M. TECH. CIVIL (WATER RESOURCE ENGINEERING)

M. Tech. Civil (Water Resource Engineering) Sem-II :SUMMER- 2022

SUBJECT : OPTIMIZATION IN HYDRAULICS

Day : Wednesday
Date : 3/8/2022

S-23660-2022

Time : 10:00 AM-01:00 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) Use of non-programmable calculator is **ALLOWED**.

SECTION – I

Q. 1 Find optimal solution by using simplex method **(10)**

Maximize, $Z = 4x_1 + 3x_2 + 6x_3$

Subject to,

$$2x_1 + 3x_2 + 2x_3 \leq 440$$
$$4x_1 + 3x_3 \leq 470$$
$$2x_1 + 5x_2 \leq 430$$

$x_1, x_2, x_3 \geq 0$.

OR

Q. 1 *Maximize*, $Z = 2x_1 + 5x_2$ **(10)**

Subject to,

$$x_1 + 4x_2 \leq 24$$
$$3x_1 + 2x_2 \leq 21$$
$$x_1 + x_2 \leq 9$$

$x_1, x_2 \geq 0$.

Q. 2 Find optimal solution for following Transportation model by VAM **(10)**

2	3	11	7	6
1	0	6	1	1
5	8	15	9	10
7	5	3	2	17

OR

Q. 2 Maximize Assignment problem by Hungarian method. **(10)**

42	35	28	21
30	25	20	15
30	25	20	15
24	20	16	12

P. T. O

Q. 3 Explain in detail golden section method. **(10)**

OR

Q. 3 What are the different NLP applications in Civil Engineering? **(10)**

SECTION – II

Q. 4 Solve by using Kuhn – Tucker conditions. **(10)**

Maximize,

$$F = 8x_1 + 4x_2 + x_1x_2 - x_1^2 - x_2^2$$

Subject to,

$$2x_1 + 3x_2 \leq 24$$

$$-5x_1 + 12x_2 \leq 24$$

$$x_2 \leq 5.$$

OR

Q. 4 Explain Lagrangian multiplier technique in detail. **(10)**

Q. 5 Explain Fuzzy system for optimization techniques with example. **(10)**

OR

Q. 5 Write note on simulated annealing and neural networks. **(10)**

Q. 6 Explain with example crop field optimization. **(10)**

OR

Q. 6 Explain multi basin and multi reservoir systems. **(10)**

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