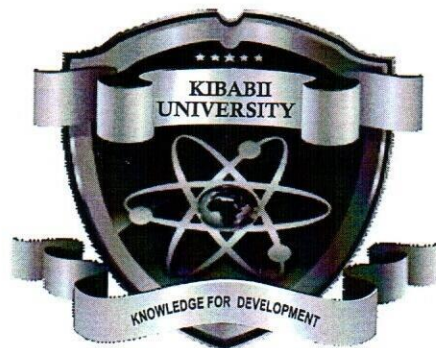


Provide Graph Papers.

3



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

THIRD YEAR 2ND SEMESTER
MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE AGRICULTURE
ECONOMICS AND RESOURCE MANAGEMENT

COURSE CODE: AEC 325
COURSE TITLE: OPERATIONS RESEARCH

DATE: 14TH APRIL 2023

TIME: 9 – 11 AM

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other TWO Questions.

TIME: 2 Hours

This paper consists of 3 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

PLEASE PROVIDE A GRAPH PAPER WITH THIS EXAM

QUESTION ONE

30 MARKS

- a) Explain what you understand by the term Operations Research (OR) and outline five different techniques used in O.R. (10 Marks)
- b) Define the following terms (10 Marks)
- i. Feasible Solution
 - ii. Objective Function
 - iii. Dual Problem
 - iv. network
 - v. Reorder Level
- c) A juice company has its products viz. canned apple and bottled juice with profit margin KSh.4 and KSh.2 respectively per unit. The following table shows the labour, equipment, and ingredients to produce each product per unit.

	Canned Apple	Bottled Juice	Total
Labour	2.0	3.0	12.0
Equipment	3.2	1.0	8.0
Ingredients	2.4	2.0	9.0

Formulate the linear programming problem (model) specifying the product mix which will maximize the profit without exceeding the levels of resources. (6 Marks)

- d) What are the limitations of using Linear programming to solve this product mix problem (4 Marks)

QUESTION TWO

20 MARKS

Find out the estimated completion time, variance and standard deviation of the critical path and the project with the following time estimates in weeks

Activity	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
Optimistic time estimate (to)	3	2	6	4	8	3	3	2	8
Most likely time estimate (tm)	6	5	12	5	11	7	9	4	16
Pessimistic time estimate (tp)	9	8	18	6	14	11	15	6	18

QUESTION THREE

20 MARKS

- a) Inventory may be classified into manufacturing, service and control aspects. Discuss the different types of inventory categorized in the manufacturing aspects. (10 Marks)
- b) A manufacturer uses KSh. 20, 000 worth of an item during the year. The manufacturer estimated the ordering cost as KSh.50 per order and holding costs as 12.5% of average inventory value. Find the optimal order size, number of orders per year, time period per order and total cost (10 Marks)

QUESTION FOUR

20 MARKS

Explain the following terms as used in Operations research

- a) predecessor event, and successor event,
- b) activity, and dummy activity,
- c) Critical path and Critical activities
- d) Optimistic time and pessimistic time
- e) Back log and delivery lag

QUESTION FIVE

20 MARKS

A company purchasing scrap material has two types of scrap materials available. The first type has 30% of material X, 20% of material Y and 50% of material Z by weight. The second type has 40% of material X, 10% of material Y and 30% of material Z. The costs of the two scraps are KSh.120 and KSh.160 per kg respectively. The company requires at least 240 kg of material X, 100 kg of material Y and 290 kg of material Z. Using the graphical method, Find the optimum quantities of the two scraps to be purchased so that the company requirements of the three materials are satisfied at a minimum cost.