Exam questions for SW for Embedded Systems 2022

---------- Jens' part----------

topic 1

Explain what is an interrupt.

Explain download file nokrnl/isr01 – how is interrupt installed

Explina download fil norknl/isr02 – how is interrupts generated

Explain difference to nokrnl/isr03

topic 4

ex 4

- Design a krnl program that blinks with LED 13 10 times a second
- Write a simple counter on terminal every 400 millisecond

topic 5

ex 2 Design and implement a system which …

- has one high priority task running with Ts = 100 msec and print out a shared variable of type int (v)

- has one low prio task which update an integer every 2 sec (v++)

topic 6

"the big one"

topic 7

ex 5

- do a skeleton impl in krnl/freertos for 14.3 and 14.4

- use stub functions for reading shaft rotation count etc

topic 7

ex 6

- do a skeleton impl of fig 14.15

---------- Henriks part ----------

topic 2:

entire exercise

topic 3

entire exercise

topic #7

ex 1

- Given a taskset:T1=5,c1=3,T2=8,c2=3 where relative deadlines equal periods.
- Based on T and c values, give a (scheduling independent) upper bound of busy period length.
- Create a feasible cyclic schedule to solve the problem.

ex 2

- Given a periodic taskset : T1=4,c1=3,T2=12,c2=2 where relative deadlines equal periods.
- Suggest a slot-time for round robin scheduling.
- Validate feasibility of a round robin with the suggested slot-time.

ex 5

- Implement the example of ex. 4 in krnl or FreeRTOS.
- Measure computation time of task1 with millis().
- Measure the time between ready and scheduling instant with millis().
- Measure the time between ready and completion instant with millis().

topic #8

ex 1

- Given a periodic taskset : T1=4,c1=3,T2=12,c2=2 with relative deadlines d1=4,d2=7
- Examine the taskset w.r.t. schedulability using the exact criterion for DMA scheduling.
- Is the taskset EDF schedulable ?

ex 2

Given a periodic taskset T1=40,c1=10,d1=20,T2=60,c2=20,d2=30,T3=80,c3=20,d3=80 (milliseconds) where task1 and task2 share data protected by semaphore S. Accessing the shared data lasts no more than 10 (time units-mill sec). Priority ceiling or immediate ceiling is assumed.

- Is the taskset DMA schedulable ?
- If the data above are instead shared between task1 and task3, is the taskset then DMA schedulable.

topic #9

the entire exercise