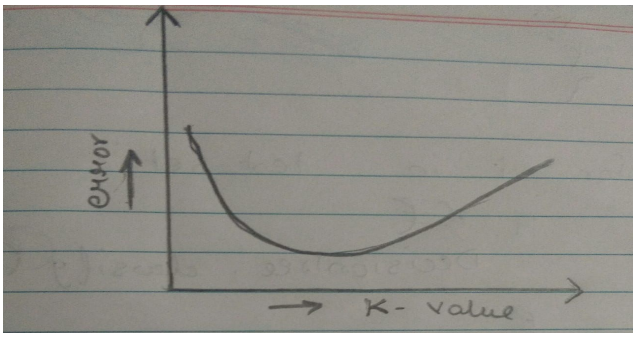
Question 1-

a) When k decrease from n to 1 training error will decrease
- When k=1, training error is zero as the distance of a point from itself is always 0
- When k is larger, then that larger k value tries to bias the point toward other class also, as the points of both the classes are overlapped also

b) Generalization error does not follow any fixed trend
- At a particular k value generalization error will be minimum and that depends on dataset
- At first it decreases and then started increasing
- The sketch between generalization error and k is



c) When input dimensions are high
- Using too many features results in overfitting, the classifier starts learning exception so, when test data comes it cannot generalize well
- As the input dimensions are high, memory requirements are high and time for computing distance between the points is high

d) No
- Because in voronoi diagram for 1-NN the decision boundary is very complex whereas in a decision tree, the boundary the boundaries would always be parallel to the coordinate axes based on the decision node.
- In decision tree it may possible that it may take multiple decisions but in 1-knn the decision is based on euclidean distance only.