A

Course File Report

On

"MICROPROCESSORS AND MICROCONTROLLERS"

REGULATION-R20

Submitted by

D.LATHA
Assistant Professor, ECE.
In the department of

Electronics & Communication Engineering

CMR ENGINEERING COLLEGE

(Affiliated to J.N.T.U, HYDERABAD)
UGC AUTONOMOUS
KANDLAKOYA (V), MEDCHAL ROAD HYDERABAD-501 401
(2022-2023)

CMR ENGINEERING COLLEGE
UGC AUTONOMOUS
(Approved by AICTE - New Delhi. Affiliated to JNTUH and Accredited by NAAC & NBA)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Subject: MICROPROCESSORS AND MICROCONTROLLERS
Subject code: EC502PC
Year: III– B.Tech, I SEM Branch: ECE

Contents of Course file

1. Department vision & mission
2. List of PEOs and Pos PSO's
3. Mapping of course out comes with POs
4. Syllabus copy
5. Individual time table
6. Session plan
7. Session execution log
8. Assignment Questions and innovative assignments
9. Sample assignment script
10. Mid exam question papers
11. Scheme of evaluation
12. Sample mid answer script
13. Unit-wise course material
14. Material collected from Internet/Websites
15. Power point presentations
16. Innovation teaching methods (if any)
17. Previous question papers
18. References (Text books/websites/Journals)

CMR ENGINEERING COLLEGE (AUTONOMOUS)
KANDLAKOYA (V), MEDCHAL ROAD, HYDERABAD-501401

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE INSTITUTE:
To be recognized as a premiere institution in offering value based and futuristic quality technical education to meet the technological needs of the society.

MISSION OF THE INSTITUTE:

1. To impart value based quality technical education through innovative teaching and learning methods.
2. To continuously produce employable technical graduates with advanced technical skills to meet the current and future technological needs of the society.
3. To prepare the graduates for higher learning with emphasis on academic and industrial research.

VISION OF THE DEPARTMENT:

To promote excellence in technical education and scientific research in electronics and communication engineering for the benefit of society.

MISSION OF THE DEPARTMENT:

M1: To impart excellent technical education with state of art facilities inculcating values and lifelong learning attitude.

M2: To develop core competence in our students imbibing professional ethics and team spirit.

M3: To encourage research benefiting society through higher learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs) :

PEO 1: Establish themselves as successful professionals in their career and higher education in the field of Electronics & Communication Engineering and allied domains through rigorous quality education.

PEO 2: Develop Professionalism, Ethical values, Excellent Leadership qualities, Communication Skills and teamwork in their Professional front and adapt to current trends by engaging in lifelong learning.

PEO 3: Apply the acquired knowledge & skills to develop novel technology and products for solving real life problems those are economically feasible and socially relevant.

PEO 4: To prepare the graduates for developing administrative acumen, to adapt diversified and multidisciplinary platforms to compete globally.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Ability to apply concepts of Electronics & Communication Engineering to associated research areas of electronics, communication, signal processing, VLSI, embedded systems, IoT and allied technologies.

PSO2: Ability to design, analyze and simulate a variety of Electronics & Communication functional elements using hardware and software tools along with analytic skills.

PROGRAM OUTCOMES (PO'S):

1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations**.**
6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice**.**
7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course outcomes:

Course Code.CO No	Course Outcomes (CO's)	Blooms Level's
At the end of the course student will be able to		
EC502.1	**Demonstrate** the internal organization of 8086 microprocessor along with its instruction set and addressing modes.	**BL2**
EC502.2	**Develop** an assembly language programs using 8051 instructions.	**BL3**

EC502.3	**Design** the interfacing circuit of microcontroller with I/O devices.	**BL6**
EC502.4	**Examine** the internal architecture and data flow of ARM processor.	**BL4**
EC502.5	**Explain** the internal organization of Cortex and OMAP processors.	**BL2**

Mapping of course outcomes with POs:

