**Printed Pages : 4**

ECE-052

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 100853**

Roll No.

# B. Tech.

## (SEM. VIII) THEORY EXAMINATION, 2014-15
### WATER RESOURCES SYSTEM

Time : **3** Hours]　　　　　　　　　　　[Total Marks : **100**

Note :　　Attempt All Questions. Additional data may be assumed　for the best answering the questions.

1.　Attempt any TWO parts of the following:　　10×2=20

　　(a)　Discuss about the need of planning and management of water resources systems. What are the various planning and management approaches? Also focus on the technical aspects of planning.

　　(b)　Explain the concept of a system and give advantages and disadvantages of System approach. Write a short note on the hydrologic system.

　　(c)　What is system decomposition? Explain in detail major types of decompositions.

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2    Attempt any FOUR parts of the following:    5×4=20

   (a)    What is Linear Programming? Write standard form of Linear Programming.

   (b)    Find the optimum value of the function $f(x) = x^2+3x-5$. and also state if the function attains a maximum or a minimum.

   (c)    Define the Concept of simplex algorithm.

   (d)    What is Simulation? Compare between optimization and simulation.

   (e)    What are the basic components of an optimization problem.

   (f)    What are the constrained and unconstrained optimizations?

   (g)    Discuss briefly various types of simulation models.

3    Attempt any FOUR parts of the following:    5×4=20

   (a)    Define optimal control problems. Also write the mathematical expression.

   (b)    Discuss about the necessary and sufficient conditions of unconstrained optimization.

   (c)    Write a short note on the Benefit-cost ratio method.

   (d)    Write various conditions of project optimality.

   (e)    Two alternative plans are feasible. The estimated cost of 1st plan is 70 lakhs and the corresponding benefit is 80 lakhs. The cost for the 2nd plan is 85 lakhs and benefit is 100 lakhs. Which plan should be selected?

   (f)    What are the major challenges in water sector as per World Water Forum?

   (g)    What is a cash flow diagram? How it is used in economic analysis?

4    Attempt any TWO parts of the following:    10×2=20

(a)    What is a multi objective problem? How non-inferior solutions of a multi objective problem can be determined?

(b)    What are various combinations of a multipurpose reservoir? Discuss about optimal sizing and operation of a single multipurpose reservoir .

(c)    Explain Utility Function Method (Weighting function method) of multi objective problem solution.

5    Attempt any ONE part of the following :    20×1= 20

(a)    Consider two crops 1 and 2. One unit of crop 1 brings four units of profit and one unit of crop 2 brings five units of profit. The demand of production of crop 1 is A units and that of crop 2 is B units. Let x be the amount of water required for A units of crop 1 and y be the same for B units of crop 2. The linear relations between the amounts of crop produced (i.e., demands A and B) and the available water (i.e., x and y) for two crops are shown below.

$$A=0.5(x-2)+2$$

$$B=0.6(y-3)+3$$

Minimum amount of water that must be provided to 1 and 2 to meet their demand is two and three units respectively. Maximum availability of water is ten units. Find out the optimum pattern of irrigation.

(b) Derive an optimal operating policy for a reservoir to meet a long-term objective. Single reservoir operation with deterministic inflows. K = 400.

Table - Inflow, evaporation and demand values of the reservoir

| t | Inflows | Evaporation | Demand |
|---|---------|-------------|--------|
| 1 | 90.7 | 10 | 71.5 |
| 2 | 450.6 | 8 | 140.5 |
| 3 | 380.4 | 8 | 140.5 |
| 4 | 153.2 | 8 | 80.6 |
| 5 | 120 | 6 | 30.6 |
| 6 | 55 | 6 | 240.6 |
| 7 | 29.06 | 5 | 241.7 |
| 8 | 24.27 | 6 | 190.5 |
| 9 | 30.87 | 6 | 98.1 |
| 10 | 15.9 | 8 | 0 |
| 11 | 12.8 | 9 | 0 |
| 12 | 15.9 | 10 | 0 |

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