Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (APM)/SEM-6/APM-605/2010

2010
OPERATIONS RESEARCH

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Graph sheet(s) will be supplied by the Institution.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 5 × 2 = 10

   i) Linear programming is

      a) a constrained optimization model

      b) a constrained decision making model

      c) a mathematical programming model

      d) all of these

      e) none of these.

   ii) Every corner of the feasible region is defined by

      a) the intersections of 2 constraint lines

      b) some subset of constraint lines and non-negativity conditions

      c) all of these

      d) none of these.

iii) The signal for optimality in a max. model is

a) $C_j - Z_j \leq 0 \forall j$

b) $Z_j \leq 0 \forall_j$

c) $C_j - Z_j \geq 0 \forall j$.

iv) The non-negativity requirement is included in an LP because

a) it makes the model easier to solve

b) it makes the model correspond more closely to the real world problem

c) both (a) and (b)

d) neither of these.

v) The simplex method has the property that

a) at each iteration it gives a solution which is at least as good as the earlier solution

b) at each stage it produces feasible solution

c) it signals that optimal solution has been found

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is Economic order quantity for inventory management ? Discuss its importance in inventory management of Apparel industry.

3. What is saddle point ? Explain in with example. How is saddle point determined by different approaches of Game theory ?

4. Explain the terms "slack variables", "basic solutions" and "basic feasible solutions".

5. Solve the following linear programming problem graphically :

Maximize $Z = 4x_1 + 6x_2$

subject to the constraints $x_1 + x_2 = 5$

$x_1 \geq 2,\ x_2 \leq 4$

$x_1,\ x_2 \geq 0.$

6. What do you meant by CPM & PERT methods of Production planning and scheduling ? Explain it with example.

7. Mention the activity dependency conditions against the following CPM diagram as shown below :

Fig.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. A diet for a sick person must contain at least 4,000 units of vitamins, 50 units of minerals and 1,400 unit of calories. Two foods *A* & *B* are available at a cost of Rs. 4 and Rs. 3 per unit respectively. If one unit of *A* contains 200 units of vitamins, 1 unit of mineral & 40 units of calories and 1 unit of food *B* contains 100 units of vitamins, 2 units of minerals and 40 units of claries, find by simplex method, what combination of food be used to have least cost ?

9. Following is the pay-off matrix for players A and B :

Player B

Player A	I	II	III	IV	V
I	2	4	3	8	4
II	5	6	3	7	8
III	6	7	9	8	7
IV	4	2	8	4	3

Using dominance property, obtain the optimal strategies for both the players and determine the value of the game.

10. Solve the following game graphically & find the value of the game.

Player B

$$\begin{array}{c} \\ A_1 \\ A_3 \end{array} \begin{array}{c} \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\ \begin{bmatrix} 8 & 4 & -2 \\ -2 & -1 & 3 \end{bmatrix} \end{array}$$

11. Discuss briefly the applications of linear programming in any functional area of management. Give an explanation of non-feasible solution and the degeneracy.

12. According to the Work Break Down & Production Scheduling, the following table has been formed :

Activity	Must precede	Estimated Time required (in days)
A	None	2
B	A	3
C	A	3
D	C	4
E	C	5
F	E	2
G	E	2

a) Prepare a suitable CPM diagram.

b) Prepare a suitable PERT diagram.

c) Identify the critical path & time required for project completion.

13. Write short notes on any *three* of the following : 3×5

a) Optimization of production cost by linear programming approach.

b) ABC analysis and VED analysis of inventory items.

c) Mixed strategy approach of Game theory.

d) Production planning and control by machine scheduling as per product mix.

e) Quantitative approaches for decision making for cost reduction in production process.

f) Methods of review project performance analysis.

g) Techniques/measures of reduction of idle machine hours and man-hours.