

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

Tutorial Sheet Number--02

- Q1. Write down the examples of Water Resources Projects where maximum operation and maintenance is required.
- Q2. The capital cost of an irrigation project at the start of its construction period is Rs. 50 Lacs. The value of gross benefits from the project is 5.0 Lacs per year where as the increase in the cost of the agricultural operations is 1.50 Lac per year. The annual cost of operation, maintenance and repair is is Rs. 50000. Assuming that the benefits from the project will begin 10 years after completion and will continue to occur uniformly over the remaining 65 years of the estimated useful life span of 75 years. Determine the benefit cost ratio assuming a rate of interest = 3%.

- Q3. A water resources project is estimated to cost 200 crores and the time required for its completion is 5 years. The department provides a phased expenditure on the project as follows:-

Year:-	1st	2nd	3rd	4th	5th
Amount in crores :-	20	40	60	40	40

The project is financed at 4% per annum. Surplus funds not required for one year can be invested at 3% per annum along with sinking fund. What amount in excess of 200 crores must be obtained to meet the interest charges on capital during the construction period ?

- Q4. In a constrained maximization problem, the objective function is given by :-

$$Y=10 a b$$

subject to the constraint that $5a+b=200$. Find a , b, and lemnda.

- Q5. Consider that a quantity of water= Q has to be allotted to three users denoted by j-1,2,3 where j is the user. The problem is to supply three water quantities X_1 , X_2 and X_3 to three users 1,2 and 3 so as to maximize the total net benefits.