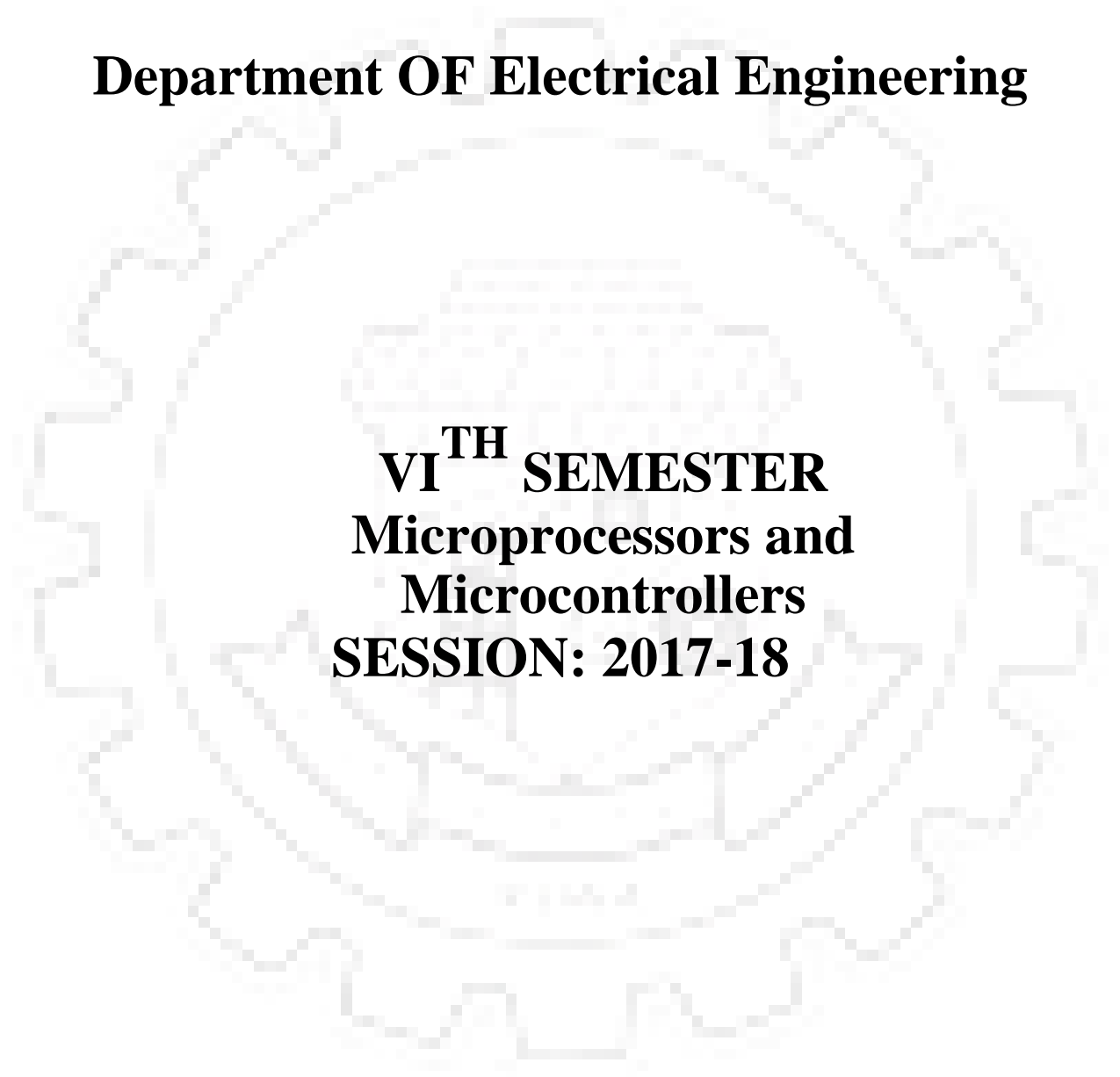


Rewa Engineering College, Rewa

Rewa 486001

Department OF Electrical Engineering



VITH SEMESTER
Microprocessors and
Microcontrollers
SESSION: 2017-18

Prepared by:
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Approved by
H.O.D.

Course Outcomes:

After completion of this course the students will be able to

- CO1.** identify a detailed architecture and the instruction set of an Intel Microprocessor 8086 and Microcontroller 8051 & 8096.
- CO2.** distinguish and analyze the properties of Microprocessors & Microcontrollers.
- CO3.** illustrate the interfacing of different peripherals with Microprocessor and Microcontroller.
- CO4.** analyze abstract problems and apply a combination of hardware and software to address the problem through assembly language programming.
- CO5.** differentiate and examine the data transfer information and standards of data transfer through serial & parallel ports.



