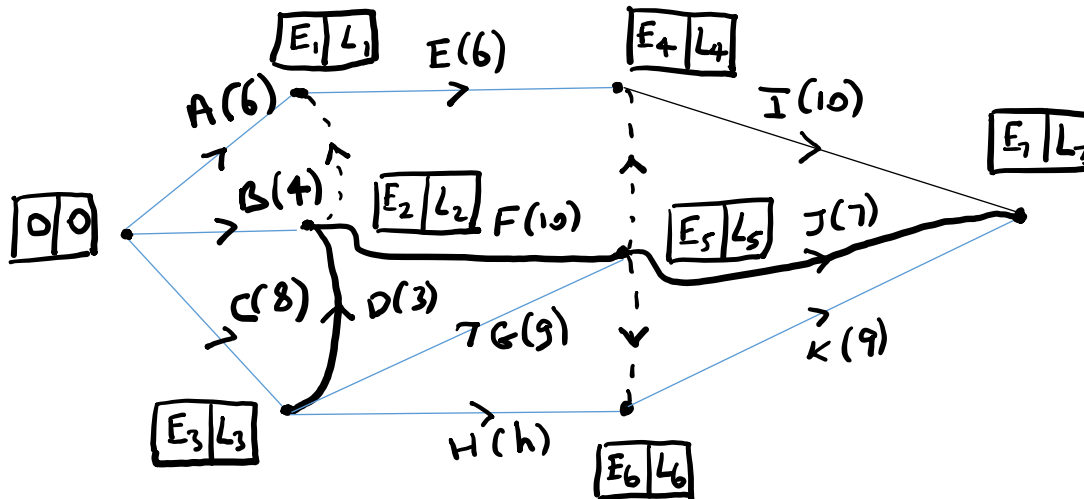


Critical Path Analysis – Q5 (21/5/24)

Create an activity-on-arc network corresponding to the following precedence table, with earliest and latest event times, given that the only critical activities are C, D, F and I.

| Activity | Immediate predecessors | Duration (hours) |
|----------|------------------------|------------------|
| A | – | 6 |
| B | – | 4 |
| C | – | 8 |
| D | C | 3 |
| E | A, B, D | 6 |
| F | B, D | 10 |
| G | C | |
| H | C | |
| I | E, F, G | 10 |
| J | F, G | 7 |
| K | F, G, H | 9 |

Solution



Denoting the duration of activity A by a etc:

$$E_3 = 0 + 8 = 8; E_2 = \max(E_3 + 3, 0 + b) = \max(11, 4) = 11$$

$$E_1 = \max(E_2 + 0, 0 + a) = \max(11, 6) = 11$$

As C is critical, $L_3 = E_3 = 8$

As D is critical, $L_2 = E_2 = 11$

As F is critical, $E_5 = E_2 + f = 11 + 10 = 21$, and $L_5 = E_5 = 21$

$$E_4 = \max(E_1 + e, E_5 + 0) = \max(11 + 6, 21) = 21$$

As I is critical, $L_4 = E_4 = 21$, $E_7 = E_4 + i = 21 + 10 = 31$

and $L_7 = E_7 = 31$

$$L_6 = L_7 - k = 31 - 9 = 22$$

As K is not critical, and $L_6 + k = L_7$, it follows that $E_6 < L_6$;

ie $E_6 < 22$

$$E_6 = \max(E_3 + h, E_5 + 0) = \max(8 + h, 21)$$

So $E_6 \geq 21$, and hence (as $E_6 < 22$) $E_6 = 21$

