

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION-2021

B.Tech 7th Semester

COURSE CODE: 19B1WCI737

MAX. MARKS: 35

COURSE NAME: OPTIMIZATION METHODS IN BUSINESS ANALYTICS

COURSE CREDITS: 3

MAX. TIME: 2 Hours

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. Choose the correct option

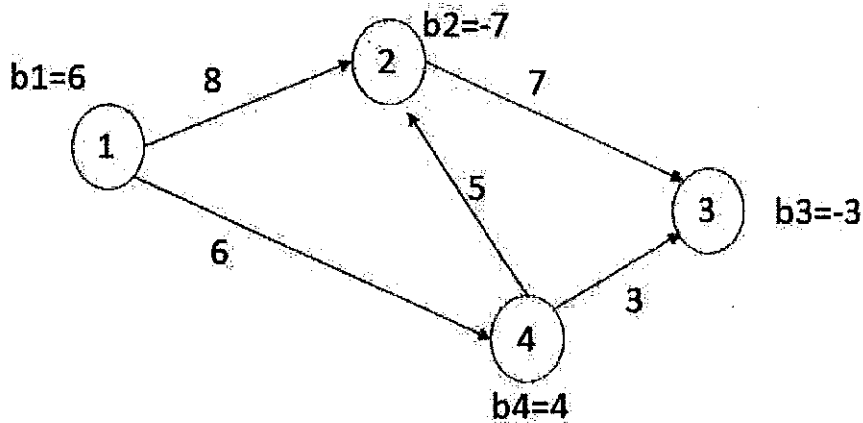
[1+1+1+1+1]

- A. Which of the following statement is false with respect to performing sensitivity analysis
- Change in Constraint coefficient of basic variables
 - Change in Objective function coefficients of non basic variable
 - Change in Objective function coefficients of basic variable
 - Add a new constraint
- B. Which of the following is/are invalid pair (change, remedy) for sensitivity analysis context
- (Change in Objective function coefficients of non basic variable, Simplex)
 - (Change in Objective function coefficients of basic variable, Simplex)
 - (Change in RHS of constraint, simplex)
 - (Add a new constraint, Dual simplex)
- C. Which is/are not a salient feature of transportation problem
- Optimality of MODI or UV method
 - Economic Interpretation of Dual
 - balanced problems
 - integer solution
- D. Which of the following is/are valid termination condition of non gradient optimization procedure; assume f is an objective function.
- $\|\nabla f_{x=x_i}\|_2 < \text{threshold}$
 - $|\nabla f_{x=x_i}| < \text{threshold}$
 - $|x_{i+1} - x_i| < \text{threshold}$
 - $\|x_{i+1} - x_i\|_2 < \text{threshold}$
- E. Which one of the Hessian matrix does not satisfy convexity
- $\begin{bmatrix} 5 & 0 \\ 0 & 2 \end{bmatrix}$
 - $\begin{bmatrix} -5 & 0 \\ 0 & 2 \end{bmatrix}$
 - $\begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$
 - $\begin{bmatrix} -5 & 0 \\ 1 & 2 \end{bmatrix}$

2. Why we do sensitivity analysis and write the name of any two cases? [2]

3. Explain Min cut theorem for max flow problem with duality. You may consider any arbitrary graph. [5]

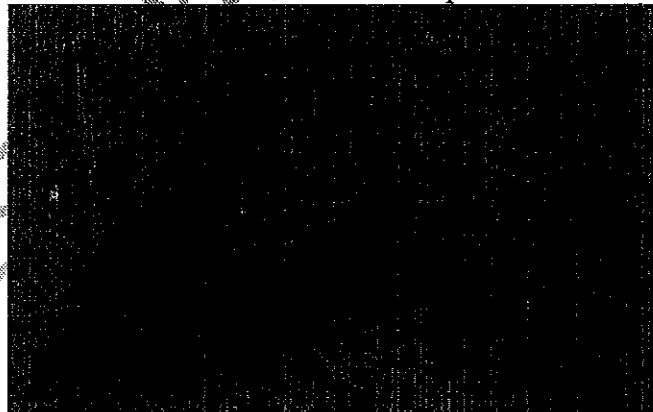
4. Solve min cost flow of below graph? Consider b_1, b_2, b_3 and b_4 are respective resource at different nodes and edge weight represents the cost per unit for transporting the resource. [5]



5. Find out the optimal solutions to minimize $f(x,y)=3x+y$ Such that, $x^2+y^2=8$ and $xy=8$. [5]

6. Explain the principal behind the expansion and contraction behind the simplex method. Please provide respective formula. [5]

7. Find out the derivation of hessian matrix of objective function $f(x_1,x_2)$ with the constraints g_1, g_2, g_3, g_4 as given below. Please consider a minimization problem. [3]



8. Solve the TSP with branch and bound methods for below distance data among the cities. Each cell (i,j) represents respective distance between i city to j city. Here we have 4 cities. [5]

—	20	30	10
15	—	16	4
3	5	—	2
19	6	18	—