DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

SYLLABUS

B.Sc. Third Year[ELECTRONICS (OPTIONAL)]

{Effective from – June- 2009 onwards}

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

B.Sc. Third Year

ELECTRONICS

[Effective from June 2009)

Paper IX

Microcontrollers : Theory and Applications

Marks:100 **Total Lectures: 90**

1. **Introduction to Microcontrollers** **2**

   Introduction, Microcontrollers and microprocessors, history of microcontrollers, embedded versus external memory devices, 8-bit and 16-bit microcontrollers, CISC and RISC processors, Harvard and Von Neumann architecture, commercial microcontroller devices

2. **8051 Microcontroller** **8**

   Introduction, MCS-51 architecture, registers in MCS-5 , pin description, 8051 connections, 8051 parallel I/O ports, Memory organization

3. **MCS-51 Addressing Modes and Instructions** **15**

   8051 addressing modes, MCS-51 instruction set, 8051 instructions and simple programs, using stack pointer

4. **MCS-51 Interrupts, Timer/counters and serial communication** **8**

   Interrupts, interrupts in MCS-51, timers and counters, serial communication.

5. **Applications of MCS-51** **12**

   Overview of 89CXX and 89C20XX Atmel microcontrollers, pin description of 89C51 and 89C2051, using flash memory,square wave generation, rectangular wave generation, pulse generation, stair case ramp generation, sine wave generation, pulse width measurement, frequency counter

6. **PIC Microcontrollers** **15**

   PIC microcontroller overview and features, PIC 16C6X/7X: ALU, CPU registers,pin diagram, PIC reset actions, PIC oscillator connections, PIC memory organization, PIC 16C6X/7X instructions, Addressing modes,, I/O ports

7. **PIC 16F8XX Flash microcontrollers** **15**

   Introduction, pin diagram, status register , PCON, option_reg , PIC 16F8XX program memory, PIC 16F8XX data memory, data EEPROM and Flash program EEPROM,Interrupts in 16F877, I/O ports,Timer.

8. **Interfacing and Industrial applications of Microcontroller** **15**

   LED, push buttons, relays and latch connections, keyboard interfacing, interfacing of 7 segment display, LCD interfacing, ADC and DAC interfacing.

Text Book : Microcontrollers : Theory and Applications – Ajay Deshmukh –TMH

Reference Books :

1.The 8051 Microcontroller and Embedded systems- M.A.Mazadi, J.G.Mazadi & R.D.McKinlay - pearson PHI.

2. The 8051 Microcontroller – K.J.Ayala - Thomson

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

B.Sc. Third Year

ELECTRONICS

[Effective from June 2009]

Paper X : Microprocessor Interfacing and PLC

Marks:100 **Total Lectures: 90**

1. **Interfacing of memory and I/O (A.K.Ray & Bhurchandi chp.5)** **05**

   Semiconductor memory interfacing, dynamic RAM interfacing, interfacing I/O ports.

2. **PIO 8255 and its interfacing (A.K.Ray & Bhurchandi chp.5)** **10**

   PIO 8255, modes of operation of 8255, Interfacing ADC, interfacing of DAC, stepper motor interfacing, control of high power device using 8255

3. **Programmable interval timer, interrupt controller and its interfacing (A.K.Ray & Bhurchandi chp.6)** **10**

   Programmable interval timer: architecture, control word, operating modes, programming and interfacing 8253. Programmable interrupt controller : architecture and signal description, interrupt sequence, command word, operating modes, interfacing and programming 8259.

4. **Keyboard/display controller, communication interface and its interfacing (A.K.Ray & Bhurchandi chp.6)** **10**

   The keyboard/display controller: architecture, modes of operation, command words, interfacing and programming of 9279. Programmable communication interface 8251: Methods of data communication, architecture and signal description, operating modes, interfacing and programming of 8251

5. **DMA , CRT controllers and its interfacing (A.K.Ray & Bhurchandi chp.7)** **10**

   DMA controller 8257 : internal architecture, data bus buffer, signal description, DMA transfers and operations, programming and reading the 8257 registers, interfacing 8257 with 8086. CRT controller : Internal architecture, signal description, system operation, display formats and operational features, command set of 8275 CRT controller, programming and interfacing 8275 with 8086

6. **Introduction to programmable controllers (Terry Bartelt chp.18)** **15**

   Industrial motor control circuits, relay ladder logic circuits, building a ladder diagram, motor control starter circuit, rack assembly, power supply, PLC programming unit, Input / Output sections, Processor unit, Addressing, relationship of data addresses to I/O modules.

