Seat No. : _____

TA-118

April-2013

M.Sc. Sem. II

409 : Statistics

(Mathematical Programming)

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) Attempt all questions.

(2) All questions carry equal marks.

1. (a) Describe the revised simplex method for solving a linear programming problem. What are the advantages of this method ?

OR

Show that if either the primal or the dual problem has a finite optimal solution, then the other one also possess the same, and the optimal values of the objective functions of the two problems are equal, Max. Z_x = Min. Z_y.

(b) Describe the dual simplex method for solving a linear programming problem. What are the advantages of dual simplex method over simplex method ?

OR

Discuss the role of sensitivity analysis in linear programming. Under what circumstances is it needed, and under what conditions do you think it is not necessary ?

2. (a) Discuss sensitivity analysis with respect to addition of new variable.

OR

In a LP problem, Max. $Z = cx$, subject to $Ax = b$; $x \geq 0$, obtain the variation in coefficients c_j which are permitted without changing the optimal solution.

(b) Explain the method of solving a zero-sum two person game as a linear programming problem.

OR

Discuss parametric linear programming with respect to variation in the availability of resources.

3. (a) What is integer linear programming ? Explain Gomory's all integer cutting plane method.

OR

Discuss zero-one integer programming with examples.

(b) Explain mathematical formulation of linear fractional programming problem. Also discuss importance of fractional programming in practical situations.

OR

Explain branch and bound method in integer programming.

4. (a) Explain the differences/similarities between linear programming and goal programming.

OR

State the general goal programming model. Give a procedure to formulate a GP model.

(b) State some problem areas in management where goal programming might be applicable.

OR

Explain modified simplex method of goal programming.

5. Answer the following :

(i) If i^{th} constraint in the primal is an equality, then the i^{th} dual variable is unrestricted in sign.

(a) True (b) False

(ii) If either the primal or the dual LP problem has an unbounded objective function value, then the other problem has no feasible solution.

(a) True (b) False

(iii) The dual of the primal maximization LP problem having m constraints and n non-negative variables should

(a) have n constraints and m non-negative variables

(b) be a minimization LP problem

(c) both (a) and (b)

(d) none of the above

(iv) Revised simplex method requires more computations than the ordinary simplex method.

(a) True (b) False

(v) A change in the objective function for a non-basic variable can affect

(a) $c_j - z_j$ values of all non-basic variables

(b) $c_j - z_j$ values of all basic variables

(c) only the $c_j - z_j$ value of that variable

(d) none of the above

(vi) When an additional variable is added in the LP model, the existing optimal solution can further be improved if

(a) $c_j - z_j \geq 0$ (b) $c_j - z_j \leq 0$

(c) both (a) and (b) (d) none of the above

(vii) A mixed strategy game is based on the assumption that players act irrationally.

(a) True (b) False

(viii) Game theory models are classified by the

(a) number of players (b) sum of all payoffs

(c) number of strategies (d) all of the above

(ix) The part of the feasible solution space eliminated by plotting a cut contains

(a) only non-integer solutions

(b) only integer solutions

(c) both (a) and (b)

(d) none of the above

(x) The situation of multiple solutions arises with

(a) cutting plane method

(b) branch and bound method

(c) both (a) and (b)

(d) none of the above

(xi) Dynamic programming approach optimizes a sequence of interrelated decision over a period of time.

(a) True (b) False

(xii) In GP problem, a constraint having unachieved variable is expressed as :

(a) an equality constraint

(b) a less than or equal to type constraint

(c) a greater than or equal to type constraint

(d) all of the above

(xiii) The deviational variable in the basis of the initial simplex table of GP problem is

(a) positive deviational variable

(b) negative deviational variable

(c) both (a) and (b)

(d) artificial variable

(xiv) The GP approach attempts to achieve each objective

(a) sequentially (b) simultaneously

(c) both (a) and (b) (d) none of the above

_____