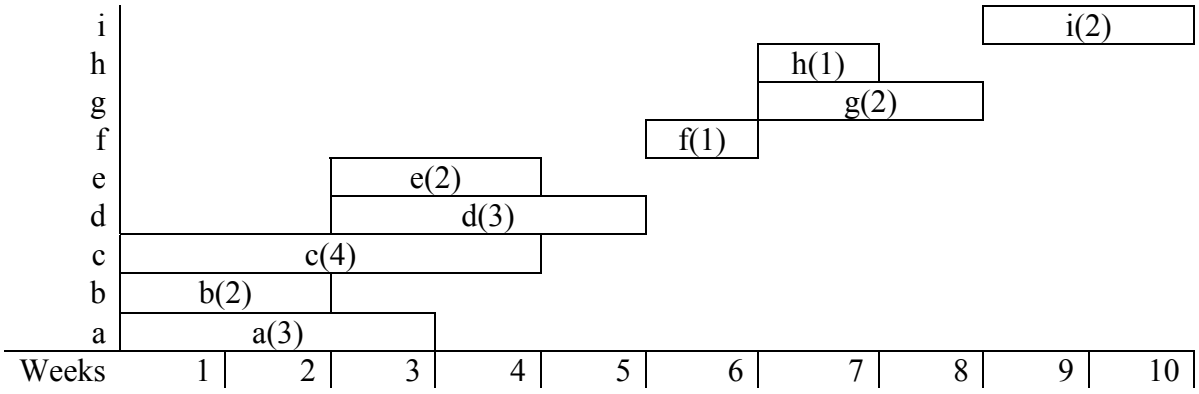
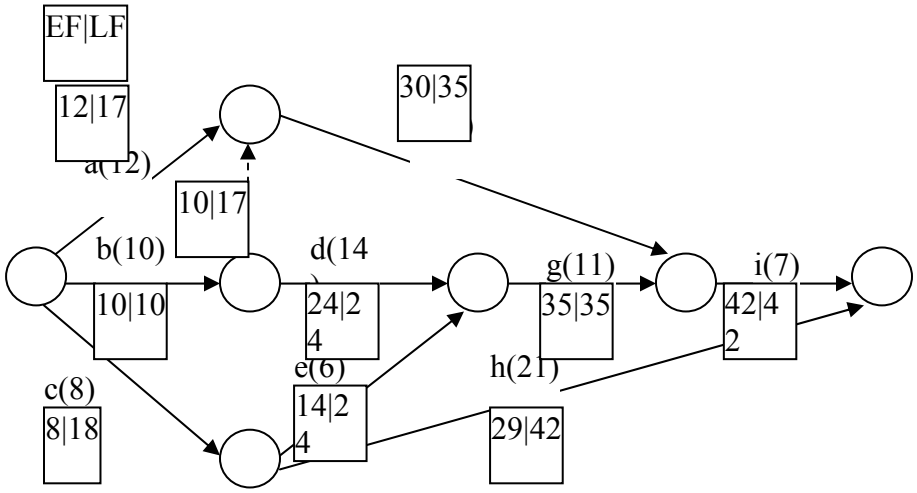
SOLUTION TO HOMEWORK ON PROJECT MANAGEMENT
CHAPTER 10.

5. Gant Chart




9. The network diagram and the EF and LF are shown below.




The critical path is b, d, g, i
The project completion time is 42 days.
Slack of each activity is LF – EF. For example the slack for activity h = 42 – 29 = 13 days
The ES and LS can be determined as follows:
ES = EF – duration of the activity
LS = LF – duration of the activity.
For example ES for h = 29-21 = 8th day, and LS = 42-21 = 21st day.

12. $t_e = (t_0+4t_m+t_p)/6 = (18+4(22)+27)/6 = 22.17$ days
Variance $V = [(t_p-t_o)/6]^2 = [(27-18)/6]^2 = [9/6]^2 = 2.25$

Standard deviation $\sigma = \sqrt{V} = \sqrt{2.25} = 1.5$

14.

