



**MASINDE MULIRO UNIVERSITY OF SCIENCE AND
TECHNOLOGY (MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR**

**FOURTH YEAR SECOND SEMESTER MAIN EXAMINATION
FOR THE DEGREE OF
BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT AND
MARKETING**

**COURSE CODE: AEC 414/409
COURSE TITLE: OPERATIONS RESEARCH**

DATE: 8/4/2024

TIME: 8-10 AM

INSTRUCTION TO CANDIDATES

Answer question one and any other two in section B

Time: 2hrs

MMUST observes ZERO tolerance to examination cheating

This paper consists of 3 printed pages.

Please turn over

QUESTION 1 (30 MARKS)

- i. Explain how you would apply linear programming in real business. (7 marks)
- ii. Explain the various steps in the O.R. development process. (8 marks)
- iii. Discuss the limitations of operations research (4 Marks)
- iv. Explain the steps in minimum cost method as used to get the initial solution for a transportation problem. (6 marks)
- (v) Give five differences between CPM and PERT technique of project management. (5 marks)

QUESTION 2 (20 MARKS)

- i. Define the following terms as used in OR
 - a. Objective function (2 marks)
 - b. Feasible region (2 marks)
- ii. An organization is interested in the analysis of two products which can be produces from the idle time of labour, machine and investment. It was notified on investigation that the labour requirement of the first and the second products was 4 and 5 units respectively and the total available man hours was 48. Only first product required machine hour utilization of one hour per unit and at present only 10 spare machine hours are available. Second product needs one unit of byproduct per unit and the daily availability of the byproduct is 12 units. According to the marketing department the sales potential of first product cannot exceed 7 units. In a competitive market, first product can be sold at a profit of Rs.6 and the second product at a profit of Rs.10 per unit.
Formulate the problem as a linear programming model. Also determine graphically the feasible region. (16 marks)

QUESTION 3 (20 MARKS)

Consider the linear problem:

Maximize

$$60X_1 + 70X_2$$

Subject to:

$$2X_1 + X_2 \leq 300$$

$$3X_1 + 4X_2 \leq 509$$