3)

a) **QUESTION -1**

We can find the frequency of products sold according to the time slot. By using this information, we can get an estimate of what products we can expect to be sold in in a particular time slot. Using this, we can then allocate more of ANC's resources to prepare some items **in advance** for that time slot, so as to decrease the response time and increase customer satisfaction and thereby increase the ratings for the product. First, we need to find out which items have less rating and try to improve the response time for those. We need to identify items by timeslot, rating and get an estimate of how many items to prepare in advance.

Performance Metrics:

The performance metric would be change in ratings as a percentage of that of the previous month for each individual times slot.

The average rating of all the products can be calculated as follows:-

In a given month, for an item with item ID – "I" and price "P" with rating "R" and having quantity "Q" sold in a given timeslot, calculate $Q*P*R$ for all timeslots and all items. Find their sum and divide it by total revenue. The resultant will be the total average rating.

Change(in %) = ((New total avg ratings-Previous total avg ratings)/Previous total avg ratings)*100

Of course, when we ask the workers to increase pre-production of items, it does increase work for them and will be met with protest, so we can assign a penalty for each hour they have to pre-produce, depending on the hour.

Hour	16,17	18	19	20	21	22	23	24	00,01
Hour_weight	1	2	3	4	6	9	12	15	18

Penalty= Hour_weight*(Quantity sold in the hour)

We need to reach increase ratings by a minimum of K% by incurring minimum penalty.

b) **QUESTION - 2**

A huge factor of ANC sales is an unlikely competitor- Mess. As the mess follows a more or less fixed schedule (i.e. same food on the same day of the week), there are surges and drops in ANC sales in accordance to the quality of the mess food and student's willingness to have mess food over ANC. We need to identify the days (of the week, i.e. Monday, Tuesday, etc) where the sales are above the average sales per day (indicating lower quality of ANC food) and create discounts on bills over a specific amount (say slabs of >100, >150 etc) on those days so as to lure those who might still eat mess food over ANC food and increase sales.

Due to these offers, we will experience a decrease of revenue. Identify the most optimal discounts (maximum 10%) that can be given in a particular day for bills in each of the slabs of (50, 75, 100, 150) so that revenue decrease will be lesser than M%. Also, discounts should only be in a non-decreasing order i.e. discount for >75 cannot be more than discount for >100.

Performance measures:-

We need to affect maximum number of customers using this scheme. So let us consider H to be a performance measure, where H represents the change in number of bills in each slab multiplied by a weight.

Slab	>50	>75	>100	>150
H_weight	1	3	5	7

$H = \sum(B * H\_weight)$

Where B = increase no of bills in the slab.

The objective is to maximize H such that the change in revenue is minimum.