

Code: 9A02709

**R09**

B.Tech IV Year I Semester (R09) Supplementary Examinations June 2016

**OPTIMIZATION TECHNIQUES**

(Electrical &amp; Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) What is optimization? Give engineering applications of optimization.  
(b) Classify optimization problems and explain briefly with suitable examples.
- 2 (a) State the various methods available for solving a multivariable optimization problem with equality constraints.  
(b) Consider the following problem:  
Minimize  $f(x) = x_1^2 + x_2^2 + x_3^2$   
Subject to constraints  
 $x_1 + x_2 + x_3 \geq 5$   
 $2 - x_2x_3 \leq 0$  and  $x_1, x_2 \geq 0, x_3 \geq 2$   
Determine whether the Kuhn-Tucker conditions are satisfied at the following point (2, 1, 2).

- 3 (a) State an LP problem in standard form.  
(b) Solve the following problem by simplex method:  
Maximize  $Z = x + 3y$   
Subject to constraints  
 $-4x + 3y \leq 12$   
 $x + y \leq 7$   
 $x - 4y \leq 2, x, y \geq 0$

- 4 Find the optimum solution to the following transportation problem for which the cost, origin availabilities and destination requirements are as given below.

		To					Availability
		A	B	C	D	E	
From	O <sub>1</sub>	3	4	6	8	8	20
	O <sub>2</sub>	2	10	1	5	30	30
	O <sub>3</sub>	7	11	20	40	15	15
	O <sub>4</sub>	2	1	9	14	18	13
Requirements		40	6	8	18	6	

- 5 Find the minimum of  $f(x) = x^5 - 5x^3 - 20x + 5$  by using the quadratic interpolation method.
- 6 Minimize  $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$  starting from the point (0, 0) by using steepest decent method.
- 7 Minimize  $f(x_1, x_2) = \frac{1}{3}(x_1 + 1)^3 + x_2$   
Subject to  $g_1(x_1, x_2) = -x_1 + 1 \leq 0$   
 $g_2(x_1, x_2) = -x_2 \leq 0$ . By using the interior penalty function method.
- 8 (a) Explain the dynamic programming problem.  
(b) Minimize  $Z = y_1^2 + y_2^2 + y_3^2$  subject to  $y_1 + y_2 + y_3 \geq 15$  and  $y_1, y_2, y_3 \geq 0$ .