Syllabus

UNIT 1:

Microprocessor 8086 Introduction to 16-bit 8086 microprocessors, architecture of 8086, Pin Configuration, mode, timing diagram, Memory interfacing, interrupts, Instruction set of 8086, Addressing mode, Assembler directives & operations, assembly and machine language programming, subroutine call and returns, Concept of stack, Stack structure of 8086, timings and delays.

UNIT 2:

Input-Output interfacing: Memory Mapped I/O and Peripherals I/O. PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251.

UNIT 3:

Microcontroller 8051 Intel family of 8 bit microcontrollers, Architecture of 8051, Pin description, I/O configuration, interrupts; Interrupt structure and interrupt priorities, Port structure and operation, Accessing internal & external memories and different mode of operations, Memory organization, Addressing mode, instruction set of 8051 and programming.

UNIT 4:

8051 Interfacing, Applications and serial communication 8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based thyristor firing circuit, 8051 connections to RS- 232, 8051 Serial communication , Serial communication modes, Serial communication programming, Serial port programming in C.

UNIT 5:

Microcontroller 8096 Introduction to 16-bit Microcontroller, functional block-diagram, memory status, complete 8096 instruction set, classification of instruction set, addressing modes, programming examples using 8096, hardware features of 8096, parallel ports, control & status Registers, Introduction to 16/32 bit PIC microcontrollers and DSPIC.

LABORATORY WORK:

LIST OF EXPERIMENTS

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessors using 8255.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify Interrupt handling in 8051.
13. UART Operation in 8051.
14. Communication between 8051 kit and PC.
15. Interfacing LCD to 8051.

16. Interfacing Matrix/Keyboard to 8051.
17. Data Transfer from Peripheral to Memory through DMA controller 8237/8257.

Reference Books & Study Materials

1. Hall Douglas V., Microprocessor and interfacing, Revised second edition 2006, Macmillan, McGraw Hill .
2. A.K. Ray & K.M. Bhurchandi, Advanced Microprocessors and peripherals- Architecture, Programming and Interfacing, Tata McGraw - Hill, 2009 TMH reprint..
3. Senthilkumar Saravananjeevananthan Shah, Microprocessors and Interfacing, Oxford University Press, 2012
4. Kenneth J. Ayala, The 8086 microprocessor: programming and interfacing the PC, Indian - edition CENGAGE Learning.
5. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education, 2005.
6. Kenneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
7. V. Udayashankara and M.S. Mallikarjunaswamy, 8051 Microcontroller: Hardware, Software & Applications, Tata McGraw - Hill, 2009.
8. McKinlay, The 8051 Microcontroller and Embedded Systems - using assembly and C, PHI, 2006 / Pearson, 2006.
9. Tim Wilmshurst, Designing embedded system with PIC microcontrollers Principles and applications. 2nd ed. 2011 Bsp books pvt ltd.

LECTURE PLAN

Department	Electrical Engineering (VIII SEMESTER)	Session :	2017-18
Name of Teacher	Durgesh Choudhary	Semester	VI Sem
Subject	Microprocessors and Microcontrollers	Sub. Code	EE-6003
TIME SCHEDULE : Total expected periods: 44			

S. NO	Topic Covered	No. of Lectures Required	Reference
Unit I			
1.	Introduction to Microcontroller, Introduction to 16 bit Microcontrollers	1	R1, R2
2.	Architecture of 8086, Pin Configuration	1	R1
3.	Mode, Timing diagram, Memory interfacing	2	R2, R3
4.	Interrupts	1	R2
5.	Instruction set of 8086, Addressing mode	1	R2
6.	Assembler directives & operations	1	R2
7.	Assembly and machine language programming, Subroutine call and returns	2	R1, R2, R3
8.	Concept of stack, Stack structure of 8086, timings and delays	1	R2
9.	timings and delays	1	R1
Unit II			
10.	Input-Output interfacing: Memory Mapped I/O and Peripherals I/O	1	R4
11.	PPI 8255 Architecture and modes of operation,	1	R4
12.	Interfacing to 16-bit microprocessor and programming	2	R4
13.	DMA controller (8257) Architecture	1	R3, R4
14.	Programmable interval timer 8254	1	R3, R4
15.	USART 8251	1	R2
Unit III			
16.	Microcontroller 8051 Intel family of 8 bit microcontrollers	1	R5

