M.Sc DEGREE EXAMINATION,APRIL 2019
II Year IV Semester
Operations Research

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Write the dual to the following LP Problem

   Maximize $Z = x_1 - x_2 + 3x_3$

   Subject to constraints: $x_1+x_2+x_3 \leq 10$; $2x_1-x_2-x_3 \leq 2$; $2x_1-2x_2-3x_3 \leq 6$ and x_1, x_2, $x_3 \geq 0$
2. State any two comparison of Simplex method and Revised Simplex method.
3. Explain any two terminology of Dynamic Programming problem.
4. Write a note on Dynamic Programming under certainty.
5. When should an order be placed to replenish inventory?
6. What are the factors involved in Inventory Problem analysis?
7. What do you mean by Pre-emptive priority?
8. What are the characteristics of a Input source of an Queuing System?
9. Write the necessary conditions of Local minimum and maximum of Classical Optimization?
10. Write the KUHN – TUCKER necessary condition.
11. Write the general form of NLP.
12. Define ordering cost and holding cost.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Obtain the dual problem of the following primal LP Problem:

    Minimize Z $= x_1 + 2x_2$

    Subject to constraints: $2x_1 + 4x_2 \leq 160$

    $x_1 - x_2 = 30$; $x_1 \geq 10$ and $x_1, x_2 \geq 0$.
14. Use dynamic programming to solve the following problem:

    Minimize $Z = {y_1}^2 + {y_2}^2 + {y_3}^2$

    Subject to constraints: $y_1 + y_2 + y_3 = 10$ and $y_1, y_2, y_3 \geq 0$.

15. A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that when he starts production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for a year is Rs.2 and the set-up cost of production run is Rs.180.How frequently should production run be made ?
16. The demand for an item in a company is 18,000 units per year , and the company can produce the item at a rate of 3,000 per month. The cost of one set-up is Rs.500 and the holding cost of one unit perm month is 15 paise. The shortage cost of one unit is Rs.240 per year. Determine the optimum manufacturing quantity and the number of shortages. Also determine the manufacturing time and the time between set-ups.
17. Obtain necessary conditions for the optimum solution of the following problem

    Minimize $f(x_1, x_2) = 3e^{2x_1+1} + 2e^{5+x_2}$.

    Subject to the constraints

    $g(x_1, x_2) = x_1 + x_2 - 7 = 0$, $x_1, x_2 \geq 0$.
18. Write about the essential features of a QUEUING System.
19. Use the dual simplex method to solve the LP Problem:

    Maximize $Z = -2x_1 - x_3$

    Subject to constraints: $x_1 + x_2 - x_3 \geq 5$

    $x_1 - 2x_2 + 4x_3 \geq 8$ and $x_1, x_2, x_3 \geq 0$.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Use the revised simplex method to solve the following LP Problem

    Maximize $Z = x_1 + x_2 + 3x_3$

    Subject to constraints: $3x_1 + 2x_2 + x_3 \leq 3$

    $2x_1 + x_2 + 2x_3 \leq 2$ and $x_1, x_2, x_3 \geq 0$
21. Use Dynamic Programming to Solve the following linear programming problem.

    Maximize $Z = 3x_1 + 5x_2$

    Subject to constraints: $x_1 \leq 4$; $x_2 \leq 6$, $3x_1 + 2x_2 \leq 18$and $x_1, x_2 \geq 0$.
22. Write a note on "EOQ Model with Constant Rate of Demand and Variable Order Cycle Time".
23. Explain the pure birth process, exponential process and pure death process.
24. Determine x_1 and x_2 so as to

    Maximize $Z = 12x_1 + 21x_2 + 2x_1x_2 - 2x_1^2 - 2x_2^2$

    Subject to the constraints $x_2 \leq 8$, $x_1 + x_2 \leq 10$ and $x_1, x_2 \geq 0$.

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