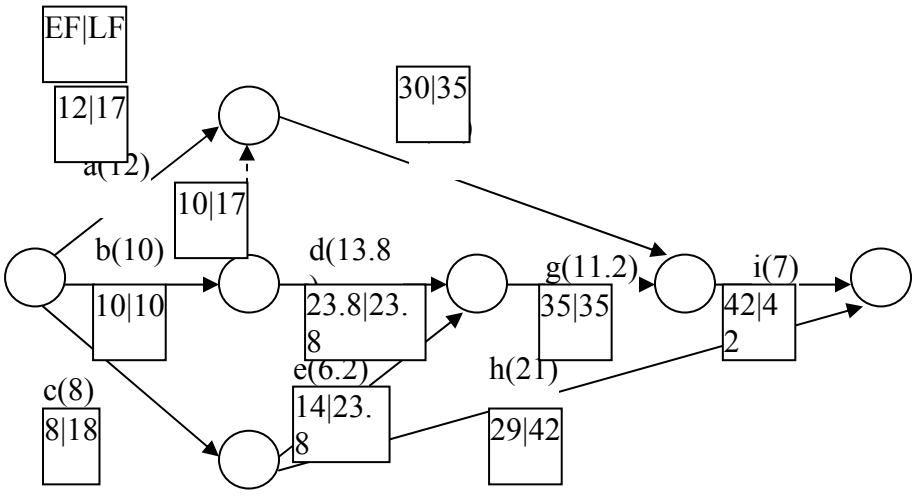
| Activity | $t_0$ | $t_m$ | $t_p$ | $t_e = (t_0+4t_m+t_p)/6$ | $V = [(t_p-t_o)/6]^2$ |
|---|---|---|---|---|---|
| a | 3 | 4 | 5 | **4.00** | **0.111** |
| d | 9 | 12 | 14 | **11.83** | **0.694** |
| f | 12 | 15 | 20 | **15.33** | **1.778** |
| k | 7 | 9 | 9 | **8.67** | **0.111** |
| Expected duration and variance of the path (by summing up)= | | | | **39.83** | **2.69** |

17.

First let us find the expected time of the activities:

| Activity | $t_0$ | $t_m$ | $t_p$ | $t_e = (t_0+4t_m+t_p)/6$ |
|---|---|---|---|---|
| a | 10 | 12 | 14 | 12.00 |
| b | 10 | 10 | 10 | 10.00 |
| c | 6 | 8 | 10 | 8.00 |
| d | 11 | 14 | 16 | 13.83 |
| e | 5 | 6 | 8 | 6.17 |
| f | 14 | 18 | 22 | 18.00 |
| g | 10 | 11 | 13 | 11.17 |
| h | 18 | 21 | 24 | 21.00 |
| i | 5 | 7 | 9 | 7.00 |

Then using the expected time of the activities, and the precedence relationship activities the network is drawn and all EF and LF are computed.




The critical path is b-d-g-i and the duration is 42 days. EF and LF are shown.

(f) To answer this question first let us find the variance and then the standard deviation of the critical path duration.

| Activity | $t_0$ | $t_m$ | $t_p$ | $V = [(t_p-t_o)/6]^2$ |
|---|---|---|---|---|
| b | 10 | 10 | 10 | 0 |
| d | 11 | 14 | 16 | 0.694 |
| g | 10 | 11 | 13 | 0.250 |
| i | 5 | 7 | 9 | 0.444 |
| Variance of the critical path duration = 0+.694+.25+.444 = | | | | 1.389 |
| Standard deviation = √1.389 = | | | | 1.179 |

Now to find the probability that the project will take more than 45 day, we first assume that the critical path duration is normally distributed

then Z = (45-42)/1.179 = 2.54.
Corresponding area under the normal curve from the normal table = 0.99446, which is the left of the Z value
So probability of project completion time more than 45 days = 1-0.99446 = 0.00554