Reg. No.

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, NOVEMBER 2019

REAL TIME SYSTEMS [ELE 4004]

(A constituent unit of MAHE, Manipal)

MANIPAL INSTITUTE OF TECHNOLOGY



A real-time system runs on pre-emptive RM scheduler with three periodic task (T) 3B. set and three Aperiodic (AP) job arrives at instances (A) as shown in Table 3B. Schedule the task set in the timeline if, a simple sporadic-server with period of 5ms and execution budget of 1.5ms is used. Schedule the task set in the timeline and draw the server budget consumption graph for a duration of 0 to 25ms.

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- **1B**.

- 2B.
- 2C.
- 3A.

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- **3C.** State the modifications to be made to task parameters of an EDF scheduler to handle the task dependencies. Make suitable modifications to the task parameters for tasks shown in **Figure 3C.** Show all the calculations and assume task parameter is given as (release time, execution time, deadline) respectively.
- **4A.** Write an Algorithm/Flowchart to show the working of Priority Ceiling Protocol (PCP) considering all the clauses/rules. Support the explanation by generating suitable example/s using set of tasks and resources for all the clauses/rules.
- **4B.** A system has tasks T_1, T_2, T_3, T_4, T_5 , and T_6 with priority order given as: $T_1 > T_2 > T_3 > T_4 > T_5 > T_6$. The resource and computing requirements of these tasks are shown in **Figure 4B**. Compute different type of inversion under PCP that each task might undergo in the worst-case condition. State the reason for each such computation.
- **4C.** Explain the issue of Dead-Lock in Priority Inheritance Protocol (PIP) and how it is rectified in Highest Locker Protocol (HLP) with relevant example set of tasks and resources.
- **5A.** The **Table 5A** shows specifications of set of 10 periodic real-time tasks. Assume that task set need to run on a multiprocessor with four processors and each processor are to be scheduled using RM algorithm. Describe the working of next fit algorithm and allocate the tasks to the processor using next fit algorithm.
- **5B.** Explain IEEE 802.4 with respect to real-time communication. A network is designed using IEEE 802.4 protocol has three nodes. Node 1 needs to transmit 2MB of data every 600ms. Node 2 needs to transmit 2.4MB of data every 1000ms. Node 1 needs to transmit 4MB of data every 400ms. Select a suitable Target Token Rotation Time(TTRT) for the network and compute the token holding time for each node.
- **5C.** Write a pseudo-code to explain the working of focused addressing and bidding algorithm for distributed real-time systems. Mention the shortcomings of algorithm

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