K/L/TX

Reg. No:

Final Assessment Test – November 2024

VIT
Vellore Institute of Technology

Course: **BECE204L - Microprocessors and Microcontrollers**

Class NBR(s): **4315 / 4318 / 4321 / 4323 / 4326 / 4328 / 4331 / 4334 / 4343**

Slot: **G1+TG1**

Time: **Three Hours**

Max. Marks: **100**

- **KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE**
- **DON'T WRITE ANYTHING ON THE QUESTION PAPER**

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Discuss the differences between microprocessors and microcontrollers, focusing on how microprocessors, like Intel Pentium and i3/i5/i7 series, are used in general-purpose computing as opposed to embedded systems.

2. Explain the internal block diagram and operational functionality of the 8255 Programmable Peripheral Interface (PPI). Illustrate your explanation with a detailed block diagram and describe how each block contributes to the overall operation of the 8255.

3. a) In an 8086 based system, given the following segment registers: CS = 4000H, DS = 6000H, ES = 3000H, SS = 8000H. Calculate the physical addresses corresponding to the following offset addresses:
   (i) IP = 1500H (ii) BX = 2500H (iii) SI = 3500H (iv) SP = 4500H (v) BP = 5500H

   b) Write an 8086-assembly language program to multiply two 16-bit unsigned integers: 1234H stored at memory location 2000:0700H and 5678H stored at 2000:0702H. Store the 32-bit result at memory locations 3000:0800H (lower 16 bits) and 3000:0802H (higher 16 bits).

4.(a) In the 8051 Microcontroller, develop an assembly program to add two 16-bit BCD numbers 4567H and 1234H. Store the result in registers R5 (lower byte) and R6 (higher byte), ensuring correct BCD carry handling.

OR

4.(b) (i) In a version of 8051, the crystal frequency is 16MHz. Find the time delay associated with loop section of the following DELAY subroutine.

Label	Instructions	No. of Machine Cycles (MC)
DELAY:	MOV R5, #250	1 MC
Here:	NOP	1MC
	NOP	1 MC
	NOP	1 MC
	NOP	1 MC
	DJNZ R5, HERE	2MC
	RET	2MC

(ii) In the 8051 microcontrollers, determine the status of the Carry (CY), Auxiliary Carry (AC), and Parity (P) flags of the Program Status Word (PSW) register after performing the binary addition of the values 88H and 93H.

5. Develop an 8051-assembly program to find all the even numbers from the list stored in code memory starting at ORG 300H: 25H, 36H, 45H, 50H, 72H. Store the even numbers in RAM starting from 60H.

6.(a) Write an 8051-assembly language program to control an LED array connected to Port 0. The system should generate a square wave on all pins of Port 0, with a 3ms ON time and a 10ms OFF time. The microcontroller operates with a 12 MHz crystal oscillator. Use any timer mode of the 8051 to configure the timer for generating the required delays.

OR

6.(b) The system based on 8051 Microcontroller continuously monitors a sensor connected to pin P1.2, detecting objects on the conveyor. When an object is detected (P1.2 = high), the microcontroller inserts a 600 µS delay (for sensor debouncing) and then activates the motor by writing 25H to port P2. Show the necessary delay calculation using XTAL = 11.0592 MHz.

7. Write an 8051 – assembly language program using interrupts to do the following:

a) Receive data serially and sent it to P0,

b) Have P1 port read and transmitted serially, and a copy given to P2,

c) Make timer 0 generate a square wave of 5kHz frequency on P0.1.

Assume that XTAL-11,0592. Set the baud rate at 4800.

8. Develop an assembly language program to interface a 4x4 matrix keyboard with 8051 microcontrollers.

9. Explain the distinct processor modes supported by ARM processors. Also, describe the Five-stage pipeline mechanism in the ARM processor, accompanied by a diagram to clarify its operation

10. a) Provide a brief overview of the data processing instructions available for ARM processors.

b) Write an ARM program to find the sum of all elements in an array. Assume the base address of the array is stored in r0, and the number of elements is stored in r1.

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