

4E2039

Roll No. : _____

Total Printed Pages : **3**

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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**

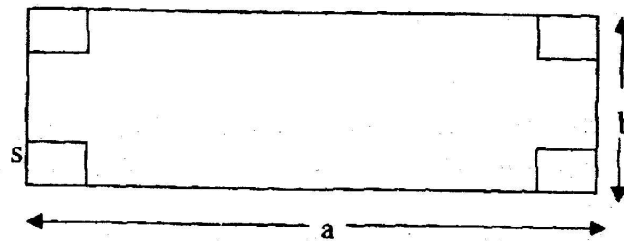
*Attempt overall 5 questions. All questions carry **equal** marks. Assume missing data suitable if any and specify the same.*

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.

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[Contd...

- 2 (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.

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- 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.

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- 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)

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[Contd...

- 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 :
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 ?