M. Tech.-II (Civil-Hydraulic Engineering) (CBCS – 2015 Course) :
SUMMER - 2019
SUBJECT: OPTIMIZATION IN HYDRAULICS

Day: Tuesday
Date: 11/06/2019

Time: 11.00 AM TO 02.00 PM
Max Marks: 60

S-2019-3400

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Answer to both the sections should be written in **SAME** Answer book.
4) Assume suitable data if necessary.

SECTION – I

Q.1 Solve the following LPP by graphical method. **[10]**

Minimize $z = -x_1 + 2x_2$

Subject to $-x_1 + 3x_2 \le 10$

$x_1 + x_2 \le 6$

$x_1 - x_2 \le 2$

$x_1,\ x_2 \ge 0$

OR

Find the optimal solution by simplex method. **[10]**

Maximize $z = 20x_1 + 25x_2$

Subject to $12x_1 + 16x_2 \le 100$

$16x_1 + 8x_2 \le 80$

$x_1,\ x_2 \ge 0$

Q.2 Solve the following transportation problem to find initial basic feasible solution by VAM method. **[10]**

		Destinations				
		D_1	**D_2**	**D_3**	**D_4**	**Supply**
Stores	**S_1**	10	20	5	7	10
	S_2	13	9	12	8	20
	S_3	4	15	7	9	30
	S_4	14	7	1	0	40
	S_5	3	12	5	19	50
	Demand	60	60	20	10	

OR

a) Explain how to solve maximization transportation problem. **[05]**

b) Solve the following assignment problem. **[05]**

		Machines			
		M_1	**M_2**	**M_3**	**M_4**
Jobs	**J_1**	15	11	13	15
	J_2	17	12	12	13
	J_3	14	15	10	14
	J_4	16	13	11	17

P.T.O.

Q.3 Maximize $f(x) = -3x^2 + 21.6x + 1$ using Fibonacci search. Take minimum resolution of 0.5 over six functional evaluations. The optimal of $f(x)$ is assumed to lie in the range $0 \le x \le 25$. **[10]**

OR

a) Distinguish between Dichotomous method and Fibonacci method. **[05]**

b) Explain steepest gradient method used in NLP. **[05]**

SECTION – II

Q.4 **a)** Define DP and explain the terms stage, state and Bellman's principle of optimality with reference to DP. **[05]**

b) Discuss Kuhn – Tucker conditions for constrained minimization NLPP. **[05]**

OR

a) Using Lagrangean multiplier method. **[05]**

Minimize $f(x) = 5x_1^2 + 2x_2 - x_1 x_2$

Subject to $x_1 + x_2 = 3$

b) Discuss forward recursion and backward recursion method in DP. **[05]**

Q.5 Discuss the basic principles of Artificial Neural Networking. **[10]**

OR

Explain the basic concepts of Fuzzy logic. **[10]**

Q.6 Discuss any one application of optimization technique to hydraulics / water resources problem. **[10]**

OR

Discuss how optimization technique can be applied to reservoir operation for hydropower optimization. **[10]**

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