

4E2039

Roll No. : _____

Total Printed Pages : **3****4E2039**

B. Tech. (Sem. - IV) (Main/Back) Examination, June/July - 2011
4CE6.2 Optimization Techniques
Civil Engg.

Time : **3 Hours**][Total Marks : **80**[Min. Passing Marks : **24**

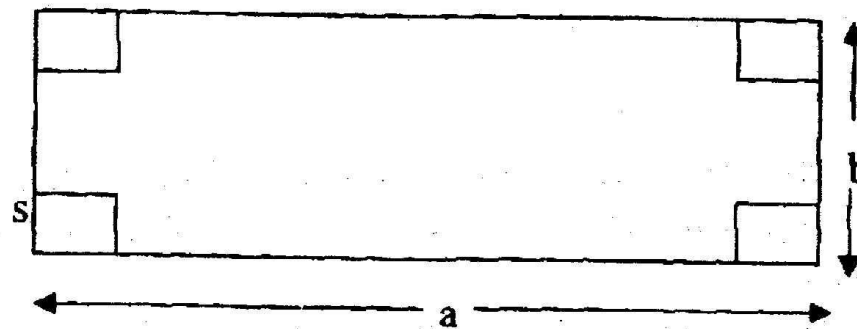
Attempt overall 5 questions. All questions carry equal marks. Assume missing data suitable if any and specify the same.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. _____ Nil _____

2. _____ Nil _____

- 1 (a) (i) What are the engineering application of optimization methods? Explain briefly.
- (ii) A rectangular plate of size $a \times b$ is to be used to prepare a box open at top by cutting four rectangular portions at each corners and folding along the edge. Find the size s of the smaller rectangular portions to be cut to obtain the maximum volume in the box.

**OR**

- (b) (i) What are the classifications of optimization problems? Explain any one in briefly.
- (ii) A solid cone is to be moulded by using minimum material and to obtain maximum volume. Find the ratio of base diameter to height.

4+12

4E2039]



1

[Contd...

- z (a) What do you mean by a linear programming problem ?
 (b) Using Simplex method solve the following linear programming problem ?
 Max $z = x_1 + 3x_2 - 2x_3$
 Subject to

$$\begin{aligned} 3x_1 - x_2 + 2x_3 &\leq 7 \\ -2x_1 + 4x_2 &\leq 12 \\ 4x_1 + 3x_2 + 8x_3 &\leq 7 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

OR

- 2 (a) What do you mean by Duality in Linear Programming ?
 (b) Write the dual of the Linear Programming problem given above in and find the solution.

4+12

- 3 (a) What do you mean by a sensitivity analysis of linear programming problem ?
 (b) Using simplex method solve the following linear programming problem.

$$\begin{aligned} \text{Max } z &= x_1 + 3x_2 - 2x_3 \\ \text{Subject to} \\ 3x_1 - x_2 + 2x_3 &\leq 7 \\ -2x_1 + 4x_2 &\leq 12 \\ 4x_1 + 3x_2 + 8x_3 &\leq 7 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

OR

- 3 (a) What do you mean by Transportation problem ?
 (b) Find and solve the dual of the Linear Programming problem given above.

4+12

- 4 (a) What are the methods employed in solving the Non-linear optimization problems. Give a brief of any one method.
 (b) Find the minimum of the function $f = x^5 - 5x^3 - 20x + 10$ using golden section method, in the interval (0,5)

OR

- 4 (a) What do you mean by direct search method employed in solving the Non-linear optimization problems. Give a brief of the method.
 (b) Find the minimum of the function $f = x^5 - 5x^3 - 20x + 10$ using Fibonacci method, in the interval (0,5)

4+12



5 (a) What do you mean by multi-stage decision in dynamic methods of optimization problems. Give a brief of any one method.

(b) Solve the following LP problem by dynamic programming :

$$\text{Max } z = 5x_1 + 4x_2$$

Subject to

$$2x_1 + x_2 \leq 25$$

$$3x_1 + 2x_2 \leq 15$$

$$x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

OR

5 (a) What do you mean by dynamic programming in optimization problems. Give a brief of the method.

(b) Differentiate between an initial value problem and final value problem. How to convert an initial value problem and final value problem ?

4+12