Question Bank For PG Course

Mathematics
Paper-9A(ii)
Special Paper: Applied Mathematics
OPERATIONS RESEARCH: PGMT-IXA

Question 1

State a sufficient condition for a stationery point x0 to be an extremum of f (x).

Question 2

State the conditions for sufficiency of the Kuhn-Tucker conditions.

Question 3

Solve the following LPP by Dual simplex method:

$x_1 + 2x_2 \geq 2$, $x_1 + 2x_2 \leq -1$, $x_1, x_2 \geq 0$

Question 4

In post optimality analysis, how does the optimal solution change due to discrete change in the requirement vector?

Question 5

State the advantages of Revised simplex method over regular simplex method.

Question 6

What are the assumptions for the optimal solution of a quadratic programming problem to be global in nature?

Question 7

Which method is used to solve both pure and mixed Integer Programming Problem?

Question 8

Solve the following Integer Programming Problem by Gomory's cutting plane method:

Maximize $z = x_1 + 2x_2$

Subject to the constraints

$x_1 + x_2 \leq 7$, $2x_1 \leq 11$, $2x_2 \leq 7$, x_1 , $x_2 \geq 0$ &

are integers.

Question 9

What property is used by Steepest Descent method for minimizing a function of n variables?

Question 10

Minimize $f(x_1, x_2, x_3) = x_1^2 + 2x_2^2 + x_3^2$

Subject to $2x_1 + 4x_2 + 3x_3 = 9$

$4x_1 + 8x_2 + 5x_3 = 17$

Using method of constrained variation.

Question 11

What is the necessary condition for a function $f(x_1, x_2, \ldots x_n)$ subject to the constraints $g_j(x_1, x_2, \ldots x_n) = 0$, $j = 1, 2, 3, \ldots m$ to have a relative minimum at a point $(x_1^*, x_2^*, \ldots x_n^*)$?

Question 12

What are the differences of the procedure of revised simplex method from simplex method?

Question 13

What is the nature of the initial solution in dual simplex method?

Question 14

By dual simplex method solve the following LPP:

Minimize $z = 2x_1 + x_2$

Subject to the constraints

$3x_1 + x_2 \geq 3$, $4x_1 + x_2 \geq 6$, $x_1 + 2x_2 \geq 3$, $x_1, x_2 \geq 0$.

Question 15

What is the effect of addition of a single variable x_{n+1} to a L.P.P. solved by simplex method?

Question 16

Determine the nature of the point $(0, -4/3)$ with respect to the function $f(x, y) = x^3 + y^3 + 4x^2 + 2y^2 + 12$.

Question 17

Solve the following LPP by dual Simplex Method

Minimize $Z = 2x_1 + x_2$

Subject to $3x_1 + x_2 \geq 3$

$4x_1 + x_2 \geq 6$

$x_1 + 2x_2 \geq 3$

$x_1, x_2 \geq 0.$

Question 18

What is solution of the following integer Programming Problem by using Branch and Bound Algorithm?

Maximize $Z = 4x + 3y$

Subject to $3x + 4y \leq 12$

$4x + 2y \leq 9$

$x, y \geq 0$, and x, y are integers.

Question 19

In post optimality analysis, how does the optimal solution change due to discrete change in the cost vector?

Question 20

Maximize $f(x) = \begin{cases} \frac{2x}{3}, & x \leq 3 \\ 5 - x, x > 3 \end{cases}$ in the interval [1,4]by Golden section method up to six experiments. What is the interval of uncertainty?

Question 21

Using Newton's method

Minimize$f(x, y) = x - y + 2x^2 + 2xy + 2y^2$ with $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$ as starting point.

Question 22

What is the solution of the following LPP, using the method of revised simplex method?

Maximize $Z = 6x_1 - 2x_2 + 3x_3$

Subject to $2x_1 - x_2 + 2x_3 \leq 2$

$x_1 + 4x_3 \leq 4$

$x_1, x_2, x_3 \geq 0.$

Question 23

Using Beale's method solve the following QPP

Maximize $Z = 5 + 4x + 6y - 2x^2 - 2xy - 2y^2$

Subject to $x + 2y \leq 2, x, y \geq 0.$

Question 24

Determine the ranges for discrete changes of the third component of b, so as to maintain the optimality of the current optimum solution for the following LPP

Maximize$Z = -x_1 + 2x_2 - x_3$

Subject to $3x_1 + x_2 - x_3 \leq 0$

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

$x_2 + x_3 \leq 4, x_1, x_2, x_3 \geq 0$

Question 25

Derive the interval of uncertainty at the end of k −th experiment of Golden section method.

Question 26

Solve the following problem by using Kuhn-Tucker conditions

Maximize $Z = 5 + 8x_1 + 12x_2 - 4{x_1}^2 - 4{x_2}^2 - 4{x_3}^2$

Subject to $x_1 + x_2 \leq 1$

$2x_1 + 3x_2 \leq 6$

Question 27

Using steepest descent method find the minimum point of the following problem

Minimize$f = x^2 + y^2 + 2gx + 2fy + c$ starting from the point $\begin{pmatrix} \alpha \\ \beta \end{pmatrix}$.

Question 28

Minimize $f(x) = |x - 1|$ in the interval $[-1, 5]$ by Fibonacci method using $n = 5$ and find the final interval of uncertainty.

Question 29

Using Davidon Fletcher-Powell method find the minimum point after second iteration of the following problem:

Minimize $f(x_1, x_2) = 2{x_1}^2 + 4{x_2}^2 - 12x_1 + 16x_2 + 41$ with $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ as starting point.

Question 30

What is the solution of the following Integer Programming Problem using Gomoroy's cutting plane method?

Maximize $z = 2x_1 + 2x_2$

Subject to $5x_1 + 3x_2 \leq 8$

$x_1 + 2x_2 \leq 4$, $x_1, x_2 \geq 0$

x_1, x_2 are integer.