BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.TECH **SEMESTER : II**
BRANCH: AI/ML **SESSION : SP/2025**

SUBJECT: CS636 EVOLUTIONARY COMPUTING

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Describe the Generic Evolutionary Algorithm using an algorithm.	[5]	1	I
Q.1(b)	Describe the Roulette Wheel Selection with the help of algorithm. Let the population and fitness are given by in Table 1.	[5]	2	III

Individual	Fitness
A	15
B	40
C	22
D	35
E	18
F	30

Apply Roulette Wheel Selection for random number 0.50.

Q.2(a)	Describe the one point crossover, two-point crossover and uniform crossover with the help of algorithm.	[5]	3	I
Q.2(b)	Describe different types of mutation operators for binary representation with algorithm.	[5]	3	I
Q.3(a)	Describe the Niching Genetic Algorithms with details. Suppose we have 3 individuals with the following original fitness values and positions (in 1D for simplicity):	[5]	2	III

Individual	Position (x)	Fitness f(x)
A	2	100
B	2.2	80
C	5	80

Assume σ_{share}=1.0, α=1. Apply fitness sharing compare the results with α=1 and α=2.

Q.3(b)	Describe the Constraint Handling technique and describe its methods	[5]	3	I
Q.4(a)	Illustrate the concept of Multi-Objective Optimization?. Explain the pareto optimality concept also discuss its advantages and disadvantages.	[5]	4	II
Q.4(b)	What is the Weighted Sum Method? Suppose we have 3 solutions (A, B, C) and two objectives: $f_1(x)$: Cost, $f_2x)$: Time. We want to choose the best solution from 3 options (A, B, and C) using the Weighted Sum Method.	[5]	4	III

Solution	Cost $f_1(x)$	Time $f_2(x)$
A	100	6
B	80	10
C	120	3

find the solution assuming w_1=0.7. Verify your answers for w_1=0.5 and w_1=0.4.

PTO

Q.5(a)	What is GBML? Why did GBML Rise? Explain.	[5]	5	I
Q.5(b)	Describe in details the following:	[5]	5	I

(i) Development of CS-1
(ii) Smith's Poker Player

::::::26/04/2025::::::E