

Marking Scheme

Optimization Technique-BC3EA04(T)

Q.1	i)	In linear programming, objective function and objective constraints are _____.	1				
		(b) Linear					
	ii)	If the value of the objective function z can be increased or decreased indefinitely, such solution is called_____.	1				
		(b) Unbounded solution					
	iii)	Which one of the given options represents constraint in an LP model?	1				
		(d) All the above					
	iv)	While plotting constraints on a graph paper terminal point on both the axes are connected by a straight line because:	1				
		(c) The constraints are linear equation or inequalities					
	v)	In simplex method, feasible basic solution must satisfy the	1				
		(a) Non-negativity constraint					
	vi)	According to algebra of simplex method, slack variables are assigned zero coefficients because	1				
		(a) No contribution in objective function					
	vii)	In PERT, the estimate b represents	1				
		(c) The most pessimistic time					
	viii)	Which of the following is NOT needed to use the transportation model?	1				
		(d) Degeneracy					
	ix)	A prisoners' dilemma is a game with all of the following characteristics except one. Which one is present in a prisoners' dilemma?	1				
		(a) Players cooperate in arriving at their strategies.					
	x)	In game theory, a situation in which one firm can gain only what another firm loses is called a	1				
		(c) Zero-sum game					
Q.2	i.	Definition of operational research	- 2 Marks	4			
		Each application	- 0.5 Mark				
	ii.	Complete steps	- 3 Marks	6			
		Example with discussion	- 3 Marks				
OR	iii.	Description of multiperiod decision problem using inventory model	- 4 Marks	6			
		Example	- 2 Marks				
Q.3	i.	Each difference	- 1 Mark	4			
	ii.	Explanation of Kuhn-Tucker method	- 4 Marks	6			
		Example	- 2 Marks				
OR	iii.	Write short note on the following?		6			
		(a) Lagrange multipliers method	- 3 Marks				
		(b) Optimizing multivariate functions	- 3 Marks				
Q.4	i.	Concept of slack variables	- 2 Marks	4			
		How they are used in the conversion process	- 2 Marks				
	ii.	Description of various steps involved in the simplex algorithm for solving a linear programming problem	- 6 Marks	6			
OR	iii.	Concept behind Karmarkar's method for solving linear programming problems	- 3 Marks	6			
		Example	- 3 Marks				
Q.5	i.	Define of assignment problem	- 2 Marks	4			
		Each difference	- 0.5 Mark				
	ii.	What is minimum cost network flow problem	- 2 Marks	6			
		Example	- 4 Marks				
OR	iii.	Explanation of role of the network simplex method in solving network optimization problems	- 4 Marks	6			
		Example	- 2 Marks				
Q.6		Attempt any two:					
	i.	Each difference	- 0.5 Marks (Max.- 2.5 Marks)	5			
		Example with discussion	- 2.5 Marks				
	ii.	Explanation of how can game theory be applied to analyse in given situation and predict potential outcomes	- 5 Marks	5			
	iii.	Explanation of idea of core stability in cooperative n-person games	- 3 Marks	5			

How does it differ from Nash Equilibrium

- 2 Marks

Enrollment No.....



Faculty of Engineering / Science

End Sem Examination May-2024

CS3EL21 / BC3EA04 Optimization Techniques

Programme: B. Tech / B.Sc. Branch/Specialisation: CSE All /
Computer Science**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. In linear programming, objective function and objective constraints are _____. **1**
 (a) Solved (b) Linear (c) Quadratic (d) Adjacent
- ii. If the value of the objective function z can be increased or decreased indefinitely, such solution is called _____. **1**
 (a) Bounded solution (b) Unbounded solution
 (c) Solution (d) None of these
- iii. Which one of the given options represents constraint in an LP model? **1**
 (a) Limitations
 (b) Requirements
 (c) Balancing limitations and requirements
 (d) All of these
- iv. While plotting constraints on a graph paper terminal point on both the axes are connected by a straight line because: **1**
 (a) The resources are limited in supply
 (b) The objective function is a linear function
 (c) The constraints are linear equation or inequalities
 (d) All of these
- v. In simplex method, feasible basic solution must satisfy the- **1**
 (a) Non-negativity constraint (b) Negativity constraint
 (c) Basic constraint (d) Common constraint

[2]

- vi. According to algebra of simplex method, slack variables are assigned zero coefficients because- **1**
 (a) No contribution in objective function
 (b) High contribution in objective function
 (c) Divisor contribution in objective function
 (d) Base contribution in objective function
- vii. In PERT, the estimate b represents- **1**
 (a) The most optimistic time
 (b) The most likely time
 (c) The most pessimistic time
 (d) The most expected time
- viii. Which of the following is NOT needed to use the transportation model? **1**
 (a) The cost of shipping one unit from each origin to each destination
 (b) The destination points and the demand per period at each
 (c) The origin points and the capacity or supply per period at each
 (d) Degeneracy
- ix. A prisoners' dilemma is a game with all of the following characteristics except one. Which one is present in a prisoners' dilemma? **1**
 (a) Players cooperate in arriving at their strategies.
 (b) Both players have a dominant strategy.
 (c) Both players would be better off if neither chose their dominant strategy.
 (d) The payoff from a strategy depends on the choice made by the other player.
- x. In game theory, a situation in which one firm can gain only what another firm loses is called a- **1**
 (a) Nonzero-sum game (b) Prisoners' dilemma
 (c) Zero-sum game (d) Cartel temptation
- Q.2 i. What do you mean by operational research? Write different applications of it. **4**
 ii. What are the steps of solving linear programming problem using graphical method? Discuss with the help of an example. **6**

[3]

- OR iii. How to solve multiperiod decision problem using inventory model? Explain with the help of an example. **6**
- Q.3 i. Differentiate between local and global maxima/minima. **4**
 ii. Explain the Kuhn-Tucker method and steps involved in it with the help of an example. **6**
- OR iii. Write short note on the following: **6**
 (a) Lagrange multipliers method
 (b) Optimizing multivariate functions
- Q.4 i. What is the concept of slack variables? Discuss how they are used in the conversion process. **4**
 ii. Describe various steps involved in the simplex algorithm for solving a linear programming problem. **6**
- OR iii. Discuss the concept behind Karmarkar's method for solving linear programming problems with the help of suitable example. **6**
- Q.5 i. Define the assignment problem? How it differentiates itself from the transportation problem? **4**
 ii. What is minimum cost network flow problem? Explain it with the help of an example. **6**
- OR iii. Explain the role of the network simplex method in solving network optimization problems by providing suitable example. **6**
- Q.6 Attempt any two:
 i. Differentiate between zero-sum and non-zero-sum games. Also, discuss an example of each. **5**
 ii. Consider a company with n managers who need to decide on a pricing strategy for a new product. Each manager has their own performance goals. Explain how can game theory be applied to analyse this situation and predict potential outcomes? **5**
 iii. Explain the idea of core stability in cooperative n-person games. How does it differ from Nash Equilibrium? **5**
