

<b>Name:</b>	 <b>UPES</b> UNIVERSITY WITH A PURPOSE
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, May 2019**

**Course: Real Time Operating System Internals**

**Semester: VIII**

**Program: B.Tech CSE (Telecom Informatics)**

**Time 03 hrs.**

**Course Code: CSIB475**

**Max. Marks: 100**

**Instructions:**

**SECTION A**

S. No.		Marks	CO
Q 1	Provide the one line definition of the following terms. i) RTOS    ii) LST    iii) SJF    iv) RR	4	CO1
Q 2	Differentiate among the following terms. a) Non-Pre-emptive Scheduling Vs Pre-emptive Scheduling b) Relative Deadline Vs Absolute Deadline	4	CO2
Q 3	What is priority inversion? Explain with example.	4	CO3
Q 4	Identify the category of the following System in groups of Soft, Hard or firm Real time system: GPS device, Satellite Tracking system, Multimedia Systems, Satellite launches system, Video broadcasting, Anti-lock breaking	4	CO1
Q 5	What is task in RTOS? Explain the requirement of Real time task scheduling.	4	CO4

**SECTION B**

Q 6	What are the requirements of RTOS? Write down the characteristics of RTOS.	10	CO1
Q 7	With the help of an example explain the drawbacks of Uniprocessor Scheduling Algorithm EDF	10	CO2
Q 8	Explain the properties of Priority Inheritance Protocol.	10	CO3
Q 9	Consider the following periodic tasks: $T_1(e_1=1, p_1=6), T_2(e_2=6, p_2=10), T_3(e_3=5, p_3=30)$ . Schedule the tasks using DM (Deadline Monotonic) algorithm. <b>OR</b> Consider the following periodic tasks: $T_1(e_1=1, p_1=6), T_2(e_2=6, p_2=10), T_3(e_3=5, p_3=30)$ . Schedule the tasks using RM (Rate Monotonic) algorithm.	10	CO4

**SECTION-C**

Q 10	Consider the following three periodic real-time tasks to be scheduled using EDF on a	20	CO3, CO5
------	--	----	----------

	uniprocessor: $T_1(e_1=10, p_1=20), T_2(e_2=5, p_2=50), T_3(e_3=10, p_3=35)$ . Determine whether the task set is schedulable.		
Q 11	<p>Describe all the real time requirements of an Embedded Systems. What are the all design metrics of E.S. design? List all the requirements of fully automatic Washing Machine design. Draw its functional diagram. What are the control requirements of this design? Describe the functioning of sensors and actuators in the systems. List of the Task that needs to be performed and explain the scheduling requirements for your design.</p> <p style="text-align: center;"><b>OR</b></p> <p>The Process needs to communicate with each other to send data as input to other process or taking input from the other process. Discuss different inter task communication methods such as message passing, shared memory, Pipes, Message Queue and Remote procedure call. Discuss each one and provide the suitability requirements in the Real time environment for each method.</p>	<b>20</b>	<b>CO2, CO4</b>

Name:	 <b>UPES</b> UNIVERSITY WITH A PURPOSE
Enrolment No:	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**End Semester Examination, May 2019**

**Course: Real Time Operating System Internals**

**Semester: VIII**

**Program: B.Tech CSE (Telecom Informatics)**

**Time 03 hrs.**

**Course Code: CSIB475**

**Max. Marks: 100**

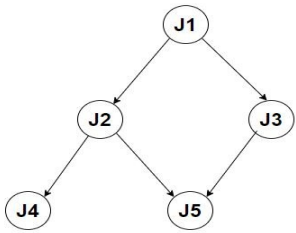
**Instructions:**

**SECTION A**

S. No.		Marks	CO
Q 1	Provide Definitions of Hard, Soft and Firm Real Time System with examples.	4	CO1
Q 2	Write the characteristics of an embedded system. What are the components of an embedded system?	4	CO1
Q 3	Differentiate among the following terms. a) Absolute Deadline Vs Relative Deadline b) Preemptive Scheduling Vs Non-Preemptive Scheduling	4	CO2
Q 4	Categorize the following System in groups of Soft, Hard or firm Real time system. Car Brakes, Car Clutch, Car Accelerator, pacemakers, whether sensors, Streaming audio-video.	4	CO2
Q 5	Explain the utility of Kernel. Write down the functionality of <b>RTOS kernel</b> .	4	CO5

**SECTION B**

Q 6	Provide the definition Slack time or laxity? Discuss the LST (Least Slack Time) scheduling algorithm and apply in the given scenario	<b>10</b>	<b>CO4</b>																
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>arrival</th> <th>duration</th> <th>deadline</th> </tr> </thead> <tbody> <tr> <td><b>T1</b></td> <td style="text-align: center;">0</td> <td style="text-align: center;">10</td> <td style="text-align: center;">33</td> </tr> <tr> <td><b>T2</b></td> <td style="text-align: center;">4</td> <td style="text-align: center;">3</td> <td style="text-align: center;">28</td> </tr> <tr> <td><b>T3</b></td> <td style="text-align: center;">5</td> <td style="text-align: center;">10</td> <td style="text-align: center;">29</td> </tr> </tbody> </table>			arrival	duration	deadline	<b>T1</b>	0	10	33	<b>T2</b>	4	3	28	<b>T3</b>	5	10	29		
	arrival	duration	deadline																
<b>T1</b>	0	10	33																
<b>T2</b>	4	3	28																
<b>T3</b>	5	10	29																

Q 7	Define the term <b>Task</b> . What is the precedence constraint among tasks? Follow the precedence graph below and find the priority of tasks.	<b>10</b>	<b>CO3</b>
			

Q 8	Discuss the characteristics of an embedded system. What are the components of an embedded system?	10	CO1
Q 9	<p>What is CPU utilization factor? How to find schedulability on the basis of Utilization factor? Schedule the following tasks using the DM scheduling <math>T_1(e_1=2, p_1=5), T_2(e_2=4, p_2=7)</math>,</p> <p style="text-align: center;"><b>OR</b></p> <p>Discuss the Rate Monotonic Scheduling algorithm. Schedule the following tasks using the RM scheduling <math>T_1(e_1=1, p_1=4), T_2(e_2=2, p_2=5), T_3(e_3=5, p_3=20)</math></p>	10	CO2, CO4
<b>SECTION-C</b>			
Q 10	Discuss priority inheritance and priority ceiling protocol	20	CO3, CO5
Q 11	<p>Consider the following three periodic real-time tasks to be scheduled using EDF <math>T_1(e_1=1, p_1=6), T_2(e_2=6, p_2=10), T_3(e_3=5, p_3=30)</math>. Determine whether the task set is schedulable.</p> <p style="text-align: center;"><b>OR</b></p> <p>Consider the following three periodic real-time tasks to be scheduled using RM (Rate Monotonic): <math>T_1(e_1=1, p_1=6), T_2(e_2=6, p_2=10), T_3(e_3=5, p_3=30)</math>. Determine whether the task set is schedulable.</p>	20	CO2, CO4