Reg. No. : | | | | | | | | | | |

Question Paper Code: 36503

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Sixth Semester

Electronics and Instrumentation Engineering

01UEI603 - REAL TIME EMBEDDED SYSTEMS ARCHITECTURE

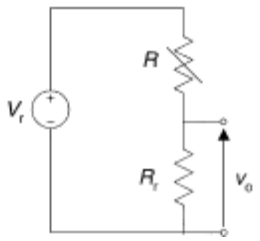
(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. The MGS 1100 CO gas sensor (Motorola) has 1000 $k\Omega$ in air, from 30 $k\Omega$ to 300 $k\Omega$ (150 $k\Omega$ typical) for CO concentration of 60 x 10^{-6} (R_{60}), and a ratio R_{60} / R_{400} = 2:5 (typical). If the allowable voltage across the sensing resistor and power dissipation in it are 5 V and 1 mW, design a voltage divider according to figure shown for such a sensor if the expected CO concentration range is from 0 to 400 x10^{-6}.



2. Draw the circuit diagram of differential amplifier based on single op-amp and four matched resistors.

3. Write the output equation for capacitance bridge analog linearization with a circuit diagram.

4. Define debugging.

5. What is an embedded system?

6. What are the characteristics of an embedded system?

7. List the limitations of orifice plate.

8. Write a note on square root extractors.

9. Write a note on instrument index sheet.

10. Define piping and instrumentation diagram.

PART - B (5 x 16 = 80 Marks)

11. (a) How the Wheatstone bridge can be balanced? Explain the balance measurement techniques in detail. (16)

Or

(b) Explain I/O ports in 8051 with neat diagrams. (16)

12. (a) Design an ac amplifier with power supply decoupling and explicate the step by step design procedure with diagrams and equations. (16)

Or

(b) Illustrate the interfacing of stepper motor control with 8051 and explain in detail. (16)

13. (a) Explain the operations of P, PI and PID controllers in detail. Brief the characteristics of each controller. (16)

Or

(b) (i) Explain in details about the build process of an embedded system. (8)

(ii) Discuss in details about the memory management methods of an embedded system. (8)

14. (a) Explain the design consideration of rotameter in detail with necessary diagrams and equations. (16)

Or

(b) Describe the computer parallel communication between the networked I/O multiple devices using the PCI and PCL/X Buses (16)

15. (a) Draw the Process Instrumentation (PI) diagrams of the following: (i) Valves (ii) Compressors (iii) Pumps and Turbine and (iv) Line symbols. (16)

Or

(b) Discuss the following:

(i) Non maskable interrupts (8)

(ii) Prevention of Interrupt over run (8)