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FACULTY OF ENGINEERING
Computer Engineering Department/CHEP

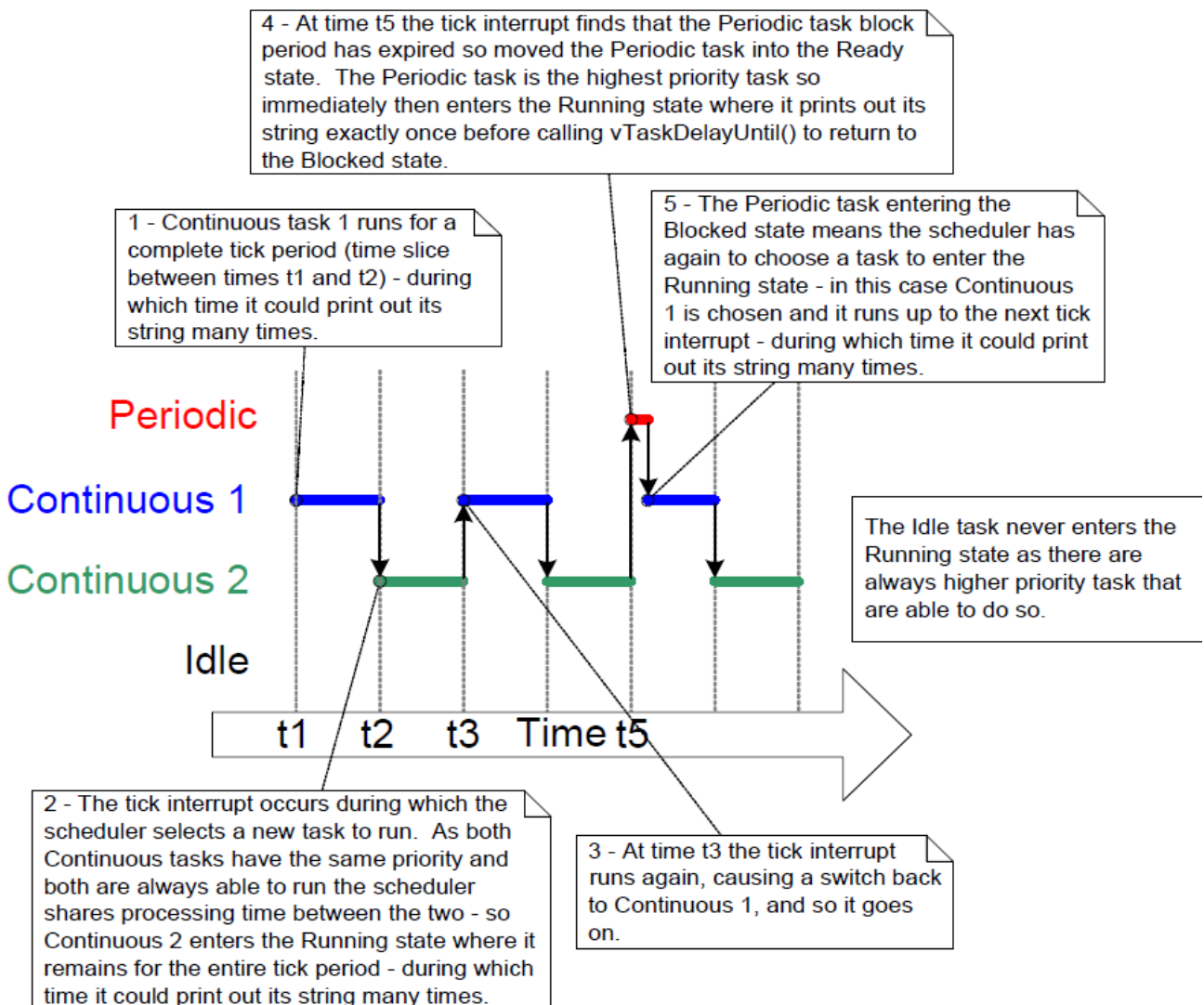| *July, 26th, 2020*	Course Code: CSE345	*Time: 2 hours*
Real Time and Embedded System Design; Final Exam		
The Exam Consists of 4 Questions, in 5 pages (ONE BLANK PAGE)	*Total Marks: 40% Marks*	**1/5**

Student Name: Marks:

Question 1

A) What is the use of the vTaskDelayUntil() API Call:

B) In the Program State Machine (PSM) model for concurrent tasks, what is the difference between TI (transfer immediate) and TOC (Transfer on Completion)?
Give example illustrating when to use either one of them.
How are these transitions implemented in software?

C) Name three processor technologies that are used in embedded system design.
What characterizes each of them?
What are the advantages/disadvantages of each of them?

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Question 2
Write a FreeRTOS based application that could achieve this descriptive timing diagram:

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Question 3 (10 Marks)

The figure below is a snap shot from a debugging session. Show the sequence of execution timing diagram starting just after vTaskStartScheduler()

```
const char *pcTextForTask1 = "Task 1 is running\n";
const char *pcTextForTask2 = "Task 2 is running\n";
int main (void )
{
xTaskCreate( vTaskFunction, "Task 1", 240, (void*)pcTextForTask1, 1, NULL );
xTaskCreate( vTaskFunction, "Task 2", 240, (void*)pcTextForTask2, 2, NULL );
vTaskStartScheduler();
for( ;; );
}
void vTaskFunction( void *pvParameters )
{
char *pcTaskName;
pcTaskName = ( char * ) pvParameters;

for( ;; )
        {
        vPrintString( pcTaskName );
        vTaskDelay( 250 / portTICK_RATE_MS );
        }
}
```

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Question 4

Explain what problem happens when this code is executed. Why did it happen? What needs to be changed to avoid such problem?

```
const char *pcTextForTask1 = "Task 1 is running\n";
const char *pcTextForTask2 = "Task 2 is running\n";
int main (void )
{
xTaskCreate( vTaskFunction, "Task 1", 240, (void*)pcTextForTask1, 2, NULL );
xTaskCreate( vTaskFunction, "Task 2", 240, (void*)pcTextForTask2, 1, NULL );
vTaskStartScheduler();
for( ;; );
}
void vTaskFunction( void *pvParameters )
{
char *pcTaskName;
pcTaskName = ( char * ) pvParameters;

for( ;; )
        {
        vPrintString( pcTaskName );
        for( ul = 0; ul < 10000; ul++ ){ }
        }
}
```

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