Seat No. : _____

ZQ-114

May-2014

M.Sc., Sem.-II

409 : Statistics

(Mathematical Programming)

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

Note : (i) Attempt **all** questions.

(ii) **All** questions carry equal marks.

1. (a) Compare the revised simplex method with simplex method and bring out the salient points of differences.

OR

(a) State and prove complementary slackness theorem.

(b) 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.

OR

(b) Discuss sensitivity analysis with respect to addition of new constraint.

2. (a) Discuss sensitivity analysis with respect to change in (b_i).

OR

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

(b) Discuss sensitivity analysis with respect to deletion of existing variable.

OR

(b) Discuss parametric linear programming with respect to variation in the objective function coefficients.

3. (a) Explain Gomory's mixed-integer cutting plane method.

OR

(a) State the principle of optimality in dynamic programming. Describe the basic features which characterize a dynamic programming problem.

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

OR

(b) Discuss zero-one integer programming with examples.

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

OR

(a) Explain the terms :

(i) Deviational variables

(ii) Preemptive priority factors

(iii) Differential weights.

(b) Explain modified simplex method of goal programming.

OR

(b) Explain alternative simplex method for goal programming.

5. Answer the following :

(i) Revised simplex method automatically generates the inverse of the current basis matrix and the new basic feasible solution as well.

(a) True (b) False

(ii) If a primal LP problem has a finite solution then the dual LP problem should have

(a) finite solution (b) infeasible solution

(c) unbounded solution (d) none of the above.

(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) The right-hand side range is often referred to as the range of

(a) improvement (b) feasibility

(c) infeasibility (d) optimality

(v) 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.

(vi) Addition of an additional constraint in the existing constraints will cause a

(a) change in objective function coefficients c_j

(b) change in coefficients a_{ij}

(c) both (a) and (b)

(d) none of the above

(vii) Game theory is the study of

(a) selecting optimal strategies (b) resolving conflict between players

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

(viii) 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

(ix) A non-integer variable is chosen in the optimal simplex table of the integer LP problem to

(a) leave the basis (b) enter the basis

(c) to construct a Gomory cut (d) none of the above

(x) While applying the cutting-plane method, dual simplex is used to maintain

(a) optimality (b) feasibility

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

(xi) Dynamic programming approach

(a) optimizes a sequence of interrelated decision over a period of time

(b) provides optimal solution to single period decision-problem

(c) provides optimal solution to long-term corporate planning problems

(d) all of the above

(xii) For applying a GP approach, the decision-maker must

(a) set targets for each of the goals

(b) assign pre-emptive priority to each goal

(c) assume that linearity exists in the use of resources to achieve goals

(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) In simplex method of goal programming, the variable to enter the solution mix is selected with

(a) lowest priority row and most negative $c_j - z_j$ value in it

(b) lowest priority row and most positive $c_j - z_j$ value in it

(c) highest priority row and most negative $c_j - z_j$ value in it

(d) highest priority row and most positive $c_j - z_j$ value in it.

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