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BICEE-021

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B.TECH. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2013

BICEE-021 : COMPUTATIONAL METHODS IN STRUCTURAL ENGINEERING

Time : 3 hours *Maximum Marks : **70***

Note : *(i)* *Answer **any five** questions.*
(ii) *All questions carry **equal** marks.*
(iii) *Use of **scientific** calculator is **permitted**.*

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1. (a) Locate the stationary points of $f(x)=12x^5-45x^4+40x^3+5$ and find out if the function is convex, concave or neither at the points of optima based on testing rules. **7**

(b) Discuss the properties of a concave and convex function. **7**

2. Minimize $f=x_1^2+x_2^2+60x_1$ subject to the constraints **14**

$g_1=x_1-80\geq 0$

$g_2=x_1+x_2-120\geq 0$

using KUHN - TUCKER conditions.

3. Transform the general form of a linear programming problem given below to its standard form. **14**

Minimize $Z = 6x + 5y$

Subject to $2x - 3y \leq 5$

$x + 3y \leq 11$

$4x + y \leq 15$

$x, y \geq 0$

4. Solve the problem by Integer linear programming **14**

Maximize $Z = 3x_1 + x_2$

Subject to $2x_1 - x_2 \leq 6$

$3x_1 + 9x_2 \leq 45$

$x_1, x_2 \geq 0$

x_1, x_2 are integers.

5. Solve the following set of equation by Gauss elimination method. **14**

$2x + y + z = 10$

$3x + 2y + 3z = 18$

$x + 4y + 9z = 16$

6. Define the following *(any two)* : **7x2=14**

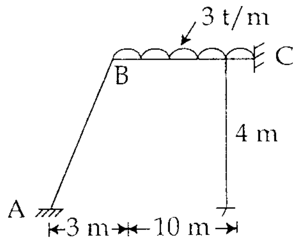
(a) Isoparametric elements

(b) Shape function

(c) Constant strain triangle

(d) Finite element method

7. Analyse the bent frame by force method. **14**



EI is constant