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BICEE-021

B.TECH. CIVIL ENGINEERING

(BTCLEVI)

Term-End Examination, 2019

BICEE-021 : COMPUTATIONAL METHODS IN STRUCTURAL ENGINEERING

Time : 3 Hours] **[Maximum Marks : 70**

Note : Attempt **any five** questions. **All** questions carry **equal** marks. Use of scientific calculator is permitted.

1. (a) Explain Gauss elimination method. [7]

   (b) Solve the following equation by Gauss elimination method : $x+y+z=3$, $2x+3y+7z=0$, $x+3y-2z=17$. [7]

2. Write short notes on **any two** of the following : [2×7=14]

   (a) Branch and Bound method in Integer Programming.

   (b) Any four major applications of Linear Programming in Structural Analysis.

(c) Cholesky Method in Structural Analysis.

3. Solve the problem by integer linear programming : [14]

Min $z=4x_1+5x_2$; subject to, $x_1+4x_2 \geq 5$

$3x_1+2x_2 \geq 7$; $x_1, x_2 \geq 0+x_1$ and x_2 are integers.

4. (a) Discuss the properties of a concave and convex function. [7]

(b) Convert the following primal equations into dual equations : [7]

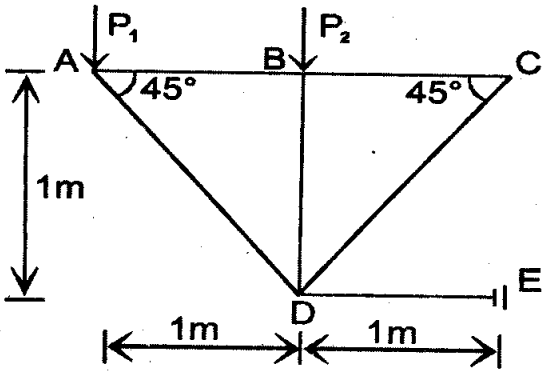
Max $z=6x_1+14x_2+13x_3$

Subject to , $\frac{1}{2}x_1+2x_2+x_3 \leq 24$

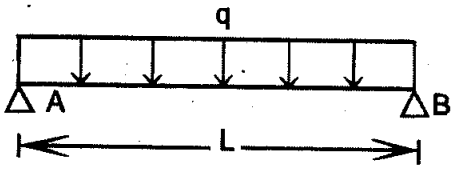
$x_1+2x_2+4x_3 \leq 60$

$x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$

5. The truss, used to support a balcony, is subjected to the loading shown. Approximate each joint as a pin and determine the force in each member. State whether the members are in tension or compression. Set P_1 = 3KN, P_2 = 2KN. [14]



6. Determine the deflection of beam AB supporting a uniform load of intensity q. Also determine δ_{max} and θ_A, θ_B. [14]



7. Define the following : [3½×4=14]

(a) Shape function

(b) Constant Strain Triangle (C.S.T.)

(c) Finite element method

(d) Isoparametric elements

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