InSem Examination-IISummer2025	
Exam Seat No.:	
Academic Year:2024-2025	Semester:VI
Class:TY	Program:B.Tech
Branch Code:ROB	Pattern:2022
Name of Course:Swarm Intelligence for Robotics	Course Code:ROB223015(C)
Max. Marks:30	Duration:1.15 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

1 a) Determine the value of Griewank function at $x_1 = 22$, $x_2 = -36$ and $x_3 = 68$. Also mention the bounds of Griewank function and its global solution.   (7)   CO1

Question No. 2

2 a) What is swarm intelligence? Explain its applications in robotics   (8)   CO1

OR

2 b) How genetic algorithm is different from particle swarm optimization algorithm?   (8)   CO1

Question No. 3

3 a) PSO algorithm is used to minimize a function $xy - x^2$. The initial positions of five birds in the swarm are (1, 3), (4, 7), (3, 2), (6, 1), (5, 5). Calculate the updated velocity and position of bird at position (4, 7). Also calculate the function value at this new position. Given that: (7)   CO1, CO3

- Current velocity of a particle: (6, 2)

- Inertia coefficient: 0.55

- Cognitive factor : 1.75

- Social factor: 1.80

- Random number (r_1) = 0.45

- Random number (r_2) = 0.72

Question No. 4

4 a) What are algorithm specific parameters in particle swarm optimization? How their values are chosen?   (8)   CO2

OR

4 b) Considering all random numbers as 0.65, show that the combination $w = 0.2$, $C_1 = 1.8$, and $C_2 = 1.7$ (8)   CO2
is in the convergence zone.

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