Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, May 2020

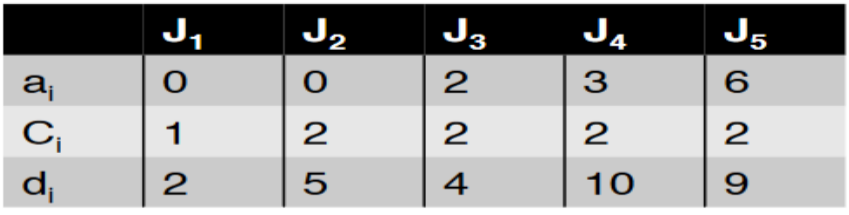
Course: Real Time Operating System Internal **Semester: V**
Program: B. Tech. CSE IoT-SC **Time 03 hrs.**
Course Code: CSTI 4001 **Max. Marks: 100**

SECTION A

Each Question will carry 5 Marks. for Multiple choice question and fill in the blank answer type in the correct option in the text box.

S. No.	**Question**	**CO**	
Q 1	For a particular scheduling algorithm, the RTOS scheduling algorithm need to run at ARM multicore processors with 4 cores and precedence constraint and need to optimize the finish time of all processor. How It will be represented in Grahams notation (α|β|γ) ……|……..|……..	**CO1**	**5**
Q2	Software Unit testing consists of which of the following approach: a). Data-intensive testing: applying a large range of data variation for function parameter values, or b). Boundary value testing: Checking the system performance at the boundary values c). Scenario-based testing: exercising different method invocation sequences to perform all possible use cases as found in the requirements. d). Integration testing: Checking the integration of different units and their integration Pick the correct option i) a only ii) b and d both iii) a, b, c and d iv) a and c only v) b and c only	**CO5**	**5**
Q3	In a simple priority-driven preemptive scheduler, **3** periodic tasks **T1**, **T2** and **T3**. The periodic task T1 has the highest priority and executes once every 20 milliseconds and requires 5 milliseconds of execution time each time. T2 requires 10 milliseconds of processing every 50 milliseconds. T3 requires 10 milliseconds and reoccurs every 50 milliseconds. Assuming that all the tasks start at time 0, then total CPU utilization factor ……	**CO4**	**5**
Q4	Pick the wrong statement: a). SPI protocol uses master slave configuration and daisy chaining for priority assignment. b). I2C is a synchronous half-duplex protocol with multi master/ slave configuration. c). UART is used for Synchronous Parallel communication. d). All	**CO3**	**5**

<table>
<tr><td>Q5</td><td>Match the following and pick the correct option. (All option on right not necessarily match)
i). 8051 — 1. ARM architecture
ii). DSP — 2. Intel microcontroller
iii). Arduino — 3. Atmel
iv). Snapdragon — 4. AMD
v). Raspberry Pi — 5. ASIC

a).23441
b). 21134
c). 25311
d). 12355</td><td>CO2</td><td>5</td></tr>
<tr><td>Q6</td><td>Match the following (All option on right not necessarily match)
i) Bartley algorithm — 1. 1 | sync | Lmax
ii) EDF — 2. N|sync|Lmax
iii) EDD — 3. 1 | sync | feasible
iv) Horns Algorithm — 4. 1 | preem | Lmax
v) Jacksons Algorithm — 5. 1|sync|Σf_i
6.N|preem|Lmax</td><td>CO4</td><td>5</td></tr>
<tr><td colspan="3">SECTION B
1. Each question will carry 10 marks
2. Instruction:</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Q 7</td><td>Discuss SPI protocol and Explain multi slaves are daisy chained using the SPI protocol.</td><td>CO3</td><td>10</td></tr>
<tr><td>Q 8</td><td>Differentiate between Wireless an and Bluetooth PAN. Explain scatter net and piconet in Bluetooth communication.</td><td>CO3</td><td>10</td></tr>
<tr><td>Q 9</td><td>What is the difference between error, fault and bug? Discuss stuck at 0 fault model with diagram.</td><td>CO5</td><td>10</td></tr>
<tr><td>Q 10</td><td>Take self-driving car as case study to discuss it as RTS. Try to describe it as much as possible with the help of diagram.</td><td>CO1</td><td>10</td></tr>
<tr><td>Q 11</td><td>ARM is a high performance RISC machine with high performance. Discuss.
Provide the register set of ARM7TDI and processor modes.</td><td>CO2</td><td>10</td></tr>
<tr><td colspan="3">Section C
1. Each Question carries 20 Marks.
2. Instruction: Write long answer.</td><td></td></tr>
<tr><td>Q12</td><td>a) Discuss Bartley algorithm and the feasible schedule in the following scenario.
 
