



ELIZADE UNIVERSITY

ILARA-MOKIN

FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2nd SEMESTER EXAMINATION
2015 / 2016 ACADEMIC SESSION

COURSE CODE: CSC 406

COURSE TITLE: Operations Research

COURSE LEADER: Dr. Kehinde Agbele

DURATION: 2 ½ Hours

HOD's SIGNATURE

A handwritten signature in black ink, appearing to be "A. Agbele", is written over the text "HOD's SIGNATURE".

INSTRUCTION:

The paper will contain TWO SECTIONS. You should answer ALL Questions in SECTION A and any other TWO Questions from SECTION B.

The exam paper is worth 60% of the overall mark for OPERATIONS RESEARCH.

Students are warned that possession of any unauthorized materials in an examination is a serious offence

SECTION A: (All Questions are Compulsory)

1. Write a historical note in brief about operations research (OR)?
2. Write in short any two principles of modelling in operations research?
3. State the limitations of a graphical method of solving linear programming problem (LPP).
4. Write the general form of linear programming problem.
5. What do you mean by general linear programming problem?
6. Define the following (i) Slack variables, (ii) Surplus variable, (iii) Basic feasible solution, and (iv) Optimal solution.
7. Explain briefly the different phases of OR?
8. Explain the special cases that arise in the use of the simplex method in solving LPP.

SECTION B: (Answer any TWO questions)

1. (a) A production company produces two varieties of a product. Variety A has a profit per unit of #2.00 and variety B has a profit per unit of #3.00. Demand for variety A is at most four units per day. Production constraints are such that at most 10 hours can be worked per day. One unit of variety A takes one hour to produce but one unit of variety B takes two hours to produce. Ten square metres of space is available to store one day's production and one unit of variety A requires two square metres while one unit of variety B requires one square metre. Formulate the problem of deciding how much to produce per day as a linear program and solve it graphically.

(b) Solve the following linear programming problem graphically.

$$\text{Max } Z = 8000x_1 + 7000x_2$$

Subject to

$$3x_1 + x_2 \leq 6$$

$$x_1 + x_2 \leq 45$$

$$x_1 \leq 20$$

$$x_2 \geq 40$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

2. A manufacturer produces 3 models 1, 2, 3 of certain product using raw materials A & B, the following data is given below. Formulate the LPP and solve using simplex method.

Raw Material	Requirements			Availability
	1	2	2	
A	2	3	5	4000
B	4	2	7	6000
Minimum Demand	200	200	150	-
Profit per unit	30	20	50	-

3. Solve the following linear programming problem (LPP) using simplex method

(1) $\text{Max } Z = 3x_1 + 4x_2$

Subject to constraints

$$2x_1 + x_2 \leq 6$$

$$2x_1 + 3x_2 \leq 9$$

and $x_1, x_2 \geq 0$

(ii) $\text{Max } Z = 4x_1 - 4x_2 + 2x_3$

Subject to constraints

$$2x_1 + x_2 + 2x_3 \leq 6$$

$$x_1 - 4x_2 + 2x_3 \leq 0$$

$$5x_1 - 2x_2 - 2x_3 \leq 0$$

and $x_1, x_2, x_3 \geq 0$