent

 Elaborate on the above terms [9 marks]

**QUESTION TWO**

a) Consider a situation where the mean arrival rate () is one Customer every 4 minutes and the mean service time ( 1/) is 21/2 minutes.

 Calculate

 (i) Average number of customers in the system

 (ii) Average queue length

 (iii) Average time the customer spends in the system

 (iv) Average time a customer waits before being served.

 [10 marks]

b) Elaborate on the characteristics of Linear programming as applied in operation research. [10 marks]

**QUESTION THREE**

a) Under networking system, measures should be taken to limit errors.

 Elaborate on the following diagrammatically.

 (i) Loop in the net work

 (ii) Dangling in the net work

 [8 marks]

b) Electrical equipment Limited, produces power transformers and traction -

 transformers. Both of these categories of transformers pass through 3

 processes

 (1) Core preparation

 (2) Core -to-coil assembly

 (3) Vapour phase drying

The power transformer yields a contribution (selling less variable costs) of Kshs 50,000.00 and traction – transformer yields a contribution of Kshs 10,000.00. The time required in terms of hours for each of the processes is given below:

 Power transformer Traction transformer

Core - preparation 75 15

Core-to-coil assembly 160 30

Vapour-phase drying 45 10

The capacities of the core-building shop, Assembly shop and vapour phase drying equipment are as under

 Process Available capacity

 Core-preparation 1000

 Core-to-coil Assembly 1500

 Vapour phase drying 750

The objective of the company is to maximize project.

Ascertain the objective function and constraint functions

 [12 marks]

**QUESTION FOUR**

Write brief notes on the following mathematical models.

(a) Probabilistic versus deterministic

(b) Standard versus custom made

(c) Quantitative versus qualitative

(d) Static versus dynamic

 [20 marks]