

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M.TECH DEGREE EXAMINATION, APR 2021/DEC 2021

Electronics and Communication

VLSI and Embedded Systems

01EC6605 Designing with Microcontrollers

Answer any two full questions from each part

Limit answers to the required points.

Max. Marks: 60

Duration: 3 hours

PART A

1. a. Briefly compare RISC and CISC Instruction Set Architectures. (3)
b. Define and find out Pulse Time, State Time and Machine Cycle of an embedded system designed using an 8051 microcontroller with a XTAL frequency of 11.0592 MHz. (1.5)
c. Write a short note on PIC Architecture (4.5)
2. a. Draw the schematic diagram and explain power saving modes of 8051. (4.5)
b. Write a short note on Memory Organization of PIC16F87x family (4.5)
3. a. Explain the working of Timer Mode 2 with a neat diagram. (2)
b. Generate an algorithm or flowchart and write a program to add two 16 bit numbers and place the result in registers R7 (MSB) and R6 (LSB) of Bank 2. (2.5)
c. Briefly explain the interrupt logic of PIC16F87x Microcontroller. (4.5)

PART B

4. a. What is Interrupt Latency? Explain about Interrupt/Exception Sequence (4.5)
b. Explain the Cortex M3 architecture and briefly describe the ARM Cortex M3 detailed Block diagram (4.5)
5. a. What is special purpose registers in ARM Cortex M3? Explain about ARM Cortex M3 Registers (4.5)
b. What is memory mapping in cortex M3? Explain in detail (4.5)

- 6. a. Explain about different types of reset signals and describe about the Reset Sequence. (4.5)
- b. What is Nested Vector Interrupt Controller? Explain about tail Chaining and Late arrival (4.5)

PART C

- 7. a. What are the debugging components in ARM Cortex M3 and explain about debugging events? (6)
- b. Design an automatic water level controller for an overhead tank in a house using an 8 bit microcontroller. Provide audio visual indications. (6)
- 8. a. Differentiate cross compiler and native compiler (6)
- b. Design an automatic sanitizer dispenser using an 8 bit microcontroller. Provide audio visual indications. (6)
- 9. a. Explain about CMSIS architecture in Cortex M3? Describe about the benefits of CMSIS. (6)
- b. Design a payload monitoring system for dump truck with following features (6)
 - 1. Weight measurement by four load sensors (current output sensors)
 - 2. Audio visual indications