Reg. No.



VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) MAKE UP EXAMINATIONS, JANUARY 2020

REAL TIME SYSTEMS [ELE 4004]

REVISED CREDIT SYSTEM

Time:	3 Hours	Date: 02 J	Max. Ma	Max. Marks: 50					
Instru	ctions to Candidates:								
	✤ Answer ALL the ques	tions.							
	Missing data may be	suitably	y assumed. G	raph she	et may be p	rovided.			
	All representations of time are in mili-seconds.								
1A.	Draw a basic block diagra block in the model with t	am moo he help	del for a real of an examp	-time sys ole	tem and exp	plain the working of each	(04)		
1B.	Real-time tasks are norm the characteristics that a	ally cla re uniq	ssified into p ue to each o	eriodic, a f the thre	periodic an e categorie	d sporadic tasks, identify s of tasks. Give examples			
	of tasks in practical systems which belong to each of the three categories of tasks								
1C.	Why event driven sche applications having man small applications?	dulers y tasks	are invaria s, whereas c	ibly usec cyclic sch	l in all mo edulers are	oderate and large-sized predominantly used in	(03)		
2A.	Using analytical method schedulable by RMA? Als using timeline diagram.	for tin so chec	me demand ck whether i	analysis, t is scheo	, check if t dulable wit	he following task set is h DMA? Verify the same			
		Task	Execution	Period	Deadline				
		Т1	10	50	35				
		T2	15	100	20				
		T3	20	200	200		(05)		
2B.	Schedule the task set give a timeline of T (0 to 10ms	en in tal). Ment	ole below usi ion any one a	ng Earlie Idvantage	st Deadline e and disadv	First (EDF) scheduler for vantage of EDF Scheduler.			
			Tack Pario	d Eveci	ition				
			Task Terro T1 2	1					
			T2 5	2.5			(03)		
2C.	In a simple priority-driven preemptive scheduler, two periodic tasks T1 and T2 and a background task are scheduled. The periodic task T1 has the highest priority and executes once every 20ms and required 10ms of execution time each time. T2 requires 20ms of								
	processing every 50ms. T3 is a background task and requires 100ms to complete. If all the tasks start at time 0, determine the time at which T3 will complete.								
3A.	A real-time system runs with task set shown in Table below, scheduled with the pre- emptive RM scheduler. Consider an Aperiodic job arrives at time $t=0.1$ ms and has an execution time of $e=0.8$ ms. Schedule the task set in the timeline and calculate the response								

(04)

Task	Period	Execution	Deadline
T1	3	1	3
T2	10	4	10

- **3B.** Explain the working of the following resource sharing protocols for real-time systems by clearly stating the shortcomings and the advantages of the protocols. Priority Inheritance Protocol(PIP), Highest Locker Protocol(HLP) and Priority Ceiling Protocol(PCP)
- **4A.** Mention the requirements for an operating system to be real-time POSIX standard compliant.
- **4B.** Explain the working of count-down protocol used in real time communication for LAN. With the help of an example explain how high priority message is determined in Count-down protocol.
- **4C.** A system has four tasks T_1, T_2, T_3 , and T_4 with priority values of the tasks as 10, 7, 5 and 2 respectively. Priority order is given as: $T_1 > T_2 > T_3 > T_4$. The task set requires two critical resource CR1 and CR2 and the duration for which the task requires the resources are shown below. Compute different type of inversion that each task might undergo in the worst-case condition. Clearly state the reason for each such computation.



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.

Task	T_1	T ₂	T ₃	T_4	T_5	T ₆	T ₇	T ₈	T 9	T ₁₀
Execution	5	5	3	1	8	11	1	3	9	17
Period	10	22	22	24	30	40	50	55	70	75

5C. Explain IEEE 802.5 priority-based token ring protocol for real time communication

(03)

(06)

(03)

(04)

(05)

(05)