

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

# FIFTH SEMESTER B.TECH. (ELECTRONICS & INSTRUMENTATION ENGG.)

# END SEMESTER DEGREE EXAMINATIONS, JANUARY - 2021

## MICROCONTROLLERS [ICE 3152]

TIME: 3 HOURS

#### 02-02-2021

## MAX. MARKS: 50

## Instructions to candidates : Answer ALL questions and missing data may be suitably assumed.

- 1A. a) What is the total amount of memory in megabytes for each of the following CPUs, given the size of the address buses:
  - i) 24-bit address bus
  - ii) 32-bit address bus
  - b) Mention any two advantages of microcontrollers over a general purpose microprocessor system.
- 1B. Explain the general format of an assembly language instruction. Explain the meaning of the following assembler directives: i) DB ii) END
- 1C. Explain the concept of register banks in 8051. What is the function of the following pins of 8051 microcontrollers:
  - i) T0,T1
  - ii) P0.0-P0.7
  - iii) A8-A15
  - iv) TXD

(2+3+5)

- 2A. Write an 8051 ALP to find y, given  $y = x^2 + 2x + 10$  and x is between 0 and 9.
- 2B. With the help of a timing diagram, explain the write cycle of a LCD interface.
- 2C. Write a program to accept series of eight bit data from port 0. The program should find the position of the first high (1) in the data input. The data is scanned from D0 to D7. Send the result to port1.

(2+3+5)

- 3A. Explain how the interrupt priority is set in 8051.
- 3B. Explain half and full duplex transmission with neat diagrams. Write a program to transfer the letter 'Y' serially at 9600 baud continuously.
- 3C. Generate a square wave of 40% duty cycle on P1.1. Use timer 0 in mode 1 to generate the delay. The total time delay generated by the timer for 1 period should be 30µs.

(2+3+5)

- 4A. Explain pipelining in ARM7 TDMI processors.
- 4B. What is the function of CPSR and SPSR registers in ARM processor? Explain the meaning of different bits of CPSR register.
- 4C. a) Explain the following instructions:
  - i. ADDAL r0,r1,r2
  - ii. ADDEQ r0,r1,r2
  - iii. ADDS r0,r1,r2
  - b) What is register indirect addressing in ARM processors? Explain pre-indexing and post indexing using examples for each.

(2+3+5)

- 5A. List any four features of LPC2148 Microcontrollers.
- 5B. Explain how PWM is achieved in LPC2148 microcontrollers. What is the function of PWMMR and PWMMCR registers.
- 5C. Explain the registers used for GPIO functions in LPC2148. Develop the code for LPC2148 to generate a square waveform at P0.4-P0.7, with 75% duty cycle.

(2+3+5)