There are two methods to rank the subjects in order of difficulty

Method1 :

 In method1 ranks of difficulty is based on the majority score in that particular subject. An histogram of each subject is obtained and based on the majority score (at what range of marks does the peak lye). If the peak position is present LEFT(lower marks range), then that subject is difficult for majority of students. If the peak is present more towards RIGHT(higher marks range), then that subject is easy for majority of students. So based on the peak position the subjects are arranged accordingly.

Implementation (Using MATLAB)

1. The excel file containing marks of students is in the form of a matrix (students X subject marks, in our case 45 students X 6 subjects) is imported to a matrix 'marks' using xlsread() command.

	A	B	C	D	E	F	G
1	1NT16EC70	12	12	14	11	10	14
2	1NT16EC71	5	2	10	3	17	10
3	1NT16EC72	14	13	10	5	16	0
4	1NT16EC73	15	17	18	10	10	0
5	1NT16EC74	15	10	1	22	3	16
6	1NT16EC75	18	12	3	21	6	18
7	1NT16EC76	3	12	8	18	9	17
8	1NT16EC77	5	22	28	12	10	13
9	1NT16EC78	20	25	14	12	22	20
10	1NT16EC79	22	24	30	14	16	25
11	1NT16EC80	22	20	28	15	18	26
12	1NT16EC81	23	28	2	1	15	29
13	1NT16EC82	12	18	3	6	10	30
14	1NT16EC83	10	19	30	4	7	20
15	1NT16EC84	5	21	19	19	2	25
16	1NT16EC85	9	15	23	15	0	22
17	1NT16EC86	13	19	25	19	25	18
18	1NT16EC87	18	13	20	22	27	20
19	1NT16EC88	15	15	19	27	15	29
20	1NT16EC89	10	5	18	28	18	12
21	1NT16EC90	14	2	1	16	19	23
22	1NT16EC91	16	0	21	19	12	16
23	1NT16EC92	3	0	4	17	14	18
