

MTEch 2nd sem. Civil---Water Resources Systems

ASSIGNMENT--03

Date of submission:-

- Q1. Use a lagrangian multiplier to find the maximum value of $Y=15xw-5w^2$ subject to the constraint $x+w=18$. What would be the maximum value if the constraint is $x+w=16$?
- Q2. The long run marginal cost of supplying water to a city of 5000 persons is given by the expression as $10-0.002A+0.000003A^2$, where A is the annual water usage in acre feet. The city supplies 1000 acre feet annually at Rs.12 per acre foot. Over the next few years, the usage is likely to increase to 4000 acre feet. The price elasticity of demand for water is 0.5. The fixed annual cost of the water supply project is 56,000. Neglecting the loses, calculate :-
- (a) Marginal cost if all the 4000 acre feet are supplied
 - (b) Cost of supplying additional 3000 acre feet
 - (c) Project benefits, if we assume a constant demand of elasticity
 - (d) Optimum project size for supplying additional water
 - (e) Costs and benefits of optimum supply project
 - (f) Optimum project size if loses are 15% and community benefits are 25% of direct benefits.
- Q3. Find out the optimum allocations of water to three users with $Q=5$. Also
 $a_j=100,50,100$
 $b_j=0.1, 0.4,0.2$ For $j= 1,2,3$ respectively
 $c_j=10,10,25$
 $d_j=0.6, 0.8,0.4$
Use the recursive set of equations.
- Q4. There are two alternatives for purchasing an agricultural machinery . They are
- Alternative -1:-Initial purchase cost=2,50,000. Annual operation and maintenance cost=25,000. Expected salvage value=1,30,000. Useful life span=5 years
- Alternative-2:- Initial purchase cost=3,20,000. Annual operation and maintenance cost=35,000. Expected salvage value=75,000. Useful life span=5 years
- Using the Present worth method, find out the most appropriate alternative if rate of interest is 12% per annum.