Code: 9A01708

R09

B.Tech IV Year I Semester (R09) Supplementary Examinations, May 2013
WATER RESOURCES SYSTEM PLANNING & MANAGEMENT
(Civil Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

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1. (a) Define the concept of systems analysis.
    (b) Describe about various types of optimization techniques.
    (c) Draw the flowchart of role of models in the planning process and explain it.

2. (a) Explain briefly about simplex method.
    (b) Discuss the various applications of linear programming in water resources.

3.   To illustrate the changes mentioned in the three cases, the original problem written in the standard form is
        Maximize z $= 4x_1 + 5x_2$
        Subject to $2x_1 + 3x_2 + x_3 = 12$
                      $4x_1 + 2x_2 + x_4 = 16$
                      $x_1 + x_2 + x_5 = 8$ $x_1, x_2, x_3, x_4, x_5 \geq 0$, where x_3, x_4, x_5 are slack variables.
        The final simplex table is

Basic	x_1	x_2	x_3	x_4	x_5	RHS
x_2	0	1	1/2	-1/4	0	2
x_1	1	0	-1/4	3/8	0	3
x_5	0	0	-1/4	-1/8	1	3
z	0	0	3/2	1/4	0	22

4. (a) Write statement of the Bellman's principle of optimality.
    (b) Describe about backward recursion and forward recursion with neat diagrams.

5.   Examine the following functions for convexity/ concavity and determine their values at the extreme points.
        (i) f(x) $= x_1^2 + x_2^2 - 4x_1 - 2x_2 + 5$
        (ii) f(x) $= -x_1^2 - x_2^2 - 4x_1 - 8$
        (iii) f(x) $= x_1^3 + x_2^3 - 3x_1 - 12x_2 + 20$

6. (a) Define the term "simulation". Differentiate between linear models and routing models.
    (b) Write down the applications of simulation techniques in water resources.

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7.　To provide water supply to a town two types of pipe lines are proposed to be laid. Two alternative types of pipes are as shown in below.

Type of pipe	Cost of pumping per hour in Rs.	First cost of construction in Rs.
A	5.0	80,000
B	3.0	1,60,000

The life of both pipe lines is 15 years, having no salvage valve. Interest ratio is 6%. Determine by equivalent annual cost method.

(i) The most economical type of pipe line for a total pumping hour of 5000 per year.

(ii) How many pumping hours per year will take the two pipe lines equally economical?

8.　(a)　Specify the concept of optimal cropping pattern.

　　(b)　Discuss the various advantages of conjunctive use of water.

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