

Practical File

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Subject: Artificial Intelligence

Course: B.Sc Hons Computer Science

Q1 - Write a prolog program to calculate the sum of two numbers.

sum(X,Y,Z):-Z is X+Y.

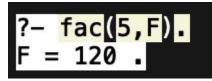
Q2 - Write a Prolog program to implement max(X, Y, M) so that M is the maximum of two numbers X and Y.

```
max(X,Y,M):- X>=Y, M is X.
max(X,Y,M):- Y>=X, M is Y.
```

?-
$$\max(5,8,X)$$
.
X = 8.

Q3 - Write a program in PROLOG to implement factorial (N, F) where F represents the factorial of a number N.

```
fac(0,1).
fac(N,F) :- N>0, N1 is N-1, fac(N1,F1), F is F1*N.
```



Q4 - Write a program in PROLOG to implement generate_fib(N,T) where T represents the Nth term of the fibonacci series.

```
fib(0,0).
fib(1,1).
fib(N,F):- N>0,N1 is N-1, fib(N1,F1), N2 is N-2, fib(N2,F2), F is F1+F2.
```

Q5 - Write a Prolog program to implement GCD of two numbers.

```
gcd(X,Y,Z):- X=Y, Z is X.
gcd(X,Y,Z):- X>Y, X1 is X-Y, gcd(X1,Y,Z).
gcd(X,Y,Z):- Y>X, Y1 is Y-X, gcd(X,Y1,Z).
```

Q6 - Write a Prolog program to implement power (Num, Pow, Ans) : where Num is raised to the power Pow to get Ans.

```
pow(_,0,1).
pow(X,Y,Z) :- X>0, Y1 is Y-1, pow(X,Y1,Z1), Z is Z1*X.
```

?-
$$pow(5,5,X)$$
.
X = 3125.

Q7 - Prolog program to implement multi (N1, N2, R) : where N1 and N2 denotes the numbers to be multiplied and R represents the result.

mul(X,Y,Z):-Z is X*Y.

$$- \frac{\text{mul}(4,5,X)}{\text{X}}$$

Q8 - Write a Prolog program to implement memb(X, L): to check whether X is a member of L or not.

```
mem(H,[H|_]).
mem(X, [_|T]):- mem(X,T).
```

Q9 - Write a Prolog program to implement conc (L1, L2, L3) where L2 is the list to be appended with L1 to get the resulted list L3.

```
conc([],L2,L2).
conc([H1|L1],L2,[H1|L3]):- conc(L1,L2,L3).
```

Q10 - Write a Prolog program to implement reverse (L, R) where List L is original and List R is reversed list.

```
reverse([], []).
reverse([H|T], R) :- reverse(T, TRev), append(TRev, [H], R).
```

Q11 - Write a program in PROLOG to implement palindrome (L) which checks whether a list L is a palindrome or not.

```
reverse([], []).
reverse([H|T], R) :- reverse(T, RevT), conc(RevT, [H], R).
palindrome(L) :- reverse(L, L).
```

```
?- palindrome([2,3,2]).
true.
```

Q12 - Write a Prolog program to implement sumlist(L, S) so that S is the sum of a given list L.

```
sumlist([], 0).
sumlist([H|T], S) :- sumlist(T, ST), S is H + ST.
```

```
?- sumlist([1,2,3],X).
X = 6.
```

Q13 - Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.

```
evenlength([]).
evenlength([_|T]) :- oddlength(T).

oddlength([_]).
oddlength([_|T]) :- evenlength(T).
```

```
?- oddlength([3,4,5]).
true .
?- oddlength([3,4,5,7]).
false.
```

Q14 - Write a Prolog program to implement nth_element (N, L, X) where N is the desired position, L is a list and X represents the Nth element of L.

```
nth_element(1, [H|_], H).
nth_element(N, [_|T], X) :- N > 1, N1 is N-1, nth_element(N1, T, X).
```

```
?- nth_element(3,[1,2,4,5,6,7], X).
X = 4 .
```

Q15 - Write a Prolog program to implement maxlist(L, M) so that M is the maximum number in the list.

```
maxlist([X], X).
maxlist([H|T], M) :- maxlist(T, M1), (H > M1 -> M is H; M is M1).
```

```
?- maxlist([1,4,3,2,6,9],X).
X = 9 .
```

Q16 - Write a prolog program to implement insert_nth (I, N, L, R) that inserts an item I into Nth position of list L to generate a list R.

```
insert_nth(I, 1, L, [I|L]).
insert_nth(I, N, [H|T], [H|R]) :- N > 1, N1 is N-1, insert_nth(I, N1, T, R).
```

```
?- insert_nth(2,1,[0,4,5,6], L).
L = [2, 0, 4, 5, 6] .
```

Q17 - Write a Prolog program to implement delete_nth (N, L, R) that removes the element on Nth position from a list L to generate a list R.

```
delete_nth(1, [_|T], T).
delete_nth(N, [H|T], [H|R]) :- N > 1, N1 is N-1, delete_nth(N1, T, R).
```

```
?- delete_nth(1,[1,2,3],X).
X = [2, 3] .
```

Q18 - Write a program in PROLOG to implement merge (L1, L2, L3) where L1 is first ordered list and L2 is second ordered list and L3 represents the merged list.

```
merge([], L2, L2).
merge(L1, [], L1).
merge([H1|T1], [H2|T2], [H1|T3]) :- H1 =< H2, merge(T1, [H2|T2], T3).
merge([H1|T1], [H2|T2], [H2|T3]) :- H2 < H1, merge([H1|T1], T2, T3).
```

```
?- merge([1,2,3,4],[2,3,4,5],X).
X = [1, 2, 2, 3, 3, 4, 4, 5]
```