24	1NT16EC93	29	8	29	24	19	0
25	1NT16EC94	11	10	1	23	20	17
	1NT16EC95	28	20	26	25	21	16

```
Command Window
 New to MATLAB? Watch this Video, see Examples, or read Getting Started.

  marks =

     12    12    14    11    10    14
      5     2    10     3    17    10
     14    13    10     5    16     0
     15    17    18    10    10     0
     15    10     1    22     3    16
     18    12     3    21     6    18
      3    12     8    18     9    17
      5    22    28    12    10    13
     20    25    14    12    22    20
     22    24    30    14    16    25
     22    20    28    15    18    26
     23    28     2     1    15    29
     12    18     3     6    10    30
     10    19    30     4     7    20
      5    21    19    19     2    25
      9    15    23    15     0    22
     13    19    25    19    25    18
     18    13    20    22    27    20
     15    15    19    27    15    29
     10     5    18    28    18    12
     14     2     1    16    19    23
     16     0    21    19    12    16
```
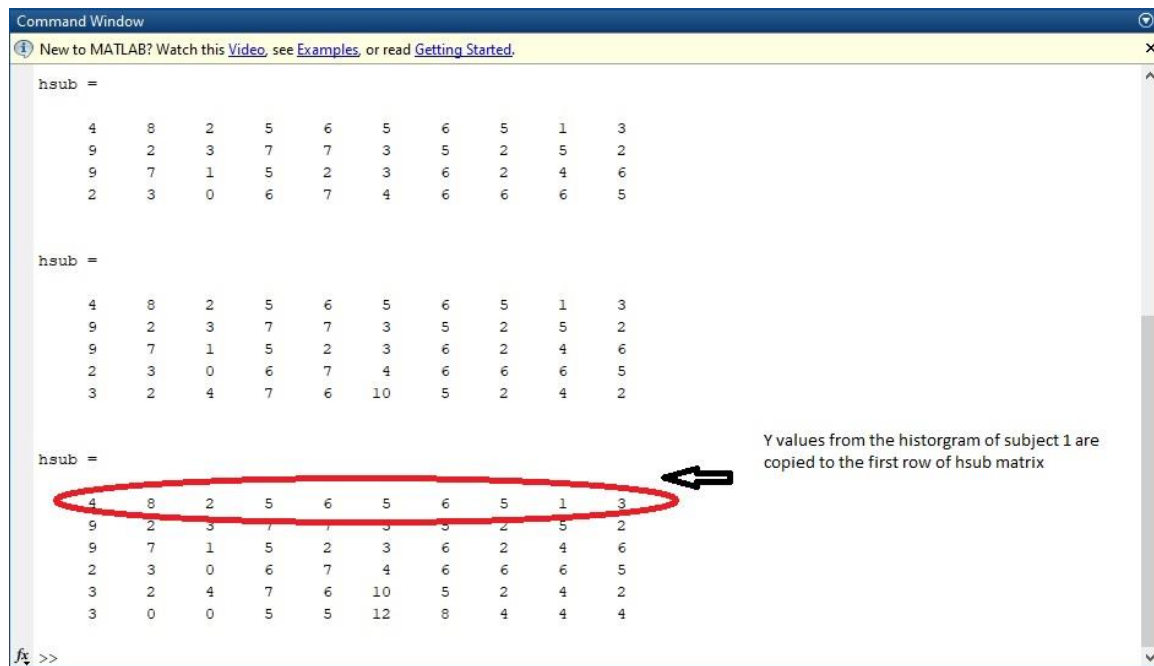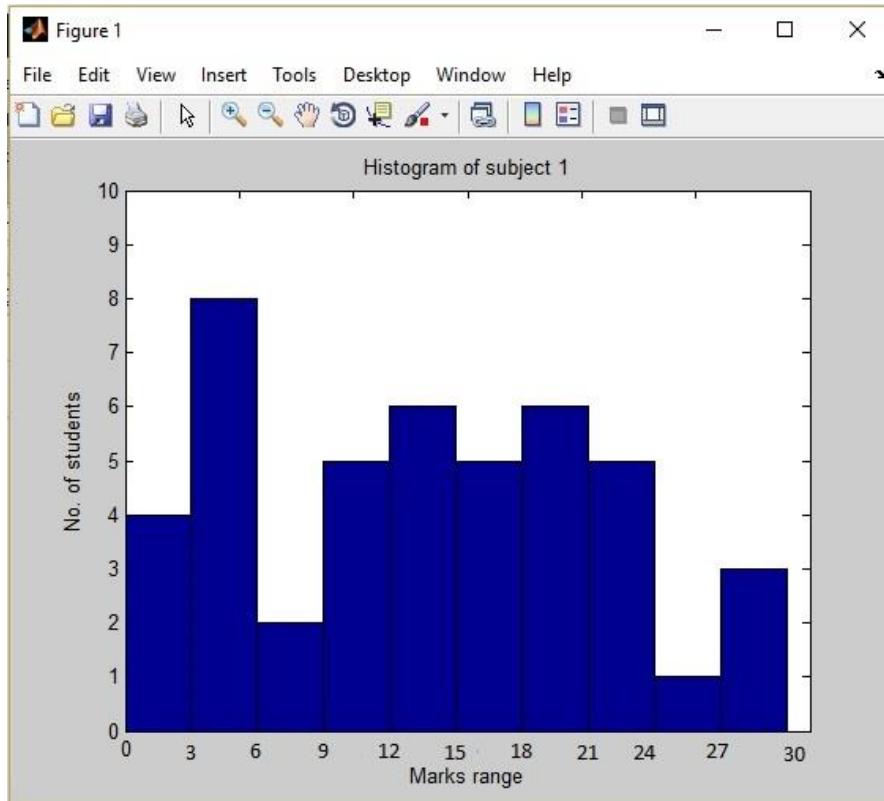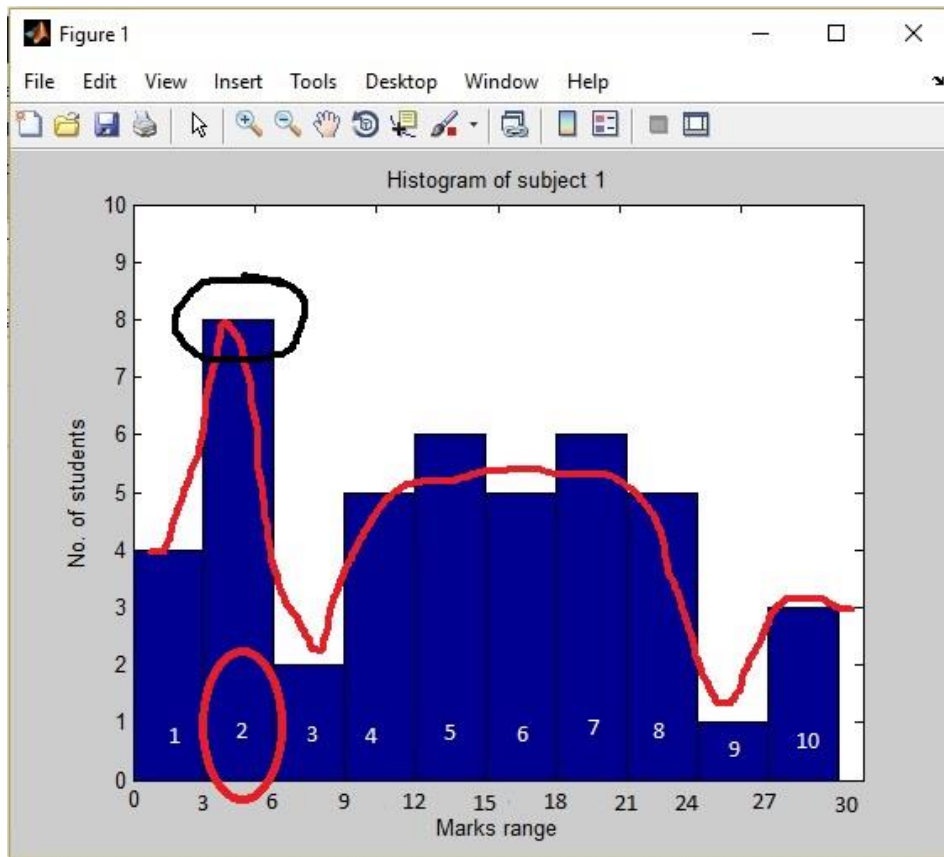
2. A histogram for each subject is obtained based on the marks of all the students in that subject. In MATLAB, by using the hist() command we can obtain the histogram. The hist() command returns two things, first is a graph(histogram), the second is a matrix that represents the Y value of the histogram for each division of X).

