| BIMEE-022 |

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

00265 **Term-End Examination**
December, 2014

BIMEE-022 : OPTIMIZATION FOR ENGINEERING DESIGN

Time : 3 hours   *Maximum Marks : 70*

Note : *Answer any* **five** *questions.* **All** *questions carry equal marks. Assume suitable data, if missing and / or incorrect.*

1. (a)   Define Dual of an LP problem.   *4*

    (b)   Find the dual of the following LPP and solve the dual problem.

    Minimise $z = 4x_1 + 6x_2 + 18x_3$

    subject to

    $x_1 + 3x_2 \geq 3$

    $x_2 + 2x_3 \geq 5$

    $x_j \geq 0$ for $j = 1, 2, 3$.   *10*

2. Solve the following LPP with simplex method.
    Maximise $z = 3x_1 + 12x_2$
    subject to $2x_1 + 4x_2 \leq 7$

    $5x_1 + 3x_2 \leq 15$

    $x_1, x_2 \geq 0$ and integers.   *14*

3. Use three iterations of bi-section and secant method to minimize the following function
$$f(x) = 2e^x - x^3 - 10x.$$
Compare the algorithms in terms of the interval obtained at the end of three iterations. *14*

4. (a) Explain branch and bound method. *7*

(b) Explain stochastic processes with suitable examples. *7*

5. Solve the following integer linear programming problem : *14*

Maximise $z = 4x_1 + x_2$

subject to $4x_1 + 2x_2 \le 7$

$3x_1 + 5x_2 \le 15$

x_1, x_2 are non-negative integers.

6. Use Golden section search to maximize $-x^2 - 1$, subject to $1 \le x \le 0 \cdot 75$ with the final interval of uncertainty having a length less than $0 \cdot 25$. *14*

7. Explain Genetic algorithm with neat flow chart and also discuss the effect of various parameters involved in the said algorithm. *14*