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B.TECH.

THEORY EXAMINATION (SEM–VIII) 2016-17

WATER RESOURCES SYSTEMS

Time : 3 Hours *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION-A

1. Attempt all parts in short. **(2×10=20)**

a) Explain the term stochastic modeling.

b) Define the term 'system analysis'?

c) Hydrologic measurements are subject to errors. Write the types of these errors.

d) A LP problem has all equality constraints. The number of constraints is the same as the number of decision variables. How does the solution change with a change in the coefficients (of decision variables) in the objective function?

e) What is a rating curve? Write the equation of a rating curve.

f) Write four physical parameters of water quality?

g) What is an objective function?

h) Define optimal control problems.

i) What are decision variables?

j) What is the reservoir rooting?

SECTION-B

2. Attempt any five of the following : **(10×5=50)**

a) What do you mean by the 'system'? Classify the systems and explain them.

b) With reference to a multipurpose project, define the terms: separable costs, joint costs, distributed costs and specific costs.

c) What is Lagrange multiplier method? How this is used in planning of water resources systems?

d) What do you understand by simulation? Under what conditions, simulation models are better than optimization models and in what conditions, optimization models are better than simulation models?

e) A dam is proposed across a river in Himalayas. It will supply water for irrigation. List and explain possible beneficial and harmful environmental consequences of the project.

f) Explain the following terms :

(i) Plan selection

(ii) Plan formulation

(iii) Sensitivity Analysis

g) Differentiate weighting method and constraint method of formulation of a multi objective planning problem. Explain any one of them in detail.

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

SECTION-C

Attempt any two of the following: **(15×2=30)**

3. Explain the following in detail:

(i) Total, average and marginal cost curves

(ii) Production and objective functions

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(iii) Discount factors and its types.

4. Water is supplied from a project for two types of users: rural and urban. The benefits to rural community are given by $B_1 = 30y_1 - 1.5y_1^2$ and those to urban community are given by $B_2 = 10y_2 - (\frac{y_2^2}{8})$ .If the total cost of the project is $C = \frac{y_2^2}{2} + 2y$, where y is the aggregate demand, determine the optimum level of water supply. Also, determine the corresponding components of rural and urban water supply levels.

5. Solve the following LP problem by simplex method:

$$\text{Maximize } z = x_1 + x_2$$
$$\text{Subject to } x_1 + 3x_2 \leq 6$$
$$4x_1 + 3x_2 \leq 12$$
$$3x_1 - x_2 \leq 36$$
$$x_1, x_2 \geq 0$$

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