MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

## SEVENTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.) END SEMESTER DEGREE EXAMINATIONS, NOVEMBER - 2019

SUBJECT: REAL TIME EMBEDDED SYSTEMS [ICE 4003]

## TIME: 3 HOURS

## MAX. MARKS: 50

## Instructions to candidates : Answer ALL questions and missing data may be suitably assumed.

- 1A. Explain the basic model of real time systems with block diagram.
- 1B. Classify real time tasks with examples for each.
- 1C. Consider 7 processes P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub>, P<sub>4</sub>, P<sub>5</sub>, P<sub>6</sub> and P<sub>7</sub> arriving in ready queue at time 0, 1, 2, 3, 4, 5 and 6 respectively with priority 2, 4, 6, 10, 8, 12 and 9 respectively. If the burst time requirements are 4, 2, 3, 5, 1, 4 and 6 respectively, use preemptive priority scheduling method to find the average waiting time, average turn around time and response time. Assume higher values indicate higher priorities.

(3+3+4)

- 2A. Explain cyclic scheduler with relevant figures. List the constraints for selecting the frame size.
- 2B. Consider the following set of 3 periodic real time tasks  $T_1 = (e_1 = 10ms, p_1 = 20ms)$ ,

 $T_2 = (e_2 = 15ms, p_2 = 60ms), T_3 = (e_3 = 20ms, p_3 = 120ms)$  to be run on a processor. Determine whether the given task set is schedulable under Rate Monotonic Algorithm (RMA)

2C. Compute the different types of inversions that each task might have to undergo for the task graph given below. Assume tasks have been sorted in order of priority. Task  $T_1$  has highest priority and task  $T_6$  has least priority.



(5+2+3)

- 3A. Compare centralized clock synchronization and distributed clock synchronization schemes with relevant figures.
- 3B. Explain Deadlock and chain blocking conditions with suitable examples.
- 3C. Define fault latency and error latency.
- 4A. Compare bus based architecture and ring architecture for real time communication in LAN.
- 4B. Explain RETHER protocol.

(4+4+2)

4C. List the disadvantages of assembly language based development. (4+4+2)
5A. Write a short note on PSOS and VRTX operating systems.
5B. Explain host target and preemption point approach in Operating systems.
5C. Define Task preemption time and static priority level. (4+4+2)

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