# Indian Institute of Engineering Science & Technology, Shibpur,

# Department of Computer Science & Technology.

# 8th Semester Artificial Intelligence Laboratory.

# ASSIGNMENT- 1

# (Simple List Processing and Arithmetic in PROLOG)

**Duration- 6 periods.** **Full Marks (including Viva Voce)-30**

**Write PROLOG programs:**

**1. To determine whether the first two elements of a list are same.**

**2. To determine whether a list is not a two-element list.**

**3. To determine whether two lists are of same length.**

**4. To determine length of a list using your own number system, that does not contain more than two symbols.**

**5. To determine whether two lists are of same length using the length predicate developed in 4 (previous problem).**

**6. To find the last element of a list.**

**7. To find whether an element is a member of a list.**

**8. To find whether two elements are next to each other in a list.**

**9. To append two lists in a third list.**

**10. To find the last element of a list using append predicate developed in 9.**

**11. To find whether an element is a member of a list using append predicate developed in 9.**

**12. To find whether two elements are next to each other in a list using append predicate developed in 9.**

**13. To reverse a list in another list.**

**14. To determine whether a list is a palindrome.**

**[the structure of predicate:**

**palindrome(L)].**

**15. To find the last but one element of a list.**

**16. To find the K'th element of a list.**

**The first element in the list is number 1.**
**Example:**
**?- element_at(X,[a,b,c,d,e],3).**
**{X = c}**

**17. To find the sum of all elements of a list.**

**18. To find the length of a list.**

**19. To find the average of all elements of a list using sum and length defined in Problem 17 and 18.**

**20. To find the maximum number from a list.**

**21. To find gcd of two integers.**

**22. To determine whether a given integer number is prime.**

**[Example:**
**?- is_prime(7).**
**true]**

**23. To determine whether two positive integer numbers are coprime.**

**[Two numbers are coprime if their greatest common divisor equals 1.**
**Example:**
**?- coprime(35, 64).**
**true]**

**24. To determine the prime factors of a given positive integer.**

**[Construct a flat list containing the prime factors in ascending order.**
**Example:**
**?- prime_factors(315, L).**
**{L = [3,3,5,7]}**
**]**

**25. Goldbach's conjecture.**

**Goldbach's conjecture says that every positive even number greater than 2 is the sum of two prime numbers. Example: 28 = 5 + 23. It is one of the most famous facts in number theory that has not been proved to be correct in the general case. It has been *numerically* confirmed up to very large numbers (much larger than we can go with our Prolog system). Write a predicate to find the two prime numbers that sum up to a given even integer.**

**[Example:**
**?- goldbach(28, L).**
**{L = [5,23]}**

**26. To generate all integers between two integers N1 and N2, both N1 and N2 included and N2>N1.**

**27. To count numbers greater than 100.0 in a list.**

**28. To split a list of numbers in two lists such that one contains negative numbers and other contains positive numbers.**

**29. To find N!**

**30. To generate first N Fibonacci numbers.**