B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2017
OPTIMIZING TECHNIQUES
(Common to CSE and CSS)

Time: 3 hours   Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1   Explain clearly the structure of optimization problems.

2   Minimize $f = \frac{1}{2}x_1^2 + \frac{3}{2}x_2^2 - x_1x_2 - 2x_2$ by the Fletcher-Reeves conjugate gradient method, starting from the point (4, -2).

3   Old hens can be bought for Rs. 2 each but young ones cost Rs. 5 each. The old hens lay 3 eggs per week and young ones 5 eggs per week, each egg being worth 30 paise. A hen cost Re. 1 per week to feed. If a person has only Rs. 80 to spend on the hens, how many of each kind should he buy to give a profit of more than Rs. 6 per week assuming that he cannot house more than 20 hens? Formulate the problem as LPP.

4   Find the optimal solution for the transportation problem.

Source	Destination					Supply
	1	2	3	4	5	
1	5	10	9	1	6	500
2	6	3	6	3	2	500
3	8	9	7	4	8	300
Demand	100	200	300	400	300	

5   State and prove Kuhn-Tucker necessary and sufficient conditions in non-linear programming.

6   Estimate upper and lower bounds on the variables and obtain a starting feasible solution for the following problem.
Minimize $f(x) = 3x_1^2 - 2x_2$
subject to $g_1(x) = 2x_1 + x_2 \geq 4$
                    $g_2(x) = x_1^2 + x_2^2 \leq 40$

7   Solve the following nonlinear programming problem.
Minimize $Z = x_1^2 + x_2^2 + 5$
subject to $3x_1^4 + x_2 \leq 16$
               $x_1 + 2x_2^2 \leq 32$
               $x_1, x_2 \geq 0$

8   A small project is composed of seven activities whose time estimates are listed in the table below:

activity	Estimated duration (weeks)		
	Optimistic	Most likely	pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

(a) Draw the project network.
(b) Find the expected duration of the each activity
(c) If the project due date is 19 weeks, what is the probability of meeting the due date