CO's/ PO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC502.1	2	2	2	-	-	-	-	-	-	-	-	2
EC502.2	2	2	3	-	2	2	-	-	-	-	-	3
EC502.3	3	2	3	-	-	2	-	-	-	-	-	2
EC502.4	2	2	3	-	-	-	-	-	-	-	-	3
EC502.5	2	2	2	-	2	-	-	-	-	-	-	2
AVG	2	2	3	-	2	2	-	-	-	-	-	2

Mapping of course outcomes with PSOs:

CO's/ PSO's	PSO1	PSO2
EC502.1	3	2
EC502.2	3	2
EC502.3	3	3
EC502.4	3	3
EC502.5	3	3
AVG	3	3

SYLLABUS:

UNIT-I

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT – II

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

UNIT –III

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

UNIT –IV

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT – V

Advanced ARM Processors: Introduction to CORTEX Processor and its Architecture, OMAP Processor and its Architecture.

INDIVIDUAL TIME TABLE:

SUBJECT: MP&MC III-ECE A,B
LAB: MPMC LAB III-ECE-A

DAY/ TIME	9:10-10:10	10:10-11:00	11:00-11:50	11:50-12:40	12:40-01:20	01:20-02:20	02:20-03:10	03:10-04:00
MON	MPMC-A			MPMC-B	L U			
TUE						MPMC/DSP LAB		
WED		MPMC-A		MPMC-B			MPMC-A	

THU	**MPMC-B**			**MPMC-B**	**N**	**MPMC/DSP LAB**		
FRI		**MPMC-B**			**C**	**MPMC-A**		
SAT		**MPMC-B**		**MPMC-A**	**H**			

LESSON PLAN:

Topic Name	No. of classes	Text books
UNIT I:8086 Architecture		
8086 Architecture	02	T1, R2
Functional diagram	02	T1, R2
Register Organization	01	T1, R2
Memory Segmentation, Memory addresses	01	T1, R2
Physical Memory Organization	01	T1, R2
Interrupts of 8086, Instruction formats	01	T1, R2
Addressing modes	02	T1, R2
Instruction Set	02	T1, R2
Assembler Directives, Macros	01	T1, R2
Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations	02	
Total No. of Classes	**15**	
UNIT II: Introduction to Microcontrollers		
Overview of 8051 Microcontroller	01	T1, R1,R3
Architecture, I/O Ports	01	T1, R1,R3
Memory Organization	01	T1,R1,R3
Addressing Modes and Instruction set of 8051	02	T1,R1,R3
Programming Timer Interrupts	02	T1,R1,R3
Programming External Hardware Interrupts	01	T1,R1,R3
Programming the Serial Communication Interrupts	02	T1,R1,R3
Programming 8051 Timers and Counters	02	T1,R1,R3
Total No. of Classes	**12**	
UNIT III: I/O And Memory Interface		
LCD Interface to 8051	01	T1,R2,R3
Keyboard Interface to 8051	01	T1,R2,R3
External Memory RAM, ROM Interface	02	T1,R2,R3
ADC, DAC Interface to 8051	02	T1,R2,R3
Serial Communication Standards, Serial Data Transfer Scheme	02	T1,R2,R3
On board Communication Interfaces-I2C Bus, SPI Bus, UART	03	T1,R2,R3
External Communication Interfaces-RS232,USB	02	T1,R2,R3

Total No. of Classes	**13**	
UNIT IV: ARM Architecture		
ARM Processor fundamentals	01	T2
ARM Architecture	02	T2
Register, CPSR	02	T2
exceptions and interrupts interrupt vector table	02	T2
ARM instruction set – Data processing, Branch instructions, load store instructions	02	T2
Software interrupt instructions, Program status register instructions	02	T2
loading constants, Conditional execution	01	T2
Introduction to Thumb instructions	02	T2
Total No. of Classes	**14**	
UNIT V: Advanced ARM Processors		
Introduction to CORTEX Processor and its architecture	03	T2,R4
OMAP Processor and its Architecture	02	T2,R4
Total No. of Classes	**05**	
Total No. of Classes	**59**	

Session execution log:

