Roll No: _____

Time allowed: 2 hrs   **Max Marks: 50**

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means.** All other instructions on the reverse of Admit Card should be followed meticulously.

Section A

Attempt any three

Q1   A diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 of calories. Two foods A and B are available at a cost of $ 4 and $ 3 per unit respectively. If one unit of A contains 200 units of vitamins ,1 unit of mineral and 40 calories and one unit of food B contains 100 units of vitamins, 2 units of minerals and 40 calories,

i.   Formulate LPP   **CILO-2 , 4 marks**

ii.   Write the dual of the LPP   **CILO-2 , 3 marks**

iii. Find the solution of dual using solver. Interpret the sensitivity report.**CILO-2 , 7 marks**

Q2. On a given day, district head quarter has the information that one ambulance van is stationed at each of the five locations A, B, C, D and E. It has to issue an order for the ambulance vans to reach 6 locations namely, P, Q, R, S, T and U, Each destination can have at most one ambulance. The distances in Km. between present locations of ambulance vans and destinations are given in the matrix below. Decide the assignment of vans for minimum total distance, and also state which destination should not expect ambulance van to arrive. Formulate   the   model   and   Use   solver   to   get   solution (*CILO-2;   14 Marks*)

From	P	Q	R	S	T	U
A	18	21	31	17	26	29
B	16	20	18	16	21	31
C	30	25	27	26	18	19
D	25	33	45	16	32	20
E	36	30	18	15	31	30

Q3. A study comparing three personal computers resulted in the following pairwise comparison matrix for the performance criterion:

	1	2	3
1	1	3	7
2	1/3	1	4
3	1/7	1/4	1

(i)   Determine the priorities for the four computers relative to the performance criterion. (*CILO-1;   4 Marks*)

(ii) Compute the consistency ratio. Are the judgements regarding performance consistent? (Random Index, RI for n = 3 is 0.58)   (*CILO-1;   4 Marks*)

(iii) Identify the cell where there is maximum error. Mention the steps of finding errors (*CILO-1;   6 Marks*)

Q4. **(i)** An airline employs call center personnel to handle reservations and to deal with website reservation system problems and for the rebooking of flights for customers whose plans have changed or whose travel is disrupted. The airline's analysts have estimated the minimum number of call center employees needed by day of the week for the upcoming vacation season. These estimates are as follows:

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Minimum Number of Employees Needed	75	50	45	60	90	75	45

The call center employees work for five consecutive days and then have two consecutive days off. An employee may start work on any day of the week. Each call center employee receives the same salary. Assume that the schedule cycles and ignore start up and stopping of the schedule. Develop a model that will minimize the total number of call center employees needed to meet the minimum requirements and find the solution using solver..
(CILO-1; 9 Marks)

(ii) Explain duality in the context of a linear program? **(CILO-1; 5 Marks)**

Section B

Discuss the concept of DEA. What is BCC model and how it is different from CCR model

CILO-1   8 marks