

M. TECH.-II (CIVIL-HYDRAULIC ENGINEERING) (CBCS –
2015 COURSE) : SUMMER - 2018

SUBJECT: OPTIMIZATION IN HYDRAULICS

Day: Monday
Date: 18/06/2018

S-2018-2997

Time: 11.00 AM TO 02.00 PM
Max Marks: 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer books.
- 4) Assume suitable data if necessary.

SECTION – I

Q.1 a) Explain the concept of degeneracy in the simplex method. [05]

b) Obtain the dual of [05]

$$\begin{aligned} \text{Maximize } z &= 12x_1 + 10x_2 \\ \text{Subject to } 2x_1 + 3x_2 &\leq 60 \\ 5x_1 + 2x_2 &\geq 50 \\ x_1, x_2 &\geq 0 \end{aligned}$$

OR

Explain two phase method. [10]

Q.2 Solve the following Assignment Problem to minimize cost given in thousand Rs. [10]

		Machine				
		1	2	3	4	5
A		13	5	14	10	8
B		10	7	27	18	18
C		18	13	28	20	12
D		25	6	8	15	6
E		8	10	16	20	10

OR

a) Find the initial basic feasible solution of the following transportation problem. [05]

		Sites			
		S ₁	S ₂	S ₃	Supply
Factories	F ₁	3	8	5	5
	F ₂	3	3	7	8
	F ₃	5	6	2	7
	F ₄	2	7	3	14
	Requirement	6	8	16	

b) Explain how degenerate transportation problem is solved. [05]

P.T.O.

- Q.3** a) Explain Fibonacci method. [05]
b) Explain steepest gradient method. [05]

OR

- a) Minimize $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1 x_2 + x_2^2$ by taking starting point as (0,0) [05]
b) Explain golden section method. [05]

SECTION – II

- Q.4** Solve the NLPP [10]
Optimize $z = x_1^2 + x_2^2 + x_3^2$
Subject to $x_1 + x_2 + 3x_3 = 2$
 $5x_1 + 2x_2 + x_3 = 5$
 $x_1, x_2, x_3 \geq 0$

OR

- a) Discuss Kuhn-Tucker conditions for constrained optimization NLPP. [05]
b) Explain the terms stage and state with reference to DP. [05]

- Q.5** Explain the basic concepts of fuzzy logic. [10]

OR

Discuss genetic algorithm with reference to working principle, fitness function and GA operators. [10]

- Q.6** Discuss how optimization technique can be applied to reservoir operation for hydropower optimization. [10]

OR

Discuss any one application of optimization technique to hydraulic / water resources problem. [10]

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