S.NO	JNTUH TOPIC	TOPIC TO BE COVERED	PERIOD
1	**UNIT-I**		**11-09-21-01/10/21**
2	Architecture of 8086:Functional diagram,	Functional diagram of 8086	

3	Register organization	Classification of registers: General purpose , special function registers	
4	memory segmentation	Need for memory segmentation, memory segmentation , advantages of memory segmentation	
5	programming model	programming model of 8086	
6	memory addresses, Physical memory organization,	Physical memory organization, of 8086	
7	signal descriptions of 8086-common function signals, ,	Mini mum & maximum modes of 8086	
8	Timing diagrams	Timing diagrams for Mini mum & maximum modes of 8086	
9	interrupts of 8086	Interrupts of 8086 (hardware& software)	
10	Instruction formats	Instruction formats of 8086	
	UNIT:2		**03/10/21-15/10/21**
11	Overview of 8051 Microcontroller	Overview of 8051 Microcontroller	
12	Architecture, I/O Ports	Architecture, I/O Ports	
13	Memory Organization	Memory Organization	
14	Addressing Modes and Instruction set of 8051	Addressing Modes and Instruction set of 8051	
15	Programming Timer Interrupts	Programming Timer Interrupts	
16	Programming External Hardware Interrupts	Programming External Hardware Interrupts	
17	Programming the Serial Communication Interrupts	Programming the Serial Communication Interrupts	
18	Programming 8051 Timers and Counters	Programming 8051 Timers and Counters	
	UNIT:3		**26/10/21-29/11/21**
19	LCD Interface to 8051	LCD Interface to 8051	

20	Keyboard Interface to 8051	Keyboard Interface to 8051	
21	External Memory RAM, ROM Interface	External Memory RAM, ROM Interface	
22	ADC, DAC Interface to 8051	ADC, DAC Interface to 8051	
23	Serial Communication Standards, Serial Data Transfer Scheme	Serial Communication Standards, Serial Data Transfer Scheme	
24	On board Communication Interfaces-I2C Bus, SPI Bus, UART	On board Communication Interfaces-I2C Bus, SPI Bus, UART	
25	External Communication Interfaces-RS232,USB	External Communication Interfaces-RS232,USB	
	UNIT:4		**30/11/21-18/12/21**
28	ARM Processor fundamentals	ARM Processor fundamentals	
29	ARM Architecture	ARM Architecture	
30	Register, CPSR	Register, CPSR	
32	exceptions and interrupts interrupt vector table	exceptions and interrupts interrupt vector table	
33	ARM instruction set – Data processing, Branch instructions, load store instructions	ARM instruction set – Data processing, Branch instructions, load store instructions	
34	Software interrupt instructions, Program status register instructions	Software interrupt instructions, Program status register instructions	
35	loading constants, Conditional execution	loading constants, Conditional execution	
	UNIT:5		**19/12/21-29/12/21**
36	IIntroduction to CORTEX Processor and its architecture	IIntroduction to CORTEX Processor and its architecture	
37	OMAP Processor and its Architecture	OMAP Processor and its Architecture	

Assignment Questions:

MID ASSIGNMENT: 1

SET-1

1. Draw the internal architecture of 8086 microprocessor and explain the function of each block in detail. **(CO1)**

2. a) Write the advantages of memory segmentation of 8086 and explain the concept in detail. **(CO1)**

b) Define the term Interrupt? List the hardware and software interrupts of 8086 with its Interrupt vector structure. **(CO1)**

