

Total number of printed pages-7

14 (COM-2) 2036

2022

COMMERCE

Paper : COM-2036

**(Operations Research and Computer
in Business)**

Full Marks : 80

Time : Three hours

**The figures in the margin indicate
full marks for the questions.**

GROUP - A

(Operations Research)

1. Answer the following questions :

(a) Fill in the blank : 1

In a linear programming problem,
objective function is always _____.

Contd.

(b) Choose the correct alternative : 1

Dual of the dual is :

- (i) Primal
- (ii) Dual
- (iii) Alternatives
- (iv) None of the above

(c) Choose the correct alternative : 1

What happens when maximin and minimax values of the game are same ?

- (i) No solution exists
- (ii) Solution is mixed
- (iii) Saddle point exists
- (iv) None of these

(d) Say whether the following statement is True or False : 1

In a transportation problem, a single source may supply something to all destinations.

(e) Define reneging and balking in Queueing system. 1

(a) Write a brief note on significant features of Operations Research. 5

Or

What are the shortcomings of Operations Research ? 5

(b) Define linear programming problem. Write the procedure for mathematical formulation of a linear programming problem. 5

(c) Define duality in linear programming. Write the dual of the following LPP :

1+4=5

$$\text{Minimize } Z = 3x_1 - 2x_2 + 4x_3$$

subject to the constraints :

$$3x_1 + 5x_2 + 4x_3 \geq 7$$

$$6x_1 + x_2 + 3x_3 \geq 4$$

$$7x_1 - 2x_2 - x_3 \leq 10$$

$$x_1 - 2x_2 + 5x_3 \geq 3$$

$$4x_1 + 7x_2 - 2x_3 \geq 2$$

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

Or

What do you understand by a balanced and an unbalanced transportation problem ? How can an unbalanced problem be tackled ? 2+3=5

3. (a) Use the graphical method to solve the following LPP : 7

$$\text{Maximize } Z = 15x_1 + 10x_2$$

subject to the constraints

$$4x_1 + 6x_2 \leq 360$$

$$3x_1 \leq 180$$

$$5x_2 \leq 200$$

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

- (b) Solve the following LPP by simplex method : 8

$$\text{Maximize } Z = 2x_1 + 5x_2 + 7x_3$$

subject to

$$3x_1 + 2x_2 + 4x_3 \leq 100$$

$$x_1 + 4x_2 + 2x_3 \leq 100$$

$$x_1 + x_2 + 3x_3 \leq 100$$

$$x_1, x_2, x_3 \geq 0$$

- (a) Discuss the different characteristics of a game. Solve the game whose pay-off matrix is : $4+3+1=8$

	<i>B</i>	
<i>A</i>	5	2
	3	4

Also interpret the result.

- (b) Explain the different elements of a Queueing system. Also write the standard Kendall's notation for representing queueing models. $5+2=7$

Or

Arrival rate of telephone calls at a telephone booth are according to Poisson distribution, with an average time of 9 minutes between two consecutive arrivals. The length of telephone call is assumed to be exponentially distributed with mean 3 minutes.

- (i) Determine the probability that a person arriving at the booth will have to wait.
- (ii) Find the average queue length that is formed from time to time.

- (iii) Find average waiting time in the system and average waiting time in the queue. $1+2+4=7$

GROUP - B

(Computer in Business)

5. (a) What is system ? 1
(b) What is E-commerce ? 1
(c) Define encryption. 1
(d) Discuss the elements of a system. 2
6. (a) Discuss how firewall works for system security. 5

Or

Highlight the future of E-commerce. 5

- (b) Discuss about different devises of authentication. 5

Or

What is decision tree ? How is it used in system analysis ? $2+3=5$

- (a) Discuss the steps involved in system development life cycle. 7

Or

What is $\Delta F\Delta$? Write notes on different levels of $\Delta F\Delta$. 2+5=7

- (b) Write short notes on the following : 4+4=8

(i) Digital signature

(ii) Secure Socket Layer (SSL)