RE-3614

M. A. / M. Sc. (Part - II) Examination

April / May – 2010

Mathematics : Paper - 5004

(Optimization Technique)

Time : 3 Hours] [Total Marks : 42

Instrucitons :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :
☛ **M. A. / M. Sc. - 2**

Name of the Subject :
☛ **5004 - MATHEMATICS**

☛ Subject Code No. : **3 6 1 4** ☛ Section No. (1, 2,.....) : **NIL**

Seat No. :

Student's Signature

(2) Each question carry equal marks.
(3) Attempt all questions.
(4) All questions are compulsory.

Q-1 (a) Define the following terms in LP

(a) Optimal Solution
(b) Surplus Variable
(c) Optimum Basic feasible solution
(d) Non-degenerate basic feasible solution

(b) Solve the following example by simplex method

Maximize $Z = 4x_1 + 10x_2$

Subject to

$2x_1 + 2x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$x_1, x_2, x_3 \geq 0$

OR

Q-1 (a) Solve the following LPP

Maximize $Z = x_1 + 2x_2$

Subject to

$x_1 + x_2 \leq 3$

$x_1 + 2x_2 \geq 5$

$3x_1 + x_2 \geq 6$

$x_1, x_2, \geq 0$

(b) Explain Algorithm of Simplex method.

Q-2 (a) Formulate the following problem in LPP form

(1) The Company has three operational departments (Weaving, processing, and packing) with capacity to produce three different types of cloths namely suiting, Shirting's and woolens yielding the profits Rs.2, Rs.4 and Rs.3 per meter respectively. One meter suiting requires 3 minutes in weaving, 2 minutes in processing and 1 minutes in packing. Similarly one meter of shirting requires 4 minutes in weaving, 1 minutes in processing and 3 minutes in packing. 1 minute in processing and 3 minutes in packing while one meter woolen requires 3 minutes in each departments. In a week, total run time of each department is 60,40 and 80 hours for weaving, processing and packing departments respectively.

(2) A firm manufactures 3 products A, B and C The profits are Rs. 3, Rs 2 and Rs. 4 respectively. The firm has 2 machine and below is given the required processing time in minutes for each machine on each product.

Machine	Product		
	A	B	C
E	7	8	8
F	8	6	4

Machine C and D have 2000 and 2500 machine-minutes respectively. The firm must manufacture 100 A's, 200 B's and 50 C's but not more than 150 A's. Set-up LP problem to maximize profit.

(b) Solve the following Example

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

Subject to

$x_1 + x_2 + 2x_3 \leq 5$

$2x_1 + 3x_2 + 4x_3 \leq 12$

$x_1, x_2, x_3 \geq 0$

OR

(a) Define the term Recursive relationship in dynamic programming? Divide a positive quantity c in to n parts so as to maximize their product.

(b) Given the linear programming problem

Maximize $Z = 3x_1 + 5x_2$

Subject to

$x_1 + x_2 \leq 1$

$2x_1 + 3x_2 \leq 1$

Where $x_1, x_2, \geq 0$

Obtain the variation in c_1, c_2 which are permitted without changing the optimal solution

Q-3 Describe Gomory's All-Integer Cutting Plane Method and Find the integer solution of following LPP by Gomory's All-integer cutting Plane Method

Maximize $Z = x_1 + 4x_2$

Subject to

$2x_1 + 4x_2 \leq 7$

$5x_1 + 3x_2 \leq 15$

$x_1, x_2, \geq 0$

OR

Q-3 Solve the following All – Integer programming problem, using Branch and Bound Method :

Maximize $Z = 6x_1 + 8x_2$

Subject to

$4x_1 + 16x_2 \leq 32$

$14x_1 + 4x_2 \leq 28$

$x_1, x_2, \geq 0$

Q-4 (a) Define the term "Sensitivity analysis". Discuss the effect of

(1) Discrete change in aij of the matrix A.

(2) Discrete change in the requirement vector B.

(b) Discussed the effect on the optimum solution of the discrete change in the requirement vector for the following LPP

Maximize $Z = 2x_1 + x_2$

Subject to

$3x_1 + 5x_2 \geq 15$

$6x_1 + 2x_2 \leq 24$

$x_1, x_2, \geq 0$

OR

Q-4 (a) find the optimum value of the objective function with the constraints

Maximum $z = 2x - 3y^2 - 2y^2$

Subject to: $x + 4y <= 4$

$x + y <= 2$

$x, y >= 0$ using Beale's Method

(b) Define quadratic programming problem. Derive the Kuhn-Tucker necessary condition for an optimal solution to a quadratic programming problem.

Q-5 (a) Describe the step to solve the nonlinear problem using wolfe's method

(b) Maximum $f(x) = x\,(1.5 - x)$ in the interval (0.0, 1.00) to within 10% of the exact value using direct root method.

OR

Q-5 (a) Describes the steps of solving one Dimensional Nonlinear Problem using direct method.

(b) Solve $f(x) = x^3 - 5x^2 - 20x + 5$, Using quadratic interpolation method.