3. a) List out the shift and rotate instructions of 8086 microprocessor with examples. **(CO1)**

b) Mention the differences between microprocessor and microcontroller. **(CO2)**

4. Draw and represent each bit of the following SFR's of 8051 Microcontroller **(CO2)**

a) IE b) IP c) SCON d) TCON

SET-2

1. Define addressing mode? Explain the different addressing modes used in 8086 microprocessor with examples. **(CO1)**

2. a) Draw and explain the each bit of flag register of 8086 microprocessor. **(CO1)**

   b) What is the importance of pipelining concept of 8086. **(CO1)**

3. a) Explain any five assembler directives of 8086 with suitable examples. **(CO1)**

   b) List out the features of 8051 microcontroller. **(CO2)**

4. a) Describe briefly the register set of 8051 microcontroller. **(CO2)**

   b) Explain various operation modes of Timer-1 and Timer-0. (**CO2)**

SET:3

1. a) List out the logical instructions of 8086 microprocessor with examples. **(CO1)**

   b) Define the term MACRO? Explain its importance in 8086. **(CO1)**

2. Draw and explain each signal function of 8086. **(CO1)**

3. a) Explain the physical memory organization of 8086 system. **(CO1)**

   b) List out different interrupts of 8051. Mention the interrupt priority in 8051. **(CO2)**

4. a) Write a short notes on Memory Organization of 8051. **(CO2)**

   b) Draw the internal architecture of 8051. **(CO2)**

MID ASSIGNMENT: 2

SET:1

1. a) Draw the keyboard interfacing diagram to 8051 along with its program. **(CO3)**

   b) Explain the classifications of serial communication with examples. **(CO3)**

2. a) List the features of ARM Processor. **(CO4)**

   b) Draw the internal architecture of ARM processor and explain the function of each block in detail. **(CO4)**

3. a) Explain the Thumb instructions of ARM processor. **(CO4)**

b) List out the main features of CORTEX processor. **(CO5)**

4. With a neat diagram, explain the architecture of OMAP processor. **(CO5)**

SET:2

1. a) Draw the interfacing diagram of A/D converter with 8051 microcontroller and write its instructions. **(CO3)**

b) Explain about following protocols in serial communication. **(CO3)**

i) SPI ii) UART

2. a) Define Pipeline? Explain the Five stage pipeline concept in ARM processor. **(CO4)**

b) Write a short note on current program status register in ARM. **(CO4)**

3. a) Explain about arithmetic and load/store instructions of ARM processor. **(CO4)**

b) List out the different applications of CORTEX processor. (**CO5)**

4. With a neat diagram, explain the architecture of OMAP processor. **(CO5)**

SET:3

1. a) Explain about following protocols in serial communication **(CO3)**

i) I2C ii) USB

b) Draw the internal diagram of LCD interfacing to 8051. **(CO3)**

2. a) List and explain different interrupts supported by the ARM processor. **(CO4)**

b) Draw the register set of ARM processor. **(CO4)**

3. a) Explain the different addressing modes supported by ARM processor. **(CO4)**

b) List out the features and applications of OMAP processor. **(CO5)**

4. With a neat diagram, explain the architecture of CORTEX processor. **(CO5)**

INNOVATIVE ASSIGNMENT:

Sample assignment scrip

Provided separately

Mid exam question papers:

MID 1 PAPER:

Sample mid answer script

PROVIDED SEPERATELY

Unit-wise course material

Provided separately

Material collected from Internet/Websites


Microprocessor & Microcontroller Notes.rar


Microprocessor-and-Microcontroller-2.rar


Pio-mpmc.rar

Power point presentations


Microcontroller 8051.rar


ppt-mpmc-webinar.rar

Previous question papers:

CodeNo:136CT

R16

JAWAHARLALNEHRUTECHNOLOGICALUNIVERSITYHYDERABAD

B. Tech III Year II Semester Examinations, May - 2019MICROPROCESSORSANDMICROCONTROLLERS

(ElectronicsandCommunicationEngineering)

Time:3hours **Max.Marks:75**

Note: ThisquestionpapercontainstwopartsAandB.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part Bconsists of 5 Units. Answer any one full question from each unit.Each question carries10 marks and mayhavea, b, cas sub questions.

