

Roll Number: _____	
<b>Thapar Institute of Engineering and Technology, Patiala</b>	
<b>Computer Science and Engineering Department</b>	
<b>Mid Sem Test</b>	
<b>BE(COE) 4<sup>th</sup> Year (7<sup>th</sup> Semester) 03 October, 2023</b>	<b>UCS704: Embedded Systems Design</b>
<b>Time: 2 Hours, Max Marks: 35</b>	
<b>Instructors: Dr. Ranjeet Kumar Ranjan, Dr. Nitin Saxena, Dr. Deepshikha Tiwari.</b>	

**Note:** Attempt all questions. All parts of a question must be answered in order. Assume any missing data.

<b>Q1</b>	Draw a block diagram of mobile phone and explain its components. Also, explain the concept of frequency reuse used in cellular technology.	6
<b>Q2</b>	(a) Design a circuit that uses Positive Temperature Coefficient (PTC) as sensor and explain its working. (b) Explain how direction of the moving vehicle is determined by encoder.	4+2
<b>Q3</b>	(a) State the alternative functions of port 3 of 8051 MCU. (b) Compare Timer and Counter on the basis of mode of operation. (c) Consider an embedded system in which watchdog timer is working on 4kHz clock. System finishes its work in 450ms and worst case time to finish work is 500ms. Consider 500ms as timeout time. Compute the "count" that should be loaded in the watchdog timer. When the "count" reaches to zero, it initiates the reset.	1+2+3
<b>Q4</b>	(a) How is tightly coupled memory different from cache? Name one application of each where embedded system employs them. (b) Why bus-oriented systems need the Hi-Z (High Impedance State) logic level? Explain with suitable example.	3+3
<b>Q5</b>	Explain the differences between the following based on their <i>design, advantages, limitations, and applications</i> :  (a) Reduced Instruction Set Computer and Complex Instruction Set Computer. (b) Field Programmable Gate Arrays and Application Specific Integrated Circuits.	3+3
<b>Q6</b>	(a) Add the two negative decimal numbers given below using 2's complement and explain the steps.  -36 and -63.  (b) Solve the following:  (i) $(9898)_{16} - (BCBC)_{16} = ( \quad )_{16}$  (ii) $(25.1)_{16} = ( \quad )_{10}$  (iii) $(125)_{10} = ( \quad )_{16} = ( \quad )_{BCD \text{ in Hex}}$	2+3

\*\*\*\*\***All The Best**\*\*\*\*\*