Histogram of subject 1

hsub =

4	8	2	5	6	5	6	5	1	3
9	2	3	7	7	3	5	2	5	2
9	7	1	5	2	3	6	2	4	6
2	3	0	6	7	4	6	6	6	5

hsub =

4	8	2	5	6	5	6	5	1	3
9	2	3	7	7	3	5	2	5	2
9	7	1	5	2	3	6	2	4	6
2	3	0	6	7	4	6	6	6	5
3	2	4	7	6	10	5	2	4	2

hsub =

4	8	2	5	6	5	6	5	1	3
9	2	3	7	7	3	5	2	5	2
9	7	1	5	2	3	6	2	4	6
2	3	0	6	7	4	6	6	6	5
3	2	4	7	6	10	5	2	4	2
3	0	0	5	5	12	8	4	4	4

Y values from the historgram of subject 1 are copied to the first row of hsub matrix

3. The hsub matrix represents the histogram values for each subject. Row -> subject1,2,3…. And column -> No. of students in the range 0-3,3-6,6-9….so on. At this step the peak positions are calculated for each subject.

Histogram of subject 1

Peak positions of subject1, sub 2, sub3, sub4, sub5, sub6

4. Once the peak position is found for each subject, the rank matrix is formed. The rank matrix represents the subject index, in decreasing order of difficulty. The first element of the rank matrix is the index of the MOST DIFFICULT subject. And the last element of the rank matrix represents the index of the EASIEST subject. For example, Say rank = [3 2 6 4 1 5], what this means is, here 3 is the first index(MOST DIFFICULT) so here 3 means 'Sujbect3' and 5 is the last element(EASIEST), so 5 means 'Subject5'.
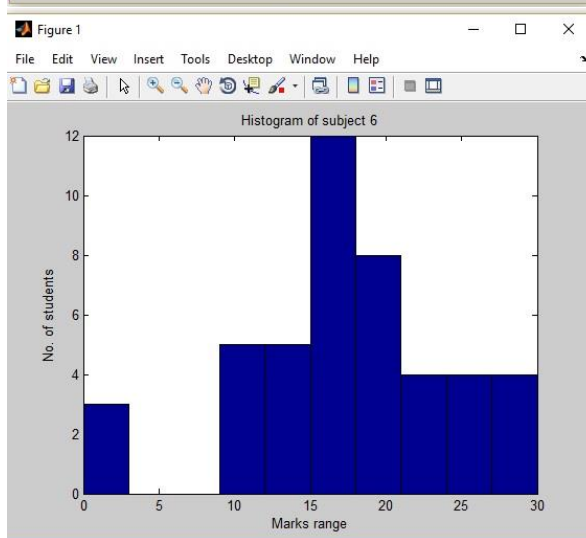

