2017

2·8

ORCB

Paper : 2·8

Full Marks : 80

Time : Three hours

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

Write the answers to the **two Groups**
in **separate books.**

GROUP–A

(Operations Research)

N.B. : While **New Course** students will answer question no. **4. (b)**, **Old Course** students will answer question no. **4. (c)** in lieu of **4. (b)**. All other questions are **common** to the students of both the courses **New** and **Old**.

1. Answer the following questions :   5

    (a) State whether the following statement is true **or** false.

         "A linear programming problem cannot have more than one optimal solution".   1

(b) Fill in the blank :

Graphical method is used to solve linear programming problems which involve _____ decision variables.

1

(c) The solution to a transportation problem with 3 sources and 5 destinations is a basic feasible solution if the number of positive allocations is :

(i) 15

(ii) 7

(iii) 8

(iv) 14.

1

(d) Choose the correct alternatives :
In an LPP

(i) only the objective function is linear ;

(ii) only the constraints are linear ;

(iii) the objective function and the constraints are linear ;

(iv) the constraints are linear, but the objective function may or may not be linear.

1

(e) Is the following statement true ?

"The value of a game can be determined only if the game has a saddle point."

1

2. *(a)* "Accountants without having knowledge of O.R. cannot be helpful to modern management". Discuss briefly.

5

(b) Explain with the help of an example the problem of multiple solutions associated with linear programming.

5

Or

What do you mean by duality in linear programming ? Write down the dual of the following LPP :

Maximize $Z = x_1 + 2x_2 + x_3$

subject to $2x_1 + x_2 - x_3 \leq 2$
$$-2x_1 + x_2 - 5x_3 \geq -6$$
$$4x_1 + x_2 + x_3 \leq 6$$
$$x_1, x_2, x_3 \geq 0$$

2+3=5

(c) Explain two-person zero-sum game.

5

3. (a) A small-scale manufacturer has production facilities for producing two different products. Each product requires three different operations : grinding, assembling and testing. Each unit of product I requires 15, 20 and 10 minutes to grind, assemble and test respectively ; whereas each unit of product II requires 7·5, 40 and 45 minutes to grind, assemble and test respectively. The production run calls for at least 7·5 hours of grinding time, at least 20 hours of assembling time, and at least 15 hours of testing time. If each unit of product I costs Rs. 60 and each unit of product II costs Rs. 90 to manufacture, determine the number of units of each product the firm should produce in order to minimize the total manufacturing cost. Solve the problem by graphical method.

7

(b) Solve the following LPP by simplex method :

Maximize $Z = 20x_1 + 30x_2$

subject to the constraints :

$$3x_1 + 3x_2 \leq 36$$
$$5x_1 + 2x_2 \leq 50$$
$$2x_1 + 6x_2 \leq 60$$
$$x_1, x_2 \geq 0$$

8

4. (a) Explain the transportation problem giving its mathematical formulation.

8

Or

Narrate the two-steps involved in the solution of a transportation problem. Also point out the basic differences between a transportation problem and an assignment problem.

5+3=8

(b) *[For New Course]*

What is a queuing model? Mention a few applications of queuing models in business.

A ticket window of a cinema hall is manned by a single individual. Customers arrive to purchase tickets in a Poisson fashion with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 30 seconds. Find

(i) expected queue length;

(ii) expected waiting time per customer in the queue.

$$1+2+2+2=7$$

(c) *[For Old Course]*

Discuss the Internal Rate of Return method of investment analysis.

7

GROUP-B

(Computer in Business)

(For both New Course and Old Course)

5. Answer the following questions :

    (a) Mention the basic elements of an information system.   1

    (b) Define System Development Life Cycle.   2

    (c) Point out *one* advantage of using data dictionary.   1

    (d) What is Encryption ?   1

6. (a) What is DFD ? What basic rules are adopted in constructing DFD ?   5

Or

    Write a note on the future of e-commerce.

    (b) Write a brief note on 'output design' and the related devices.   5

7. (a) Describe the different stages of the classical Waterfall Model representing System Development Life Cycle. 8

Or

Describe the concept and procedure used in constructing dataflow diagrams. Illustrate with an example.

(b) What do you mean by a Business model with reference to e-commerce ? Narrate briefly the basic revenue models of e-commerce. 3+4=7

Or

What do you mean by System Design ? Explain the concept of physical design. 2+5=7