IH Used Paper BTECH-28-10-20

Code No: 135CW **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, October - 2020
OPTIMIZATION TECHNIQUES
(Civil Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Discuss multivariable Optimization without equality constraints using an example. [15]

2. Use Kuhn-Tucker conditions to determine x_1, x_2, x_3 so as to maximize
$z = -x_1^2 - x_2^2 - x_3^2 + 4x_1 + 6x_2$
subject to $x_1 + x_2 \leq 2$,
$2x_1 + 3x_2 \leq 12$
and $x_1, x_2 \geq 0$. [15]

3. Solve the following LPP using Simplex method.
Minimize $Z=2X_1 + X_2$
Subject to the constraints
$3X_1 + X_2 = 3$
$4X_1+3X_2 \geq 6$
$X_1 + 2X_2 \leq 4$ and $X_1, X_2 \geq 0$. [15]

4. Solve the following transportation problem. Use Vogel's method for generating initial basic feasible solution. [15]

Warehouse / Factory	W1	W2	W3	W4	Production
F1	19	14	23	11	11
F2	15	16	12	21	13
F3	30	25	16	39	19
Requirement	6	10	12	15	

5. Find the minimum of $f(x) = 0.65 - \frac{0.75}{1+x^2} - 0.65x \tan^{-1}\frac{1}{x}$ by the Quadratic interpolation method with an initial step size of 0.1? [15]

6. Minimize f = $4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$ starting from point (0, 0) using Powell's method. Perform four iterations. [15]

7. Explain the classification and basic approach of penalty function method in detail. [15]

8. Solve the following problem by dynamic programming:
Maximize $f(x_1, x_2) = 10 x_1+8 x_2$
Subject to $2x_1+ x_2 \leq 25$
$3x_1+2 x_2 \leq 45$
$x_2 \leq 10$
$x_1 \geq 0, x_2 \geq 0$ [15]

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