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Paper Code : OM 403 OPERATIONS RESEARCH APPLICATIONS

UPID : 004684

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) What indicates a zero element in the transition matrix?

(II) Give an example of a dynamic queue discipline.

(III) How many number of iteration usually required solving a LP problem with n number of constraints?

(IV) The optimal value of the objective function is same for the primal and ______ problem.

(V) Write the names of two methods for solving integer programming problems.

(VI) What are some examples of non-linear programming models?

(VII) What types of problems can be solved using dynamic programming?

(VIII) In the optimal simplex table, if there exists alternative solution then what will be the value of c_j - z_j?

(IX) What is a feasible solution in integer linear programming?

(X) What are the key components of operation research?

(XI) When a calling population is considered to be infinite?

(XII) What represents a stage in a dynamic programming problem?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. How does a quadratic programming problem differ from a linear programming problem? [5]
3. Discuss applications of linear programming. [5]
4. What do you understand by queue discipline? [5]
5. Explain and graphically illustrate in-feasibility and un-boundedness. [5]
6. In which conditions the Markov chain reaches the steady-state equilibrium? [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) Why we need non-linear programming models? [5]

(b) Solve graphically the following non-linear programming problem: [10]

Max $Z = 2x_1 + 3x_2$

Subject to the constraints

(i) $x_1^2+x_2^2 \leq 20$,

(ii) $x_1.x_2 \leq 8$,

and $x_1, x_2 \geq 0$.

8. (a) What are the advantages and disadvantages of the simplex method? [7]

(b) Use Simplex Method to solve the following L.P.P. : [8]

Max $Z = 4x_1 + 10x_2$

Subject to solve the constraints:

$2x_1 + x_2 \leq 50$,

$2x_1 + 5x_2 \leq 100$,

$2x_1 + 3x_2 \leq 90$,

$x_1 \geq 0$ and $x_2 \geq 0$.

9. (a) What is the meaning and the role of the lower bound and upper bound in the Branch and Bound method? [9]

(b) Discuss any one method to solve integer programming problem. [6]

10. In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows exponential distribution and service time distribution is also exponential with an average 36 minutes. Calculate the following: [15]
(i) The mean queue size (line length), and
(ii) The probability that the queue size exceeds 10.
(iii) If the input of trains increases to an average 33 per day, what will be the change in (i) and (ii).

11. Solve the following LP problem by dynamic programming approach: [15]
Max $Z = 8x_1 + 7x_2$
Subject to the constraints
(i) $2x_1 + x_2 \le 8$,
(ii) $5x_1 + 2x_2 \le 15$,
and $x_1, x_2 \ge 0$.

*** END OF PAPER ***