

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

**CLASS: M.TECH.  
BRANCH: ECE**

**SEMESTER : II  
SESSION : SP/2023**

**SUBJECT: EC585 EMBEDDED SYSTEMS**

**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)	Compare an embedded system with a general-purpose system citing real-time examples. [2 Marks] What is difference between hard real-time system and soft real-time system. Cite one example for each case. [3 Marks]	[5] 1	2
Q.1(b)	Write five criteria for choosing 8051 for an embedded system design. [5 Marks]	[5] 1	3
Q.2(a)	If the crystal frequency is 4 MHz, calculate the total delay for following delay subroutine Delay: MOV R2, #20 H: DJNZ R2, H RET	[5] 2	3
Q.2(b)	Write a ALP to load the accumulator with a value 45H, and complement ACC 200 times.	[5] 2	4
Q.3(a)	What is DTMF stands for? Write the IC number for a DTMF decoder. Write any two applications for DTMF. [3 Marks] What are two modes in which an LCD can be interfaced with FPGA. If RS = 0, which register is selected and far RS = 0 case, does LCD will display any data? [2 Marks]	[5] 3	3
Q.3(b)	If the base current of a CO sensor is 10 mA and it changes to 15 mA, 20 mA and 25 mA after being exposed to 100 ppm, 200 ppm and 300 ppm of CO respectively. Calculate the sensor response for each concentration and plot the sensor response curve with CO concentration. Also, find the sensitivity from this plot.	[5] 3	2
Q.4(a)	Write a short note on SAR ADC. Comment on its accuracy. For a n-bit SAR ADC, what will be the maximum conversion time.	[5] 4	2
Q.4(b)	Draw the circuit diagram for 3-bit R-2R ladder DAC. What is the input and output voltage of the OPAMP corresponding to 101 digital input if OPAMP gain is 10 and Vref for DAC is 8 V.	[5] 4	3
Q.5(a)	What are the five attributes of “things” in Internet of Things?	[5] 5	3
Q.5(b)	Write a short note on RFID, NFC and LiFi mentioning their application areas and operation frequency.	[5] 5	2

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