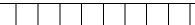
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GIET MAIN CAMPUS AUTONOMOUS GUNUPUR - 765022



B. Tech Degree Examinations, June – 2021 (Sixth Semester) **BCSPC6030 - REAL TIME SYSTEMS** (C.S.E)Time: 2 hrs Maximum: 50 Marks **Answer ALL Ouestions** The figures in the right hand margin indicate marks. **PART – A: (Multiple Choice Questions)**  $(1 \times 10 = 10 \text{ Marks})$ Q.1. Answer ALL questions [CO#] [PO#] a. In real time operating system (i) all processes have the same (ii) a task must be serviced by its 1 1 priority deadline period (iii) process scheduling can be done (iv) kernel is not required only once b. Hard real time operating system has \_\_\_\_ jitter than a soft real time operating 1 1 system. (i) less (ii) more (iii) equal (iv) none of the mentioned 1 c. In rate monotonic scheduling 1 (i) shorter duration job has higher (ii) longer duration job has higher priority priority (iii) priority does not depend on the (iv) none of the mentioned duration of the job d. The problem of priority inversion can be solved by 2 1 (i) priority inheritance protocol (ii) priority inversion protocol (iii) both priority inheritance and (iv) none of the mentioned inversion protocol e. Which one of the following is a real time operating system? 2 1 (i)) RTLinux (ii) VxWorks (iii) Windows CE (iv) All of the mentioned 2 1 f. Interrupt latency refers to the period of time : (i) from the occurrence of an event to (ii) from the occurrence of an event to the servicing of an interrupt the arrival of an interrupt (iii) from arrival of an interrupt to the (iv) none of the mentioned start of the interrupt service routine g. In a safety critical system, incorrect operation : 3 1 (i) does not affect much (ii) causes minor problems (iii) major and serious (iv) none of the mentioned causes problems scheduling algorithm schedules periodic tasks using a 3 1 h. The static priority policy with preemption. (i) earliest deadline first (ii) rate monotonic (iii) first cum first served (iv) priority 4 1 i. Rate monotonic scheduling assumes that the : (i) processing time of a periodic (ii) processing time of a periodic

	process is same for each CPU burst	process is different for each CPU burst		
	(iii) periods of all processes is the	(iv) none of the mentioned		
	same			
j.	Earliest deadline first algorithm assigns	priorities according to :	4	1
	(i) periods	(ii) deadlines		
	(iii) burst times	(iv) none of the mentioned		

## PART – B: (Short Answer Questions)

## [CO#] [PO#] Q.2. Answer ALL questions a. Why It is difficult to achieve software fault tolerance as compared to hardware 1 1 fault tolerance? b. Identify two major shortcomings of EDF while using it in real-time task 1 1 scheduling. c. What is a clock-driven scheduler and how it is different from the event-driven 2 1 scheduler? d. Distinguish traffic shaping and policing. 3 1 e. What is Task Criticality? Why is it important to consider task criticality while 4 1 designing Fault tolerant system?

## PART – C: (Long Answer Questions)

## (6 x 5 = 30 Marks)

1

 $(2 \times 5 = 10 \text{ Marks})$ 

Ansv	ver ANY FIVE questions	Marks	[CO#]	[PO#]
3.	What do you mean by Real-time system? Using a block diagram shows the important hardware components of a real time system and interactions Explain the roles of different components.	(6)	1	1
4.	Why is it necessary to synchronize the clocks in a distributed real-time system? Discuss the relative advantages and disadvantages of the centralized and distributed clock synchronization scheme.	(6)	1	1
5.	What do you mean by fault tolerance? How fault are classified according to their temporal behavior and output behavior? Discuss various types of redundancies required to design a fault tolerance system.	(6)	2	1
6.	Why is dynamically changing the priority levels of tasks important for traditional operating systems? How does this property affect real time systems?	(6)	2	1
7.	Using a cyclic real-time scheduler, suggest a suitable frame size that can be used to schedule three periodic tasks T1, T2, and T3 with the following characteristics.	(6)	3	2
	Task Phase (ms) Execution Relative Period (ms)			

Task	Phase (ms)	Execution	Relative	Period (ms)
		Time (ms)	Deadline	
			(ms)	
T1	0	20	100	100
T2	0	20	80	80
T3	0	30	150	150

8. What is cyclic scheduler? How it differs from table driven scheduler? (6) 3Discuss the important constraints that a selected frame size must satisfy

in cyclic scheduling. Prove that minimum separation of the task arrival from corresponding frame start time considering all instances of a task ti is equal to GCD (F,  $P_i$ ).

9. Describe RMA task scheduling algorithm and discuss different (6) schedulability test for RMA.

Let  $T_1$  ( $e_1 = 10$ ,  $p_1 = 50$ ,  $d_1 = 35$ ),  $T_2$  ( $e_2 = 15$ ,  $p_2 = 100$ ,  $d_2 = 20$ ),  $T_3 = (e_3 = 20, p_3 = 200, d_3 = 200)$  be a task set. Check whether this task set is RMA schedulable? Justify and if not schedulable show the alternative algorithm for scheduling it.

10. A real-time network consists of four nodes, and uses IEEE 802.4 protocol. The real-time requirement is that node  $N_i$  should able to transmit up to  $b_i$  bits over each period of duration  $P_i$  ms, where  $b_i$  and  $P_i$  are given in the table below.

Node	Bi	Pi
N1	1K	10000
N <sub>2</sub>	4K	50000
N <sub>3</sub>	16K	90000
$N_4$	16K	90000

Compute a suitable TTRT and obtain suitable values of f<sub>i</sub> (total number

of bits that can be transmitted by node  $N_i$  once every cycle). Assume that the propagation time is compared to TTRT and that the system bandwidth is 1 Mbps.

--- End of Paper ---

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(6) 4 2

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