Question Paper

Exam Date & Time: 31-Dec-2022 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH MAKE UP END SEMESTER EXAMINATIONS, ICE DEPARTMENT, DEC-JAN 2023

Real Time Operating Sytem [ICE 4060]

Α

Marks: 50

Duration: 180 mins.

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)		Explain built in self test and triple modular redundancy technique to provide hardware fault tolerance. [CO1, PO1, BL2]	(4)
	A)		
	B)	Describe the important characteristics of a real time system. [CO1, PO1, BL2]	(3)
	C)	Explain the priority inheritance protocol with example. [CO2, PO4, BL2]	(3)
2)	A)	Consider a real time system in which tasks are scheduled using Foreground Background Scheduler. There is only one periodic foreground task $T_f = (\Phi_f = 0, p_f = 100ms, d_f = 100ms)$ and the background task be $T_b = (e_b = 1000ms)$. Compute the completion time for background task. [CO2, PO2, BL3]	(2)
	B)	A cyclic scheduler is to be used to run the following set of periodic tasks on a processor $T_1 = (e_1 = 1, p_1 = 4), T_2 = (e_2 = 1, p_2 = 5), T_3 = (e_3 = 1, p_3 = 20), T_4 = (e_4 = 2, p_4 = 20).$ Select an appropriate frame size. [CO2, PO3, BL3]	(5)
	C)	Explain Earliest Deadline First (EDF) scheduler. Describe the methods of implementing EDF scheduler and also mention its drawbacks. [CO2, PO1, BL2]	(3)
3)	A)	Consider six processes P1, P2, P3, P4, P5 and P6 arriving in ready queue at time 0, 1, 2, 3, 4 and 6 time units respectively. If burst time requirements of these jobs are 4, 5, 2, 1, 6 and 3 respectively. Calculate the average Turn Around Time and average Waiting Time using Round Robin scheduling. Time Quantum = 2 ms. [CO2, PO3, BL3]	(5)
	B)	Explain the parameters of a task control block along with task states. [CO3, PO1, BL2]	(3)
	C)	Three Processes with process IDs P1, P2, P3 with estimated completion time 10, 5, 7 ms and priorities 0,3,2 (0-highest priority, 3- lowest priority) respectively enters the ready queue together. Represent the tasks as per their scheduling turns using priority based scheduling (non preemptive) and calculate the average waiting time. [CO2, PO2, BL3]	(2)
4)		Explain process management and memory management in a real time operating system. [CO3, PO1, BL1]	(4)
	A)		
	B)	Describe the protocols that support hard real time communication in LAN [CO5, PO1, BL2]	(4)
	C)	What are the features of a real time operating system? [CO3, PO1, BL2]	(2)
	-		Do

Explain centralized clock synchronization. Assume that the drift rate between any two clocks is restricted to ρ=5*10⁻⁶. Suppose we want to implement a synchronized set of six distributed clocks
a) using the central synchronization schemes so that the maximum drift between any two clocks is restricted to ε=1 ms at any time, determine the period with which the clocks need to be resynchronized. [CO5, PO1, BL3]

5)

- B) List the important features of VxWorks and μ C/OS-II operating systems. [CO4, PO1, BL2] (3)
- C) List the features of Versatile Real-Time Executive (VRTX) operating system. [CO4, PO1, BL2] (2)

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