Amrita school of Engineering, Chennai
21ARE302 – Microcontrollers and Embedded Systems
Assignment-1

Note:

- **Answer all the questions**
- **Each question carries 10 marks.**
- **Draw the diagrams using scale and pencil.**
- **Use the A4 sheet for writing answers.**
- **Late submission will lead to a negative marking**

1. Define what a microcontroller is and explain its typical components and functions.
2. Differentiate between microprocessors and microcontrollers. Provide examples of applications where each is preferred.
3. Discuss the significance of embedded systems in modern technology. Provide at least three examples of embedded systems and explain their roles.
4. Explain the concept of interrupts in microcontrollers. How are they useful in real-time applications?
5. Describe the process of analog-to-digital conversion (ADC) in microcontrollers. Why is ADC necessary in embedded systems?
6. What are timers and counters in microcontrollers? Provide examples of how timers are used in real-world applications.
7. Explain the role of serial communication interfaces (e.g., UART, SPI, I2C) in microcontrollers. Provide a scenario where each interface is preferred.
8. Describe the memory organization of a typical microcontroller. What are the types of memory commonly found in microcontrollers, and what are their purposes?
9. Examine the design and implementation of wearable health devices that monitor vital signs (e.g., heart rate, blood pressure) in real-time and discuss the challenges in ensuring reliable, low-latency data transmission.
10. Discuss the role of microcontrollers in controlling devices such as lights, thermostats, and security systems, and how they can be programmed to respond to real-time inputs from sensors and user commands.