COURSE CODE (CREDITS): 19B1WCI737   MAX. MARKS: 35

COURSE NAME: OPTIMIZATION METHODS IN BUSINESS ANALYTICS

COURSE INSTRUCTORS: Dr. Rakesh Kanji   MAX. TIME: 2 Hours

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. 1. Choose the correct option   [1+1+1+1+1]

A. Which of the following statement are true with respect to performing sensitivity analysis
    a) Add a new constraint
    b) Change in Objective function coefficients of non basic variable
    c) Change in Objective function coefficients of basic variable
    d) All of the above   [CO1]

B. Which of the following is invalid pair
    a) (Change in Objective function coefficients of non basic variable, Sensitivity analysis)
    b) (shortest path problem, Simplex)
    c) (Economic interpretation , dual simplex)
    d) (Linear problem, Lagrange)   [CO2,CO3]

C. Which one is not valid method of discontinuous function optimization
    a) simplex with direct search   b) simplex for LPP
    c) Grid search   d) none of the above   [CO3]

D. Which of the following is valid termination condition of non gradient optimization procedure, assume f is an objective function
    a) $\left\| \nabla f_{x=x_i} \right\|_2 <$ threshold
    b) $\left| \nabla f_{x=x_i} \right| <$ threshold
    c) $\left| x_{i+1} - x_i \right| <$ threshold
    d) all of above   [CO1]

E. Which of the Hassian matrix not satisfies convexity
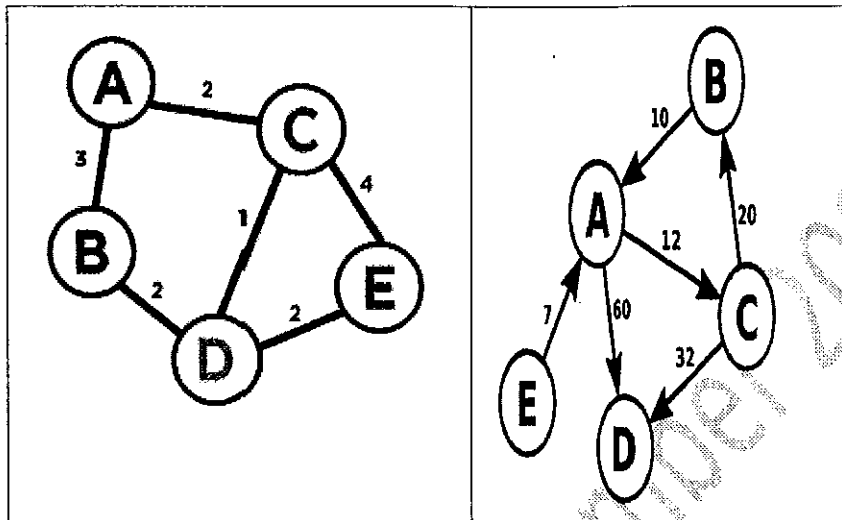   a) $\begin{bmatrix} 5 & 0 \\ 0 & 2 \end{bmatrix}$
    b) $\begin{bmatrix} -5 & 0 \\ 0 & 2 \end{bmatrix}$
    c) $\begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$
    d) $\begin{bmatrix} -15 & 0 \\ 1 & 2 \end{bmatrix}$ [CO1,CO2]

Q2. Explain Shortest path problem with LPP for A to E. Consider one of the below graph.

[CO1, CO4]   [5]

Q3.

Which one is the correct graph for applying Prims algorithm and find out the minimum spanning tree?   [CO4]   [CO3][5]

Q4.Minimize $X_1-X_2+2X_1^2+2X_2^2+2X_1X_2$ with simplex direct search method.   [CO4] [5]

Q5. Explain the idea of steepest descent algorithm. Can we apply it for linear problem like simplex? Show the derivation of step size (λ_i).   [CO1,CO4] [2+1+2]

Q6. Which would be suitable Direct substitution or Lagrange of below example and why? Please apply that to minimize.   [CO1,CO3,CO4] [2+3]

$X^2 + Y^2$ such that X+Y =4 , XY=10

Q7.Minimize $X_1^2+X_2^2-4X_1- 6X_2$ such that $X_1+X_2<=3$ and$-2X_1+X_2<=2$.   [CO1,CO4,CO3][5]