<table>
<tr><th></th><th>J_1</th><th>J_2</th><th>J_3</th><th>J_4</th><th>J_5</th></tr>
<tr><td>a_i</td><td>0</td><td>0</td><td>2</td><td>3</td><td>6</td></tr>
<tr><td>C_i</td><td>1</td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>d_i</td><td>2</td><td>5</td><td>4</td><td>10</td><td>9</td></tr>
</table></td><td>CO4</td><td>20 [12+8]</td></tr>
</table>

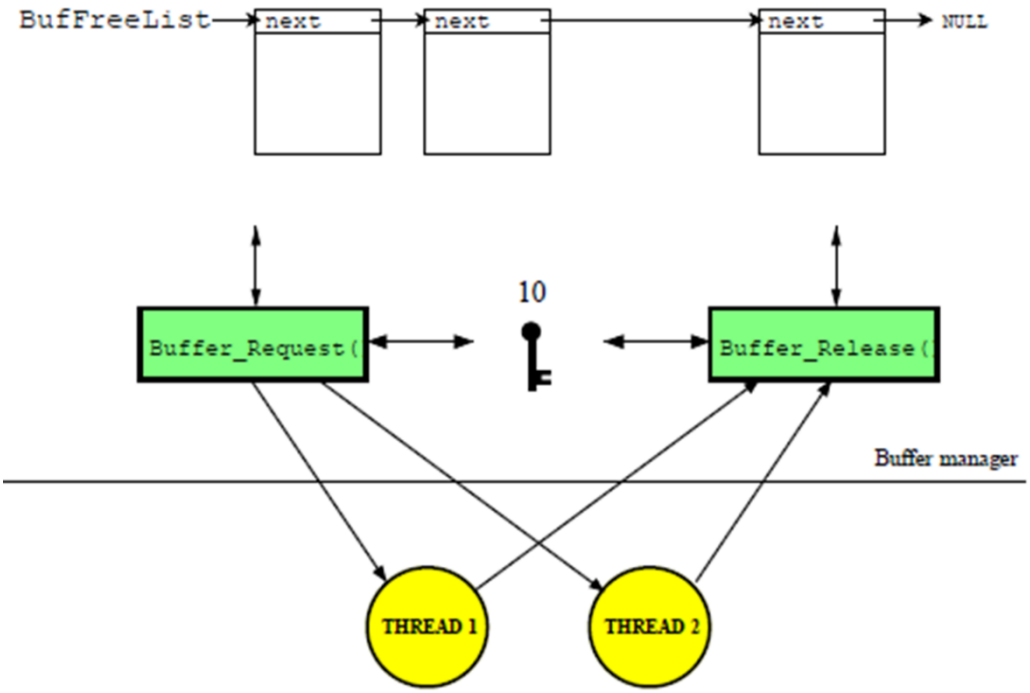
b) Solve the following using and provide the finish time of each process, throughput and CPU utilization. Consider the following set of three periodic real-time tasks: T1=(10,20), T2=(15,60), T3=(20,120) to be run on a uniprocessor.

OR Marks distribution 20(3+4+13)

Discuss the need and Role of synchronization in real time operating system. How synchronization can be achieved with the help of semaphores.

Take the above scenario and explain with the help of suitable code (C or pseudo code to provide the solution to the synchronization problem) by using the block provided.

A counting semaphore is used when many copies of a resource are present. Assume that the buffer pool initially contains 10 buffers.




```
BUF* Buffer_Request(void)
{
…….
…….
……...
return (……);
}
voidBuffer_Release(BUF* ptr)
{
```

	…… …… …….. }		