MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VI SEMESTER B. TECH (CCE) EXAMINATIONS MAY 2021

In-Semester (Online)

SUBJECT: EMBEDDED SYSTEMS DESIGN [ICT 3271]

Date of Exam: **20/05/2021** Time of Exam: **10.00 AM - 12.15 PM** Max. Marks: **30**

Instructions to Candidates:

- Answer ALL the questions
- All the questions are pertaining to LPC1768 microcontroller.
- Upload the single PDF file of your answer booklet.

1.	Given PCLK = 6 MHz and PR of Counter-0 is loaded with 5. The counter is configured to count at the positive edges of CAP0.1. What is the content of TC register of Counter-0 at the 32nd positive edge? Justify.	**2**
2.	Explain various conditional branch statements that can be used to branch after the comparison of two signed numbers.	**2**
3.	Assume that **a to h** inputs of a common anode 7-segment display are connected to P0.23 to P0.16 respectively. Write an embedded C statement using FIOPIN2 to display the character 'E' on the 7-segment.	**2**
4.	Explain the following instructions with an example for each: (i) RRX (ii) SMLAL	**2**
5.	Write an embedded C program to simulate a 4-2 encoder assuming P0.0-P0.3 as inputs and P0.4-P0.5 as as outputs.	**3**
6.	Write an assembly language program to find the sum of all the digits of a 8-digit BCD number available in the code memory and store the BCD result in the data memory.	**3**
7.	Write an embedded C program to generate a square waveform of frequency 200 kHz and duty cycle 57% on P2.3 using TIMER-0 (PCLK = 3 MHz)	**3**
8.	Assume that columns of a 2X2 matrix keyboard are connected to P2.12- P2.11 and rows are connected to P0.1-P0.0. Write an embedded C program to display the key code of the key pressed on LEDs connected to P0.3-P0.2. Also, explain the operation of the keyboard.	**4**
9.	Explain the operation of fully ascending stack and fully descending stack with suitable examples. Use Load Multiple and Store Multiple instructions.	**4**
10.	With the aid of a neat diagram, explain the working of 3-digit multiplexed common cathode seven segment display. Cathodes of the displays are connected to P0.0 to P0.2 and **a** through **h** lines are connected to P0.10 to P0.3 respectively. Write an embedded C program to simulate a 3-bit binary down counter on this display.	**5**