**0**1-03-2023

**AI Assignment 1 Code: AssignAI\_01**  **20 Marks**

**Instructions:**

* Read the instructions and assignments carefully.
* Programming language: Python
* Submission file: Only ‘.py’ file to be submitted
* Naming convention: Name\_your roll\_number\_assignment code.py.

Ex: abc\_1234\_ AssignAI\_01.py

* Submission Date: **15-03-2023**
* Not following the instructions could lead to a heavy penalty.



To find the maximum F(x) = x^2 over the interval 0-31 using a Genetic Algorithm (GA). Represent each possible solution as a binary string of 5 bits.

**Input:** p, c, m, t, x, i are input variables.

1) Population size [p]

2) Crossover type [c] (Default: one point crossover (c=0) or two point crossover (c=1) )

3) Mutation type [m] (Default: Bit flip (m=0) or swap mutation (m=1))

4) GA termination condition [t] ( Default: No improvement for x iteration (t=0) or predefined iterations (t=1) )

5) if t = 0 No improvement for x iteration [x]

6) if t =1 Predefined iterations for termination [i]

*Input example: p=10, c=0 (default), m=1 (swap mutation), t=1 (predefined iterations then i=100)*

*Another example: p=5, c=1 ( two point crossover ), m=0 ( Default ), t=0 ( No improvement for x iteration then x=10)*

**Output:** Highest fitness value solution when termination condition met.

**Note: Do not use PyGAD python library.**