7. **Fundamental PLC programming (Terry Bartelt chp.19)** **15**

   PLC program execution, ladder diagram programming language, ladder diagram programming, relay logic instructions, Timer instructions, counter instructions, data manipulation instructions, arithmetic operations, writing a program.

8. **Advanced programming, PLC interfacing & Troubleshooting** **15**
   (Terry Bartelt chp.20)

   Jump commands, data manipulations, discrete input/output modules, troubleshooting I/O interfaces, analog input and output signals, special purpose modules, troubleshooting programmable controllers.

Text Book : 1.Advanced Microprocessors and Peripherals (Second edition)
- A.K.Ray, K.M.Bhurchandi , TMH pub.

2. Industrial Electyronics: Circuits, instruments and control techniques
-Terry Bartelt – Delmar pub.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

B.Sc. Third Year

ELECTRONICS

[Effective from June 2009)

Practical Paper XI

(Microcontrollers : Theory and Applications)

Experiments: 75 Marks
Project : 25 Marks

Every candidate appearing for examination must produce journal showing that he/she has completed 08 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

List of Experiments

1. Write a program and implement using Atmel 89C51 to blink LED with 0.5 Hz frequency.
2. Write a program and implement using Atmel 98C51 for 8 bit binary UP counter.
3. Write a program and implement using Atmel 98C51 for 8 bit binary DOWN counter.
4 Write a program and implement using Atmel 89C51 to interface a switch and 8 LED for binary UP counter when switch is closed and pause the counter when switch is open.
5. Write a program and implement using Atmel 89C51 to generate square waveforms
6. Write a program and implement using Atmel 89C51 to generate stair case waveforms
7. Write a program and implement using Atmel 89C51 to generate triangular with period of 1 ms.
8. Write a program and implement using Atmel 89C51 for frequency counter to display frequency in 2 digits on SSD.
9. Write a program and implement using Atmel 89C51 for stepper motor direction control using a switch.
10. Write a program and implement using Atmel 89C51 to display Microcontroller on 2X8 LCD module

Projects: Every student should construct a project from following list or any other appropriate project based on PIC microcontroller. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

1. Real time clock using PIC
2. Data acquisition using PIC
3. Temperature controller system using PIC
4. Stepper motor speed & direction control using PIC
5. Digital balance using PIC

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

B.Sc. Third Year

ELECTRONICS

[Effective from June 2009)

Practical Paper XII

(Microprocessor Interfacing and PLC)

Experiments: 75 Marks
Project : 25 Marks

Every candidate appearing for examination must produce journal showing that he/she has completed 08 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

List of Experiments

1. Interface 8 LED and 8 switches & write ALP to display status of switch using 8255
2. Interface Hex Key board and seven segment display to display key pressed on SSD
3. Write ALP to generate triangular waveform of frequency 500 HZ using DAC 0800 with 8255 & 8086 microprocessor
4 Design stepper motor controller and write an ALP to rotate shaft stepper motor in 1.) clockwise 5 rotation & 2) anticlockwise 5 rotations.
5. Study of different modes of 8253.
6. Water level controller using PLC simulator.
7. Traffic light control using PLC simulator.
8. Horizontal motion of conveyor belt using limit switches using PLC simulator.
9. Bottling plant with counter simulator.
10. Lift control using PLC simulator.

Projects: Every student should construct a project from following list or any other appropriate project based on PLC. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

1. Water level controller using PLC
2. Traffic light control using PLC
3. Conveyor belt operation in Industry using PLC
4. Bottling plant with counter using PLC
5. Lift control using PLC