M. Sc. (Mathematics) (Sem. III) Examination
March / April - 2016
Paper - 6005 : Linear Programming

Time : Hours] [Total Marks : ]
Instructions :

(1) Fill up strictly the details of signs on your answer book.

Name of the Examination:
M. SC. (MATHEMATICS) (SEM. III)
Name of the Subject:
PAPER - 6005 : LINEAR PROGRAMMING

(2) Attempt all questions.
(3) Figures to the right indicate full marks.
(4) Follow usual notations and conventions.

1 Attempt any TWO. [08]
1. Distinguish between pure and mixed integer programming problem.
2. State the dynamic programming approach for solving an LPP.
3. State the Canonical and Standard forms of LPP.

2 Attempt any TWO. [08]
1. Define: (a) Feasible solution, (b) Optimum solution and (c) Basic feasible solution.
2. How do you recognize optimality in the simplex method?
3. Let $x_0$ be a feasible solution to the primal problem and $w_0$ be the feasible solution to its dual then if $cx_0 = b^Tw_0$ then both $x_0$ and $w_0$ are optimum solutions to the primal and dual respectively.

3 Attempt any TWO. [08]
1. Use penalty method to
Minimize $Z = 2x + y$
Subject to constraints:
$3x + y = 3, 4x + 3y \geq 6, x + 2y \leq 3$ and $x, y \geq 0$. 

DF-1487] 1 [Contd...
2. Use revised simplex method to solve
   Maximize $Z = 3x + 5y$
   Subject to constraints:
   $x \leq 4$, $y \leq 6$, $3x + 2y \leq 18$ and $x, y \geq 0$.

3. Solve the following LPP.
   Maximum $Z = x - 2y$
   Subject to constraints:
   $4x + 2y \leq 15$ where $x, y$ are non-negative integers.

4 Attempt any TWO.  [08]
   1. Use Dynamic programming to solve
      Min $Z = \sum_{i=1}^{3} y_i^2$ where $\sum_{i=1}^{3} y_i \geq 15$ for each $y_i \geq 0$.
   2. Divide quantity '5' into three parts so as to maximize their product.
   3. Use the dynamic programming to solve following LPP.
      Maximize $Z = 2x + 5y$
      Subject to constraints:
      $2x + y \leq 43$, $2y \leq 46$ and $x, y \geq 0$.

5 Attempt any TWO.  [10]
   1. Consider the LPP
      Maximize $Z = 4x_1 + 10x_2$
      Subject to constraints:
      $2x_1 + x_2 \leq 50$, $2x_1 + 5x_2 \leq 100$, $2x_1 + 3x_2 \leq 90$,
      where $x_1, x_2 \geq 0$.
      Determine the ranges for discrete change in $a_{12}$, $a_{21}$ and $a_{31}$.
   2. Given the LPP
      Maximize $Z = 15x + 45y$
      Subject to constraints:
      $x + 16y \leq 240$, $5x + 2y \leq 162$, $y \leq 50$, where $x, y \geq 0$.
      Determine the ranges for $c_1$ and $b_2$.
   3. With the help of two-phase method, solve the following LPP.
      Minimize $Z = x + y$
      Subject to constraints:
      $2x + y \geq 4$, $x + 7y \geq 7$ and $x, y \geq 0$. 