Instructions:

- Put your Legi-Card on the Table.
- Write your Name and your Legi-Number on top of this page.
- Accurately read each question before solving it.
- There is at least one correct solution.
- You will get points only for correct and complete answers.
- Supporting Materials: Printouts, handwritten notes, and calculators are allowed. Devices that can be used for communication (laptops, phones, tablets, mp3 players, etc.) are NOT allowed.
- After test duration, leave your filled test and Legi-Card on the table infront of you. Do Not collect/aggregate tests in your row.
- Test duration: 10 minutes. Good luck!

Task 1 : Real-Time Systems (Cyclic- Executives)

(a) (3 Points) Mark correct statements for any cyclic-executive schedule.
  ☑ Cyclic-executive scheduling does not use preemption.
  □ For any given task-set, there is at most one feasible cyclic executive schedule.
  ☑ For some systems, the period $P$ can be equal to the frame $f$.
  □ The frame length $f$ has to be divisible by the tasks’ execution times $C_i$.
  □ Let instance $j$ of task $\tau_i$ be released in the middle of frame $f_{i,j}$. The instance might be able to execute in frame $f_{i,j}$, if the processor is free.

(b) (2 Points) Consider the following task-set executed by cyclic-executive: $\tau_1 : T_1 = 3, D_1 = 3, C_1 = 1, \phi_1 = 0$; $\tau_2 : T_2 = 2, D_2 = 2, C_2 = 1, \phi_2 = 0$. Answer the following questions.

   (a) (1/2 Point) The smallest valid cyclic-executive period $P$ is
      □ 2   □ 3   □ 5   ☑ 6

   (b) (1 Point) Mark all of the following frame lengths $f$ that are feasible:
      □ 0.5   ☑ 1   ☑ 2   □ 3   □ 5   □ 6

   (c) (1/2 Point) The 21st instance of $\tau_1$ will be released at time:
      □ 57   ☑ 60   □ 63   □ never
Task 2 : Aperiodic Real-Time Scheduling

EDD: Earliest Deadline Due  LDF: Latest Deadline First
EDF: Earliest Deadline First  EDF*: Earliest Deadline First*

(a) (1 Point) Mark statements that are correct for every aperiodic task set.

☐ EDF minimizes the number of late tasks.
☒ EDF minimizes the maximum lateness of tasks.
☐ EDF* sometimes fails to produce a schedule, even though a valid schedule exist.
☒ When modifying a task deadline for EDF*, the new deadline is always less than or equal the original deadline.

(b) (2.5 Points) The diagram below shows the precedence constraints for a set of tasks. All tasks arrive at the same time. C denotes the task execution time and D denotes the task deadline.

Using LDF algorithm to schedule these tasks, what is the order of task execution?

☐ J_A, J_B, J_D, J_C, J_E, J_F, J_G.
☐ J_A, J_B, J_C, J_D, J_E, J_F, J_G.
☒ J_A, J_D, J_B, J_C, J_E, J_F, J_G.
☐ J_A, J_D, J_C, J_B, J_E, J_F, J_G.

(c) (1.5 Points) If EDD (with ignoring precedence) was used instead of LDF, would the schedule order change?

☐ Yes, it would change.
☒ No, it would not change.