MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL (A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) PROCTORED ONLINE MAKEUP EXAMINATIONS, FEBRAUARY 2022

REAL TIME SYSTEMS [ELE4064]

REVISED CREDIT SYSTEM

Time: 75 Minutes + 10 Minutes D	ate: 24 February 2022	Max. Marks: 20
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Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- Time: 75 minutes for writing + 10 minutes for uploading.
- **1A.** Obtain the task schedule for the following independent periodic tasks till t = 60 using
 - i. Rate monotonic algorithm
 - ii. Deadline monotonic algorithm

 T_1 = (5,1.5), T_2 = (10,2,10), T_3 = (25,5,30), T_4 = (20,4,40), and T_5 = (50,10,20).

Analyze the schedule obtained and determine the feasibility of the schedule. Justify your answer.

1B. Schedule the following tasks using RMA **i.** without slack stealing **ii.** with slack stealing.

Periodic tasks: $T_1 = (3,1.1)$, $T_2 = (10,3.9)$; Aperiodic task: 'A' released at t = 0.2 and execution time of 1.8.

Which of these methods is better for scheduling aperiodic jobs? Justify your answer.

1C. Obtain a feasible schedule for the real time task sets (T1, T2, ...T5) with precedence shown in Fig.Q1C, using a table driven scheduler. T1 = (0,9,3,9), T2 = (0,25,6,25), T3 = (0,24,7,24), T4 = (0,50,11,50), and T5 = (0,46,8,46). Describe the method used.



Fig. Q.1C

(03)

(04)

(03)

2A. With the help of a relevant pseudocode, describe the priority inheritance protocol. Discuss the limitations of priority inheritance protocol. *(03)*

- **2B.** Use analytical method of time demand analysis to check whether the following periodic tasks can be feasibly scheduled under RMA on a uniprocessor. $T_1 = (3,1.2), T_2 = (4,1.4), and T_3 = (6,0.6)$. Verify and validate your answer using graphical method of time demand analysis. **(04)**
- **2C.** A network designed using IEEE802.4 protocol has three nodes, N1, N2, and N3:
 - N1 needs to transmit 1.2 MB of data every 225 msec.
 - N2 needs to transmit 0.8 MB of data every 400 msec.
 - N3 needs to transmit 2.5 MB of data every 250 msec.

Ignore propagation time and

- i. Select suitable TTRT. Justify your answer.
- ii. Determine the synchronous bandwidth of the nodes or token holding time. **(03)**