Indian Statistical Institute

M.S. (QMS) First Year

Mid term examination (Supplementary)
Operations Research – 1

Time: 90 minutes   Maxim Marks: 30 marks

1. Top Toys is planning a new radio and TV advertising campaign. A radio commercial costs $300 and a TV ad cosls $2000.A total budget of $20,000 is allocated to the campaign. However, to ensure that each medium will have at least one radio commercial and one TV ad, the most that can be allocated to either medium cannot exceed 80% of the total budget. It is estimated that the first radio commercial will reach 5000 people, with each additional commercial reaching only 2000 new ones. For TV, the first ad will reach 4500 people and each additional ad an additional 3000. How should the budgeted amount be allocated between radio and TV?

[10]

2. Use Big M method / Two Phase method

    Maximize $2 X_1 + 2 X_2 + 4 X_3$

    Subject to

    $2 X_1 + X_2 + X_3 \leq 2$

    $3 X_1 + 4 X_2 + 2x_3 \geq 8$

    $X_1, X_2, X_3 \geq 0.$

[10]

3. A company produces two products, *A* and *B*. The unit revenues are $2 and $3, respectively. Two raw materials, *M1* and *M2,* used in the manufacture of the two products have respective daily availabilities of 8 and 18 units. One unit of *A* uses 2 units of *Ml* and 2 units of *M2,* and 1 unit of *Buses* 3 units of *Ml* and 6 units of *M2.*

    (a) Determine the dual prices of *Ml* and *M2* and their feasibility ranges.
    (b) Suppose that 4 additional units of *Ml* can be acquired at the cost of 30 cents per unit. Would you recommend the additional purchase?
    (c) What is the most the company should pay per unit of *M2?*
    (d) If *M2* availability is increased by 5 units, determine the associated optimum revenue.

[15]