2. Four processes, labelled P_1, P_2, P_3, P_4, exist in a computer system. They entered the system at times $t = 0, 0, 1, 1$ respectively. They have, respectively, the following actual CPU bursts: $\langle 2, 1, 1\rangle$, $\langle 1, 3\rangle$, $\langle 1, 1, 3\rangle$, $\langle 2, 3, 1\rangle$. They are to be scheduled using the *earliest deadline first* (EDF) algorithm.

(a) Develop the schedule generated when a *preemptive* EDF is used on the process set using the actual CPU bursts. [5]

(b) Calculate the *average waiting time* for the schedule in (a) above. [5]

(c) Since we cannot schedule using actual CPU bursts, it is proposed to develop a schedule based on *predicted* CPU bursts. CPU bursts are to be predicted using *exponential averaging*, using only the most recent history information. Develop the schedule generated when a *non-preemptive* EDF is used on the process set using the predicted CPU bursts. You can assume that the first predicted burst always matches the actual burst. You can also assume that, in the case of a tie, the process with the smallest id has precedence. [10]

(d) Calculate the *average waiting time* for the schedule developed in (d) above. [5]