



**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**

ODEL

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

DATE: 11th 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 (40 MARKS)

- i. Discuss the development of OR giving reasons for its growth. [5 marks]
- ii. Define the following terms clearly showing the examples.
- a. Objective function [2 marks]
 - b. Constraints [2 marks]
 - c. feasible region [2 marks]
 - d. Maximizing problems [2 marks]
- iii. Solve the given LPP using the graphical method. Maximise $Z = 50x_1 + 80x_2$ Subject to the constraints
- $$1.0x_1 + 1.5x_2 \leq 600$$
- $$0.2x_1 + 0.2x_2 \leq 100$$
- $$0.0x_1 + 0.1x_2 \leq 30$$
- and $x_1 \geq 0, x_2 \geq 0$ (10 Marks)
- iv. Discuss the limitations of operations research (4 Marks)
- v. Explain the Basic Assumptions of the Game theory (3 marks)
- vi. Discuss the industrial application of linear programming (5 marks)
- vii. Give five differences between CPM and PERT technique of project management. (5 marks)

QUESTION 2 (15 MARKS)

The following are activities of a project XYZ.

Activity	Preceding activity	Duration
A	-	2
B	A	3
C	A	5
D	A	8
E	B	6
F	C	1
G	C	2
H	C&D	3
I	E&F	7
J	G&H	4
K	I&J	5

Required: Draw a network diagram determine the critical path and project duration. [15 marks]

QUESTION 3 (15 MARKS)

Consider the linear problem:

Maximize

$$60X_1 + 70X_2$$

Subject to:

$$2X_1 + X_2 \leq 300$$

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

$$4X_1 + 7X_2 \leq 812$$

$$X_1, X_2 \geq 0$$

Required: Use simplex method to solve and interpret this problem. (15 marks)

QUESTION 4 (15 MARKS)

Consider the transportation problem below involving three sources and four destinations. The cell entries represent the cost of transportation per unit.

		1	2	3	4	Supply
Source	1	3	1	7	4	300
	2	2	6	5	9	400
	3	8	3	3	2	500
Demand		250	350	400	200	1200

Obtain the initial basic feasible solution using the following methods

- a) Northwest corner cell method (8 marks)
- b) Least cost cell method (7 marks)