 In our case, subject3 is the most difficult and subject5 is the easiest. By verifying the histograms of each subject manually, we can come to this conclusion.

Histogram of subject 1

Histogram of subject 2

Histogram of subject 3

Histogram of subject 4

Histogram of subject 5

Histogram of subject 6
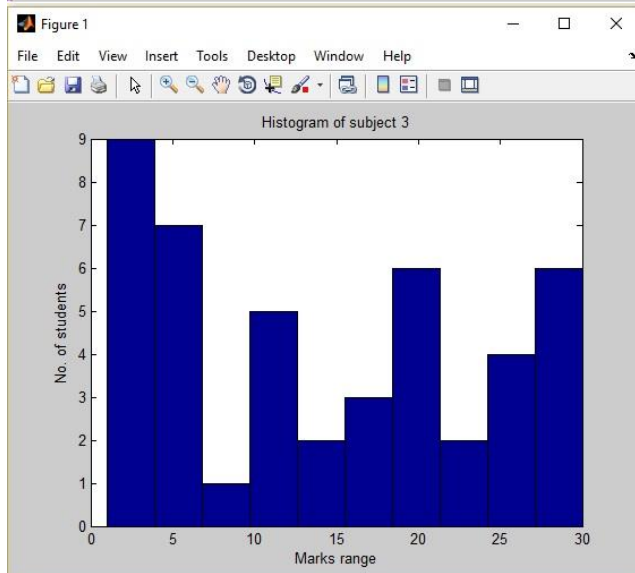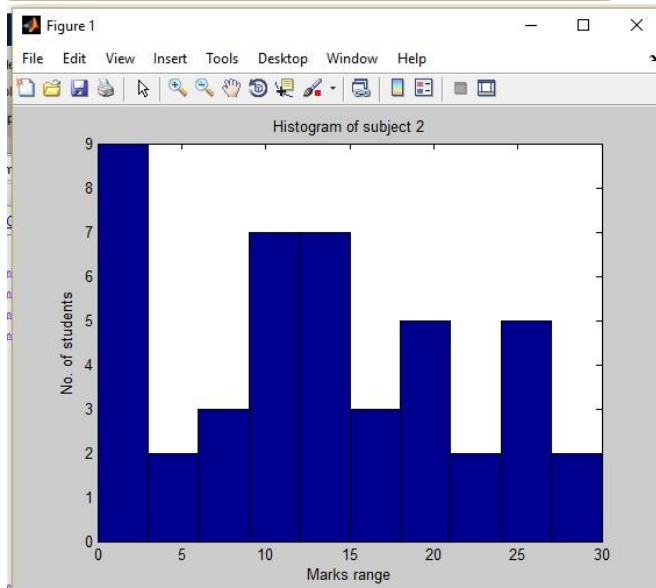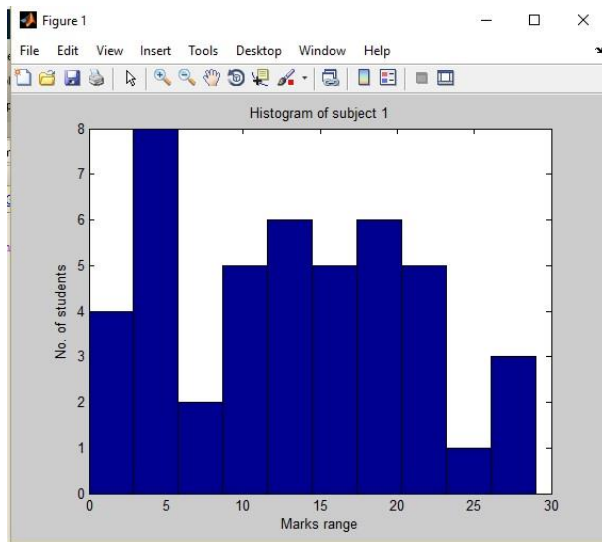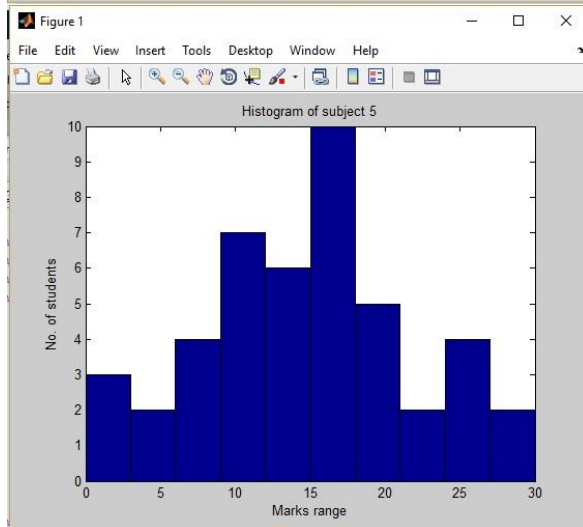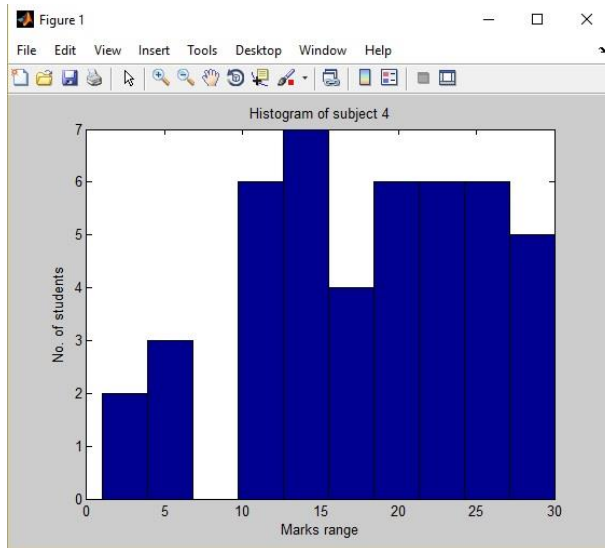
Finally based on method1 the timetable can be set as follows.