PART-A

(25Marks)

Whatis theimportanceof pipeliningconcept in 8086microprocessor? [2]
b) Howto calculatethe Physical memoryof 8086, with oneexample? [3]
c) Explaintheimportanceof8051Microcontrollerover microprocessor. [2]
d) ListoutDifferentinterrupts of8051Microcontroller. [3]
e) Explain the importanceof Memoryinterfacingof8051. [2]
f) Writeshort noteson USB. [3]
g) Listoutdifferent 16-bitregistersusedinARMprocessor. [2]
h) Listoutfew comparisonsofARMandMicrocontroller. [3]
i) ExpandOMPAprocessorandits memorycapacity. [2]
j) Explainthedifferentapplicationsof OMPAprocessor. [3]

PART-B

(50Marks)

2.a) Drawtheinternalarchitectureof8086microprocessorandexplainthefunctionofeachblock indetail.
b) Listoutdifferentstringmanipulationinstructionsused in8086 microprocessorandexplain each onein detail. [5+5]

OR

3.a) DefineAddressingmode?ListoutdifferentAddressingmodesusedin8086microprocessor.
b) DefineMacro?Explainitsimportancein8086programming. [6+4]

4.a) Listouttheimportantfuturesof 8051Microcontrolleralong withitsapplications.
b) DrawthePinDiagram of 8051 Microcontroller and explain eachpin indetail. [5+5]

OR

5. ExplainthefollowingSFRsof8051 Microcontrollerindetail:
a) SCON b)TCON c)PCON [3+3+4]

6.a) DrawtheinternalcircuitdiagramofUARTandexplainthefunctionofeachblockindetail.

a) Explain the different Serial data transfer schemes used in serial communication. [5+5]

OR

7.a) Draw the PIN diagram of RS-232 serial communications scheme and explain importance of each pin.

b) Draw the interface circuit diagram of LCD with 8051 and explain its operation in detail. [5+5]

8.a) Draw the internal architecture of ARM processor and explain function of each block in detail.

b) Define Pipeline? Explain the Five stage pipeline concept in ARM processor. [5+5]

OR

9.a) List out different Branch instructions used in ARM processor and explain each one in detail.

b) Explain the concept of Software interrupt instruction in detail. [5+5]

10. List out different classifications of OMPA processor and explain each one type in detail. [10]

OR

11.a) Explain the concept of superscalar pipeline of CORTEX processor along with circuit diagram.

b) Explain the different applications of CORTEX processor in detail. [5+5]

III B.Tech. II Semester Regular/Supplementary Examinations, May/June -2014

MICRO PROCESSORS AND MICRO CONTROLLERS

(Comm to Electronics and Communication Engineering and Electronics and Computer Engineering and Biomedical Engineering and Electronics and Instrumentation Engineering)

Time: 3 Hours Max Marks: 75

Answer any FIVE Questions

All Questions carry equal marks

*****

1. a) Explain the function of QS0 and Qs1 signals of 8086.
b) Present the architectural differences between 8086 and 8088.
c) Draw and discuss read cycle timing diagram of 8086 in minimum mode. (3+6+6)
2. a)Write an ALP to authenticate the given password .
b) Draw and discuss interrupt structure of 8086 in detail.
c) Describe the procedure to code intersegment jump and intrasegment jump. (6+6+4)
3. a) Write the salient features of strobed I/O mode of operation of 8255. Also present the input and output control signal definitions.
b) Design an interface between 8086 CPU and two chips of 16K X 8 EPROM and two chips of 32K X 8 RAM. Select the starting address of EPROM suitably. The RAM address must start at 00000H. (7+8)
4. a) Draw and explain the internal architecture of 8257.
b) Explain the initialization sequence of 8259A using a flow chart.
c) Explain the FIFO status word of 8279. (6+5+4)
5. a) Draw and discuss the register set of 80386 and explain the function of each of the registers in brief. (9+6)
b) Explain the different additional addressing modes supported by 80386 over 80286.
6. a) Draw the 8051 connection diagram and explain. (5+10)
b) Explain different addressing modes of 8051 using relevant example instructions.
7. a) Explain the function of each bit of STATUS register in PIC 16F8XX.
b) Write the features of I/O ports of PIC 16F877. (6+9)
8. Discuss in detail ARM architecture and organization. (15)

