Seat No. : _____

AT-130

May-2016

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) Develop the computational algorithm for solving a linear programming problem by revised simplex method.

OR

Describe the dual simplex method for solving a linear programming problem. What is the essential difference between regular simplex method and dual simplex method ?

(b) State and prove complementary slackness theorem.

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 change in the component 'b_i' of vector b.

OR

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

(b) Explain the following terms :

(i) Two-person zero-sum game

(ii) Principles of dominance

(iii) Pure and mixed strategies

OR

Discuss sensitivity analysis with respect to addition of new constraint.

3. (a) What is dynamic programming and what sort of problems can be solved by it ? State Bellman's principle of optimality.

OR

What is fractional programming ? Explain with example, how will you solve the linear fractional programming problem.

(b) What is mixed integer linear programming ? Explain Gomory's mixed integer cutting plane method.

OR

Explain branch and bound method for solving an integer programming problem. What is the main disadvantage of this method ?

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

OR

Explain modified simplex method of goal programming.

(b) Explain the terms :

(i) Deviational variables

(ii) Preemptive priority factors

(iii) Differential weights

OR

What is Goal Programming (GP) ? Why are all GP problems minimization problems ? Why does altering the goal priorities result in a different solution to a problem ? Explain.

5. Answer the following :

(1) The right-hand side constant of a constraint in a primal problem appears in the corresponding dual as

(a) a coefficient in the objective function

(b) a right-hand side constant of a constraint

(c) an input-out coefficient

(d) none of the above

(2) If dual has an unbounded solution, primal has

(a) no feasible solution (b) unbounded solution

(c) feasible solution (d) none of the above

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

(a) improvement (b) feasibility

(c) infeasibility (d) optimality

(4) Define a strictly determinable game.

(5) In a two person zero-sum game, a saddle point always exists.

(a) True (b) False

(6) In a mixed strategy game

(a) no saddle point exist

(b) each player selects the same strategy without considering other player's choice.

(c) each player always selects same strategy

(d) all of the above

(7) 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) construct a Gomory cut (d) none of the above

(8) Branch and bound method breaks the feasible solution region into smaller regions until an optimal solution is obtained.

(a) True (b) False

(9) What do you understand by a cut ?

(10) The corners of the reduced feasible region of an integer LP problem contains

(a) only integer solution

(b) optimal integer solution

(c) only non-integer solution

(d) none of the above

(11) In GP problem, a goal constraint having over achievement variable is expressed as a

(a) $\geq$ constraint (b) $\leq$ constraint

(c) = constraint (d) all of the above

(12) If the largest value of each goal in the 'solution-value X_B' column is zero, then it indicates

(a) multiple solution (b) infeasible solution

(c) optimal solution (d) none of the above

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

(a) positive deviational variable

(b) negative deviational variable

(c) both (a) and (b)

(d) artificial variable

(14) The GP approach attempts to achieve each objective

(a) sequentially (b) simultaneously

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

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