ME MechCMachine Design) / Sem II / Choice Base / Second Half 2018

19/11/2018

Paper / Subject Code: 35002 / Optimization .

Time: 3 Hours Marks: 80

1) Attempt any **Four Question**.
2) Make suitable assumptions if required

Que.1 a) Consider the LPP 12

Maximize; $Z = 10X_1 + 15X_2 + 20X_3$

Subject to; $2X_1 + 4X_2 + 6X_3 \leq 24$

$3X_1 + 9X_2 + 6X_3 \leq 30$

$X_1, X_2, X_3 \geq 0$

(i) Find the range of the objective function coefficient C_1 of the variable X_1 such that optimality is unchanged.

(ii) Check whether the optimality is affected if the profit coefficients are changed from (10, 15, 20) to (7, 14, 15). If so, find the revised optimal solution.

b) Obtain the duel of the following primal problem 08

Maximize; $Z = -15Y_1 - 14Y_5 + 2Y_4$

Subject to; $-Y_1 - 2Y_5 + Y_4 \leq -6$

$-2Y_1 - Y_5 - Y_4 \leq -8$

$Y_1, Y_4, \geq 0$;

$Y_5 = Y_2 - Y_3$ is unrestricted in sign

Que.2 a) Solve by dual simplex method the following problem: 10

Minimize ; $Z = 2X_1 + 2X_2 + 4X_3$

Subject to ;

$2X_1 + 3X_2 + 5X_3 \geq 2$

$3X_1 + X_2 + 7X_3 \leq 3$

$X_1 + 4X_2 + 6X_3 \leq 5$

$X_1, X_2, X_3 \geq 0$

b) Use the Kuhn – Tucker Conditions to solve the following NLPP (10)

Maximize; $Z = 2X_1^2 - 7X_2^2 + 12X_1X_2$

Subject to; $2X_1 + 5X_2 \leq 98$

$X_1, X_2, \geq 0$

Que.3 a) Use branch and bound technique to solve the following integer programming problem. (14)

Maximize; $Z = 7X_1 + 9X_2$

Subject to; $-X_1 + 3X_2 \leq 6$

$7X_1 + X_2 \leq 35$

$X_1 \geq 0, X_2 \leq 7$

X_1, X_2 are integers

b) Classify the optimization problems and also write engineering application of optimization. (06)

Que.4 a) Find the maximum of the function $f(x) = 2x_1 + x_2 + 10$ (10)
Subject to $g(x) = x_1 + 2x_2^2 = 3$
Using the Lagrange multiplier method. Also find the effect of changing the right hand side of the constraint on the optimum value of f.

b) Minimize $f(x) = 0.65 - [0.75/(1 + x^2)] - 0.65x \tan^{-1}(1/x)$ in the interval [0, 3] by the Fibonacci method using n=6. (10)

Que.5 a) Consider the function, $f(x) = x^2 + e^{-x} + \sin[4x]$. (10)
Perform two iterations of Newton's method for the function at $x = -1$.

b) Find Local minima , local maxima, global minima, global maxima and plot for the function $f(x) = x^3 - x^2 - 4x + 4$ (10)

Que.6 a) Find the minimum of $f(x) = \lambda^5 - 5\lambda^3 - 20\lambda + 5$ by the cubic interpolation method. (14)

b) Explain sequential nature of RSM. (06)

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