Embedded and Real-Time Systems

Problem Set 2

1. In the following table, five tasks with arrival times, execution times and deadlines are given.

|	J_1	J_2	J_3	J_4	J_5
a_i	0	2	0	8	13
C_i	3	1	6	2	3
d_i	16	7	8	11	18

a) Determine an Earliest Deadline First (EDF) schedule. Is this schedule feasible?
b) At time t = 3, a new task J_x arrives with execution time C_x = 2 and deadline d_x = 10. Can you guarantee the schedulability of the task set with this new task?

2. Given seven tasks, A, B, C, D, E, F, and G, construct the precedence graph from the following precedence relations:

$$\begin{aligned} A &\rightarrow C \\ B &\rightarrow C \qquad B \rightarrow D \\ C &\rightarrow E \qquad C \rightarrow F \\ D &\rightarrow F \qquad D \rightarrow G \end{aligned}$$

Then, assuming that all tasks arrive at time t = 0, have deadline D = 25, and computation times 2, 3, 3, 5, 1, 2, 5, respectively, modify their arrival times and deadlines to schedule them by EDF.

3. Given the following precedence graph of four jobs:
Explain and discuss the scheduling policies EDF, SPT, LPT, LST (MLF), LRT using the example!
a) What follows with respect of EDF if job C has deadline 7 instead of 5?
b) What follows if a job E 1 (2, d] with d = 4 resp. d = 9, E independent from AB, C, and D is added to the job set?

A 4 (0, 7] ●———————● B 2 (3, 10]

C 2 (1, 5] ●———————● D 1 (0, 6]
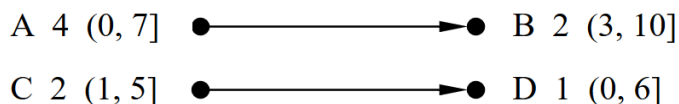
where in J e (r, d] means:
J   job name
e   execution time
r   release time
d   deadline

4. Check whether the Earliest Deadline Due (EDD) algorithm produces a feasible schedule for the following task set, given that all tasks are synchronous and arrive at time t = 0.

	J_1	J_2	J_3	J_4
C_i	3	6	2	4
d_i	8	15	3	11

P.S: please write your answers in a word document and upload them as a PDF file