



ELIZADE UNIVERSITY

ILARA-MOKIN

FACULTY: BASIC AND APPLIED SCIENCES
DEPARTMENT: MATHEMATICS AND COMPUTER SCIENCE
2nd SEMESTER EXAMINATION
2016 / 2017 ACADEMIC SESSION

COURSE CODE: CSC 432

COURSE TITLE: Operations Research

COURSE LEADER: Dr. O. Oriola

DURATION: 2½ Hours

HOD's SIGNATURE

INSTRUCTION:

Candidates should answer any **FOUR (4)** Questions

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

Students are permitted to use **ONLY** a scientific calculator.

Question 1

- a. Operations Research involves managerial decision making, mathematical and computer modeling and the use of information technology for informed decision-making. Explain!
- bi. State the functions of five scientific methods used in Operations Research.
- ii. List two applications of each scientific method in practice.
- c. What is an Optimization Problem? How does it apply to Cost-Benefit Ratio estimation?

Question 2

- a. The essence of the Operations Research activity lies in the construction and use of models. What are the significances of models?
- b. State the factors to consider in the choice of models in Operations Research. What types of models are suitable for use based on each factor?
- c. Explain Five Principles of Modelling in Operations Research.

Question 3

- a. What are the steps involved in formulating a Linear Programming Problem? Write the standard form of a Linear Programming Problem.
- b. Using graphical method, find the optimal values of x , y and Z for the following LP problems:
 - (i.) $\text{Min } Z = 6x + 8y$ subject to
 - $2x + 3y \leq 16$
 - $4x + 2y \leq 16$
 - $x, y \geq 0$
 - (ii.) $\text{Min } Z = 80x + 70y$ subject to
 - $2x + y \leq 32$
 - $x + y \leq 18$
 - $x + 3y \geq 36$
 - $x, y \geq 0$

Question 4

- a. Explain the following: (i.) Feasible Solution (ii.) Basic Variable (iii.) Slack Variable (iv.) Artificial variable (v.) Unbounded Solution
- b. A toy company manufactures two types of doll, a basic version-doll, A and a deluxe version-doll, B. Each doll of type B takes twice as long to produce as one of type A, and the company would have time to make a maximum of 2000 per day. The supply of plastic is sufficient to produce 1500 dolls per day (both A and B combined). The deluxe version requires a fancy dress of which there are only 600 per day available. If the company makes a profit of Rs. 3.00 and Rs. 5.00 per doll, respectively on doll A and B, then

- i. How many of each dolls will be produced per day in order to maximize the total profit?
- ii. What maximum profit is possible? (Hint: Use any method of your choice)

Question 5

- a. What are the steps involved in Simplex Method of solving Linear Programming Problem.
- b. Using Simplex method, find the optimal values of x , y , z and P given that:
- (i.) $\text{Max } P = 3x + 4y + z$ subject to
- $$x + 2y + z \leq 6$$
- $$2x + 2z \leq 4$$
- $$3x + y + z \leq 9$$
- $$x, y \geq 0$$
- (ii.) $\text{Max } P = 5x + 10y$ subject to
- $$x + y \leq 20$$
- $$2x - y \geq 10$$
- $$x, y \geq 0$$

Question 6

- a. State the steps involved in solving Transportation and Assignment Problems.
- b. Formulate a Linear Programming Model for the Assignment Problem below:

33	x_{11}	40	x_{12}	43	x_{13}	32	x_{14}
45	x_{21}	28	x_{22}	31	x_{23}	23	x_{24}
42	x_{31}	29	x_{32}	36	x_{33}	29	x_{34}
27	x_{41}	42	x_{42}	44	x_{43}	38	x_{44}

- c. Using VOGEL Approximation approach, find the initial feasible solution for the problem below if F represent the factory and W represent the warehouse:

	W_1	W_2	W_3	Supplies
F_1	48	60	56	140
F_2	45	55	53	260
F_3	50	65	60	360
F_4	52	64	55	220
Demand	200	320	250	

Note: Cell entries are the unit transportation costs.