BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : VII**
BRANCH: ECE **SESSION : MO/2025**

SUBJECT: EC421 REAL TIME EMBEDDED SYSTEM

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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Q.1(a)	Describe the working principle and interfacing requirements of a buzzer in digital electronic systems.	[5]	1,2	2
Q.1(b)	Develop VHDL code to make the first eight LEDS glow in a downward direction while the other eight glow in an upward direction.	[5]	2	3
Q.2(a)	Explain the concept of multichannel data logging in FPGA systems.	[5]	1,2	2
Q.2(b)	What are the key measurement techniques used in sensor-based systems, and how are they implemented in FPGA platforms?	[5]	1,2	2
Q.3(a)	Compare servo motors, and BLDC motors in terms of control signals, feedback mechanisms, and interfacing complexity with an FPGA.	[5]	2,3	1
Q.3(b)	Develop a digital system to operate the BLDC motor in a clockwise direction at a predetermined speed assuming that BLDC motor is configured with the FPGA.	[5]	2,3	3
Q.4(a)	Define the Internet of Things (IoT). Explain its key characteristics and describe any three major real-world applications of IoT.	[5]	4	1,2
Q.4(b)	Describe any four IoT applications in smart cities. Explain how IoT improves efficiency and decision-making in each case.	[5]	3	2
Q.5(a)	Explain the difference between digital inputs/outputs and analog inputs/outputs in embedded systems. Describe how each type is processed and give suitable examples.	[5]	4,5	2
Q.5(b)	Describe the working principles of an accelerometer. Explain how these sensors are used in embedded or IoT systems for motion detection.	[5]	4,5	3

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