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 in front of you.
  Do Not collect/aggregate tests in your row.
• Test duration: 10 minutes. Good luck!

Task 1: Periodic Scheduling

(a) (2 Points) Consider a task-set consisting of two periodic tasks, A and B shown in the table below.

<table>
<thead>
<tr>
<th>Execution time C</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period T</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Relative deadline D</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Choose the correct option(s) from the following, assuming Earliest Deadline First (EDF) scheduling:

☐ The task set is schedulable.
☒ The task set is not schedulable.
☐ There is no other scheduling algorithm that can schedule this periodic task set.

(b) (3 Points) Consider a task-set consisting of three periodic tasks, A, B and C shown in the table below.

<table>
<thead>
<tr>
<th>Execution Time C</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period T</td>
<td>6</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Relative Deadline D</td>
<td>6</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

Select all the correct statements, assuming a Rate Monotonic (RM) scheduling policy:

☐ The worst case interference suffered by task A is 1.
☒ The worst case interference suffered by task B is 2.
☐ The worst case interference suffered by task C is 4.
☒ The worst case response time of task C is 5.
Task 2 : BTnut Threads

(a) (2 Points) You are given the following excerpt of a BTnut program:

```c
HANDLE event;
THREAD(hello_thread, arg){
    for(;;){
        printf("hello");
        //insert command here
        for(;;){
    }
}
}
int main(void){
    btn_hardware_init();
    NutThreadCreate("hello", hello_thread, 0, 192);
    NutThreadYield();
    for(;;){
}
}
```

Which of the following commands can be inserted in line 5 such that the program stops printing “hello”?

⊠ NutThreadYield(); ⊠ NutEventWait(&event,NUT_WAIT_INFINITE); ⊠ NutThreadExit();

Task 3 : BTnode Schematic

(a) (3 Points) The figure below illustrates a modified version of the BTnode schematics, detailing how the four LEDs are interfaced to the microcontroller (not shown in the figure) using an external memory address bus. As in the original schematics, PC<0...7> is connected to the upper part (bits 8 to 15) of the microcontroller’s external memory address bus.

Which of the following lines of assembler code turns on the red, blue and green LEDs and turns off the yellow LED.

□ lds r24, 0xffff  □ lds r24, 0x3c00  □ lds r24, 0x2c00  ⊠ lds r24, 0x6f00