

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) END SEMESTER ON-LINE PROCTORED EXAMINATIONS

DECEMBER 2021

REAL TIME SYSTEMS [ELE 4064]

REVISED CREDIT SYSTEM

Time: 75 Minutes + 10 Minutes	Date: 24 December 2021	Max. Marks: 20

Instructions to Candidates:

- Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- Time: 75 minutes for writing + 10 minutes for uploading.
- **1A.** Consider a real time system with four independent periodic tasks $T_1 = (4,1), T_2 = (6,2), T_3 = (8,0.8), and T_4 = (12,1.5)$. Develop a suitable schedule using static timer-driven scheduler. Show the schedule table and task schedule diagram for one hyperperiod.

(04)

(03)

1B. Schedule the following tasks using RMA and a deferrable server (2.4,0.6);

Periodic tasks: $T_1 = (2.5,1)$, $T_2 = (9,3)$; Aperiodic task: A1 released at t = 0.1 and execution time of 0.9; A2 released at t = 2.7 and execution time of 1. Determine the response times of A1 and A2 and first job of T2. Also check whether the periodic tasks meet their deadline.

1C. Find the modified parameters (ready time, and deadline) for scheduling following tasks under EDF, with precedence constraint shown in Fig.Q.1C. T1 = (1,20,2,20), T2 = (0,25,5,25), T3 = (3,24,6,24), T4 = (0,50,10,50), and T5 = (2,48,7,48).



Fig. Q.1C



Allocate/assign following real-time periodic tasks to four processors using next fit algorithm for RMA scheduling.

Task	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇
Pi	5	10	15	20	25	30	35
ei	0.5	3	8	4	6	10	12

Can the assigned tasks be feasibly scheduled under EDF on each processor? Justify your answer

2B. In a chemical plant following three real time tasks are to be scheduled on a uniprocessor.

Task-1: Monitor temperature value every 8s. Worst case processing time for temperature is 3s.

Task-2: Monitor humidity value every 9s. Worst case processing time for humidity is 3s.

Task-3: Monitor pressure value every 15s. Worst case processing time for pressure is 3s.

Apply relevant tests/conditions to check whether these independent periodic tasks are schedulable under RMA on uniprocessor.

2C. A network designed using IEEE802.4 protocol has three nodes, N1, N2, and N3:

N1 needs to transmit 1.5 MB of data every 250 msec.

N2 needs to transmit 1.3 MB of data every 450 msec.

N3 needs to transmit 2.3 MB of data every 300 msec.

Ignore propagation time and

- i. Select suitable TTRT. Justify your answer.
- ii. Determine the synchronous bandwidth of the nodes or token holding time.

ELE 4064

eduled under EDF on each

(03)