Note: (Answer Five questions for each question 10 marks)

Q1/ A) Write a prolog program to calculate the power to items from (2 to 10) as the following table shown on the side

<table>
<thead>
<tr>
<th>N</th>
<th>2^N</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>64</td>
</tr>
<tr>
<td>7</td>
<td>128</td>
</tr>
<tr>
<td>8</td>
<td>256</td>
</tr>
<tr>
<td>9</td>
<td>512</td>
</tr>
<tr>
<td>10</td>
<td>1024</td>
</tr>
</tbody>
</table>

B) If you know the predicates part and the goal part of the following program are correct, Specify the errors in the remaining parts of the following program, then rewrite the correct program to let the program give the following output: L=[“r”,“e”,“a”,“d”].

```prolog
domain
i=integer
l=**
s=str
predicates
convert(s,l).
clauses
convert(‘’,0):-!.
convert([H|T],S):-frontstr(1,S,H,S1),convert(S1,T),goal.
convert(“read “,L).
```

Q2/A) What is the output of the following program:

```prolog
Predicates
Sen.
Start.
Clauses
Sen:-start, readln(St), str_len(St,Len),
write(St),nl,fail.
Sen.
Start.
Start:-start!,.
Goal
Sen.
```

B) Write a prolog program to draw the following square of stars

```
*****
*****
*****
*****
*****
```
Q3/ Write a prolog program for Two from the following list processing:
A) Write a prolog program to delete a number of a character from the last of a list of character such as: delete(3,[‘a’,’b’,’c’,’d’,’e’], L= [‘a’,’b’].
B) Write a prolog program to return the longest and the shortest word from a list of string such as:
   word([“ahmed”,”ali”,”yello”,”quartz”,”processing”],Longest,Shortest).Longest=10,
   Shortest=3.
C) Write a prolog program to replace each odd number in a list of integer values by the summation of the even numbers in the list such as: replace([1,2,3,4,5,6], L=[12,2,12,4,12,6].

Q4/ You have two water jugs, first one with 4-gallon and the second one with 3-gallon, assume the two jug is fill as start state and try to get 2 gallon in the first jug with any much in the second jug.
A) Represent the initial state and the goal state of the problem.
B) Draw the state space search to find the all possible solution paths.
C) Write complete prolog program to solve the problem.

Q5/ Using Backward chaining (B.W) & Forward Chaining (F.W) to find if the goal (find (Z,B,A,D)) is true or not? What is the value of the variables in the goal?
   a. b(1,2,3,4). c(4,2,3,6). d(2,1). r(3,4).
   check(Z,B,A,D):-d(Z,B), r(A,D).
   list(V,W,X,Q):-b(W,V,3,Q),c(Q,V,X,6),a.
   find(Z,B,A,D):-list(Z,B,A,D),check(Z,B,A,D).

Q6/ A) Represent the following knowledge using Semantic Net:
   Fish is an animal. Animals are either living on land or swimming. Fish has fins, has gills and is swimming in the water. We eat fish.
   B) Represent the following sentence using predicates logic:
      1- Ahmed is a smart boy.
      2- Layla went to Basrah yesterday.
      3- When Layla 21 years old, she will marry her cousin.
      4- If any student studies hard then he will pass prolog exam.

GOOD LUCK