Subject3	Subject4
Subject2	Subject6
Subject1	Subject5

Method2:

In method2 there are two stages.

In 1st stage we consider each student and arrange the subjects in decreasing order of difficulty based of highest,2nd ,3rd , 4th highest… and so on. A matrix named 'rank is formed' and each row of the rank matrix is dedicated to a particular student. In each row, the first element represents the index of the difficult subject and last element represents the easiest subject **for that particular student**. So this process is done for all the students and the rank matrix is formed.

In the 2nd stage we consider the columns of rank matrix, the columns of the rank matrix represents what is the relative difficulty of that subject for that particular student. Suppose the 2nd row of the rank matrix has elements as such.

Rank(2,:) = 3 6 1 2 5 4

What this means is

Subject 1 is 3rd difficult
Subject 2 is 6th difficult
Subject 3 is 1st difficult
Subject 4 is 2nd difficult
Subject 5 is 5th difficult
Subject 6 is 4th difficult

NOTE: Here index represents the subject and the value represents the rank of difficulty.

rank =

5	4	2	1	6	3
2	4	1	6	3	5
6	4	3	2	1	5
6	5	4	1	2	3
3	5	2	1	6	4
3	5	2	6	1	4
1	3	5	2	6	4
1	5	4	6	2	3
4	3	6	1	5	2
4	5	1	2	6	3
4	5	2	1	6	3
4	3	5	1	2	6
3	4	5	1	2	6
4	5	1	2	6	3
5	1	4	3	2	6
5	1	4	2	6	3
1	6	4	2	5	3

In 2nd stage, we consider this rank matrix and plot a histogram, this histogram represents 'How many students find this subject difficult at scale from 1 to 6.

Subject 1

Subject 2

Subject 3

Subject 4

Subject 5

Subject 6