17.	Architecture of 8051	1	R5
18.	Pin description, I/O configuration	1	R5
19.	Interrupts	1	R5, R6
20.	Interrupt structure and interrupt priorities	1	R5
21.	Port structure and operation	1	R6
22.	Accessing internal & external memories and different mode of operations	1	R5, R7,
23.	Memory organization, Addressing mode	1	R5, R8
24.	Instruction set of 8051 and programming	1	R5, R6, R7
Unit IV			
25.	8051 Interfacing	1	R7
26.	Applications and serial communication 8051 interfacing to ADC and DAC	1	R7
27.	Stepper motor interfacing	1	R8
28.	Timer/ counter functions	1	R5, R8
29.	8051 based thyristor firing circuit, 8051 connections to RS- 232	1	R8
30.	8051 Serial communication , Serial communication modes	1	R5, R7
31.	Serial communication programming, Serial port programming in C	2	R5
UNIT V			
32.	Microcontroller 8096 Introduction to 16-bit Microcontroller	1	R9
33.	Functional block-diagram, memory status	1	R9
34.	Complete 8096 instruction set	1	R9
35.	Classification of instruction set, addressing modes	1	R9
36.	Programming examples using 8096	2	R9
37.	Hardware features of 8096	1	R9
38.	Parallel ports, control & status Registers	1	R9
39.	Introduction to 16/32 bit PIC microcontrollers and DSPIC.	1	R9

Assignment Problems

S. No.	Assignment Problems	Remark
1.	<p><u>UNIT 1</u></p> <ol style="list-style-type: none"> 1. Draw and explain the architecture of microprocessor 8086? 2. Draw the pin diagram of intel microprocessor 8086? 3. Explain the various addressing modes of 8086? 4. Explain the microprocessor 8086 in details with its specifications? 	
2.	<p><u>UNIT 2</u></p> <ol style="list-style-type: none"> 1. Write an assembly language programming to convert decimal into hexadecimal. A string of 10 byte data is residing at location starting from address 30H of internal RAM. Store the data at same place after conversion. 2. Write an assembly language Program for digital clock design using 8086? 3. Write an assembly language programming to convert ASC2 to BCD? 4. Explain the interfacing of 32kb memory to 8086? 	
3.	<p><u>UNIT 3</u></p> <ol style="list-style-type: none"> 1. What are the differences between microcontroller and microprocessor? 2. Draw and explain the architecture of microcontroller 8051 in detail? 3. What are the various addressing modes in microcontroller 8051? Explain each with examples. 4. Explain interrupt handling of 8051? 	
4.	<p><u>UNIT 4</u></p> <ol style="list-style-type: none"> 1. Draw and explain the architecture of microcontroller 8051 in detail. Compare 8051, 8052, 8031 and 8751? 2. What is RS232 standard? Give the pin configuration of RS232 (DB25) and explain the hand shacking in RS232? 3. Write ALP to find the frequency of unknown source connected with 	

	<p>P3.4 and display it on port 1?</p> <p>4. Write ALP to generate the square wave of 50 Hz on port P2.3 of duty cycle 66%?</p>	
5.	<p><u>UNIT 5</u></p> <p>1. Draw and explain the architecture of microcontroller 8096 in detail?</p> <p>2. Explain the control and status register of 8096?</p> <p>3. Write an assembly language Program for digital clock design using 8096?</p> <p>4. Write an assembly language Program to generate the delay of 50ms followed by 10ms and 30 ms?</p>	

List of Experiments

Microprocessors and Microcontrollers

Subject : EE-6003

S. No.	Name of Experiment	Date of Performance	Remark
1.	Programs for 16 bit arithmetic operations for 8086.		
2.	Program for sorting an array for 8086.		
3.	Program for searching for a number or character in a string for 8086.		
4.	Program for string manipulations for 8086.		
5.	Interfacing ADC and DAC to 8086.		
6.	Interfacing to 8086 and programming to control stepper motor.		
7.	Programming using arithmetic, logical and bit manipulation instructions of 8051.		
8.	Program and verify Timer/Counter in 8051.		
9.	Program and verify Interrupt handling in 8051.		
10.	Interfacing LCD to 8051.		
11.	Interfacing Matrix/Keyboard to 8051.		
12.	Data Transfer from Peripheral to Memory through DMA controller 8237/8257.		