Name: .....

Roll Number: .....

M. A. COLLEGE OF ENGINEERING, KOTHAMANGALAM
FIRST SESSIONAL EXAMINATION, AUGUST – 2026
S5 PROGRAM ELECTIVE I
B24ME3P14 OPERATIONS RESEARCH

Time – 1.5 Hours (Answer all questions) Max. Marks – 40

Part A (4 x 3 Marks)

1. Explain the graphical interpretation of 'feasible solutions' in an LPP. [CO-1]
2. Explain the need for slack and artificial variables in the Simplex algorithm. [CO-1]
3. Comment on exact algorithms and approximate algorithms. Give suitable examples. [CO-2]
4. Write the mathematical model of a Transportation Problem. [CO-2]

Part B (2 x 14 Marks)

5. MechPro Engineering Ltd. manufactures two types of mechanical components: Gear Housings and Connecting Rods. Each Gear Housing requires 3 hours of machining time and 4 hours of assembly time, while each Connecting Rod requires 2 hours of machining time and 8 hours of assembly time. The company has a total of 240 hours of machining time and 640 hours of assembly time available per day. The profit per unit is Rs. 500 for a Gear Housing and Rs. 700 for a Connecting Rod. The company wishes to determine the daily production quantities of the two components so that total profit is maximized without exceeding the available machining and assembly time. Model this problem as a Linear Programming Problem (LPP) and solve it to find the optimal production quantities. [CO-1]

6. TSMC, a global semiconductor manufacturer, produces microchips in three fabrication plants located in Taiwan, South Korea, and Japan. These chips need to be transported to four assembly units situated in India, Vietnam, Malaysia, and China. The daily supply capacity of the plants is 200 units from Taiwan, 300 units from South Korea, and 250 units from Japan. The daily demand requirements of the assembly units are 150 units for India, 200 units for Vietnam, 250 units for Malaysia, and 150 units for China. The transportation cost per unit (in $) from Taiwan to India, Vietnam, Malaysia, and China is 10, 12, 18, and 9 respectively; from South Korea it is 11, 9, 15, and 12 respectively; and from Japan it is 14, 10, 12, and 16 respectively. TSMC wishes to develop a transportation schedule that meets all demands without exceeding the plant capacities while minimizing the total transportation cost. Formulate this situation as a transportation problem and generate a basic feasible solution using any **two** algorithms and compare the results. [CO-2]

Vision
Mentoring to ensure excellence

Mission
To facilitate comprehensive and integrated development of students by providing quality education that encourages sustainable practices.

To mould disciplined and socially committed engineers capable of assuming professional leadership upholding national integrity.

Note: CO indicates course outcome