SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
M.Sc. Appl.Maths - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - IV
20PAMET4005 - Operations Research

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Formulate the dual problem of the following primal problem with appropriate explanation.
   Minimize $z = x_I - 3x_2 - 2x_3$
   subject to the constraints:
   $3x_1 - x_2 + 2x_3 \leq 7$,
   $2x - 4x_2 \geq 12$, $-4x_1 + 3x_2 + 8x_3 = 10$,
   $x_1, x_2 \geq 0$, x_3 unrestricted.
2. Discuss the basic features of the Dynamic programming problem.
3. Classify the various costs associated with inventory control.
4. Write the algorithm of Revised simplex method.
5. A Commodity is to be supplied at a constant rate of 200 units per day.supplies of any amount can be obtained at any required time, but each ordering costs Rs 50; cost of holding the commodity in inventory is Rs 2 per unit per day while the delay in the supply of the item induces a penalty of Rs 10 per unit per day. Find the optimal policy (Q,t). where t is the reorder cycle period and Q is the inventary after reorder. What would be the best policy, if the penalty cost becomes infinite?
6. Explain duality in linear programming.
7. A manufacturing company purchases 9,000 parts of a machine for its annual requirements, ordering one month usage at a time. Each part costs Rs.20. The ordering cost per order is Rs.15 and the carrying charges are 15% of the average x inventory per year. You have been assigned to suggest a more economical purchasing policy for the company. What advice would you offer and how much would it save the company per year?
8. State the Optimal sub-division problem and solve it for the case $n = 2$.

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Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Use revised simplex method to solve the following LPP:
   Maximise $z = 3x_1 + 5x_2$ subject to the constraints:
   $x_1 \leq 4, x_2 \leq 6,\ 3x_1 + 2x_2 \leq 18,\ x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$
10. Use dynamic programming to show that
    $z = p_j log p_1\ + p_2 log p_2 + \cdots p_n log p_n$
    subject to the constraints $p_1 + p_2 + \cdots + p_n = l$ and $p_j \geq 0$ is a minimum when
    $p_1 = p_2 = \cdots = p_n = \frac{1}{n}$
11. The demand for a certain item is 16 units per period. Unsatisfied demand causes a shortage cost of Rs.0.75 per unit per short period. The cost of initiating purchasing action is Rs.15 per purchase and the holding cost is 15% of average inventory valuation per period. Item cost is Rs.8 per unit. (Assuming that shortages are being back ordered at the above mentioned cost). Find the minimum cost purchase quantity.
12. Use the dual simplex method to solve the LP problem
    Maximize z $= -3x_1 - 2x_2$
    subject to the constraints
    $x_1 + x_2 \geq 1$
    $x_1 + x_2 \leq 7$
    $x_1 + 2x_2 \geq 10$
    $x_2 \leq 3$
    and $x_1, x_2 \geq 0$.

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. Explain about the Economic production quantity model when supply is Gradual.

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