# Indian Institute of Engineering Science & Technology, Shibpur,

# Department of Computer Science & Technology.

# 8th Semester Artificial Intelligence Laboratory.

# ASSIGNMENT- 2

# (More List Processing Problems and Cut)

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

**Last Date of Submission: 19/03/2021**

**Write PROLOG programs:**

**1. To add an element to a list provided it is not present in the list.**

**2. To delete first occurrence of an element from a list.**

**3. To delete all occurrences of an element from a list.**

**4. To replace the first occurrence of an element X in L with Y giving the result in L1.**

**5. has_duplicate(L), that determines whether list L has duplicate elements.**

**6. To duplicate the elements of a list.**

**Example:**
**?- duplicate([a,b,c,c,d],X).**
**{X = [a,a,b,b,c,c,c,c,d,d]}**

**7, To duplicate the elements of a list a given number of times.**

**Example:**
**?- duplicate2([a,b,c],3,X).**
**{X = [a,a,a,b,b,b,c,c,c]}**

**What are the results of the goal:**
**?- duplicate2(X,3,Y).**

**8. To determine whether a list is a sub list of another list. A list is a sub list of another list if it's elements are present in another list consecutively and in the same order.**

**9. To determine whether a set is a subset of another set.**

**10. To determine intersection of two sets.**

**12.To determine union of two sets.**

**13.To determine difference of two sets.**

**14.To determine symmetric difference of two sets.**

**15. To replace n th element by another element X in L, leaving the resultant list in L1.**

**16. to remove every N'th element from a list.**

**Example:**
**?- remove([a,b,c,d,e,f,g,h,i,k],3,X).**
**{X = [a,b,d,e,g,h,k]}**

**For the problems 17 – 18 assume L1, L2 and L denote lists of terms.**

**17. Interleave alternate elements of L1 and L2 into L. For example, if L1= [a, b, c] and L2= [1, 2], then L= [a, 1, b, 2, c].**

**18.Transpose L1, L2 into L. That is, if L1= [a, b, c] and L2= [1, 2, 3], then L= [(a, 1), (b, 2), (c, 3)].**

**19. To split a list into two parts; the length of the first part is given.**
**Do not use any predefined predicates.**

**Example:**
**?- split([a,b,c,d,e,f,g,h,i,k],3,L1,L2).**
**{L1 = [a,b,c], L2 = [d,e,f,g,h,i,k]}**

**20. To extract a slice from a list.**
**Given two indices, I and K, the slice is the list containing the elements between the I'th and K'th element of the original list (both limits included). Start counting the elements with 1.**

**Example:**
**?- slice([a,b,c,d,e,f,g,h,i,k],3,7,L).**
**{X = [c,d,e,f,g]}**

**21. To insert an element at a given position into a list.**
**Example:**
**?- insert_at(alfa,[a,b,c,d],2,L).**
**{L = [a,alfa,b,c,d]}**

**For the problems 22 - 30 assume L and L1 is a list of terms.**

**22. To remove_every_other (L, L1). List L1 is just list L with every other element removed (the two lists should have the same first element).**

**23. cutlast (L, L1) that defines L1 to be obtained from L with last element removed.**

**24. trim (N, L, L1) that defines L1 to be obtained from L with first N elements removed.**

**25.trimlast (N, L, L1) that defines L1 to be obtained from L with last N elements removed.**

**26.exchange_first_last(L, L1), defines that L1 to be obtained from L with first and last elements exchanged.**

**Example:**

**?-exchange_first_last([a, b, c, d, e], X).**

**{X= [e, b, c, d, a]}**

**27 circular_left_shift(L, L1). That is, if L= [a, b, c, d, e, f] then L1= [b, c, d, e, f, a]..**

**28. circular_right_shift(L, L1). That is, if L= [a, b, c, d, e, f] then L1= [f, a, b, c, d, e]**

**[Try using circular_left_shift in 27 to implement circular_right_shift.]**

**29.To delete the middle element from an odd-numbered list L into a list L1.**

**30.To delete two middle elements from an even-numbered list L into a list L1.**