R16

Code No: 135BF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, October - 2020
MICROPROCESSORS AND MICROCONTROLLERS
(Common to EEE, EIE)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

- - -

1.a) Draw the flag register of 8086 microprocessor and explain each flag.
b) What are interrupts? What are their uses? List and explain different interrupt supported by 8086 microprocessor. [7+8]

2.a) Discuss different string instruction of 8086 microprocessor with examples.
b) List and explain different addressing modes supported by the 8086 microprocessor. [7+8]

3.a) With a neat diagram, explain the internal architecture of 8051 microcontroller.
b) List the applications of 8051 microcontrollers. [8+7]

4.a) Discuss the internal memory organization of 8051 microcontroller.
b) Explain the use of timers and counters available in 8051 microcontroller. [7+8]

5.a) Compare between serial communication and parallel communication.
b) What are D-to-A controllers? Explain their applications. [8+7]

6.a) What is RS232? Explain its interfacing with 8051.
b) Explain the working of I2C Bus. [8+7]

7.a) Draw and explain the program status register of ARM processors.
b) Discuss the main characteristics of ARM instruction set. [7+8]

8.a) List and discuss the features of OMAP Processor.
b) What is a cache memory? What is its use in microcomputers? [7+8]

---ooOoo---

Unit:1

1. What is the length of the instruction queue in 8086? Discuss the use of the queue? Explain the reason for limiting the length of queue?
2. What is the minimum number of segment resisters that are necessary to provide segmentation? How do you access common data for different programs using segmentation?
3. List the signals in minimum and maximum modes
4. Explain the roles of pins TEST, LOCK
5. Which are the pins of 8086 that are to be connected to interface 8284 and explain their functions?
6. Explain various interrupts of 8085 Microprocessor and their functionality?
7. Explain the
   i. SID
   ii. SOD
   iii. S0, S1, S2
   iv. INTA pins of 8085 Microprocessor
8. Explain the flag register of 8086.
9. Explain the concept of memory segmentation.
10. Draw the internal architecture of 8085? Explain about each block in it.
11. Explain the function of OPCODE prefetch FIFO Buffer in 8086?
12. What are the contents of the data bus and the status of A0 and BHE when the following instructions are executed in 8086?
    i. CPU writes a byte 11 H at memory location 1000H : 0002 H.
    ii. CPU writes a word 2211 H at memory location 1000H : 0003 H.
13. Write the functions of the following pins of 8086.
    i. MN/ MX
    ii. DEN
    iii. ALE
    iv. Ready
13. Explain the functions of different registers in 8086. Also discuss the flag register contents.

14. Explain interrupts of 8086 its minimum and maximum mode signals and common function signals.
15. Explain different registers used in 8086 and its memory segmentation. What are the registers used to access memory?
16. Explain memory mapping techniques in 8086.
17. Explain the architecture of 8086.

Unit:2

1. Distinguish between packed BCD and unpacked BCD
2. Explain branch instructions of 8086 with examples.
3. It is necessary to move a block of data of length 300H from location 6000H: A000H to location 0C000H:B000H. Write an ALP using string instructions to perform the task?
4. What happens to the SI, DI, and CX registers when the MOVSB instruction is executed (without a repeat prefix) and:

i. the direction flag is set

ii. the direction flag is clear.

4. Explain in detail the coding template for ADD instruction of 8086

5. It is necessary to declare a program as a public procedure to be accessible by other programs? Give the sequence of assembly language statements? An external program called "fact" is to used in this program. Show the required statements
6. How does near RET instruction function
7. Write a near procedure that cubes the contents of the CX register. This procedure may not affect any register except CX
8. Write an algorithm and assembly program to sort the numbers in an array in descending order using bubble sort method.
9. Explain the following instructions and their use?

    i. LODSB

    ii. CMPSW

    iii. XLAT

10. Give the instruction format of IN and OUT instructions and explain?
11. Write a program to sort an array in descending order.

12. Give the instruction sequence that compares the first 20 bytes beginning at STRG 1with the first ten bytes beginning at STRG 2 and branches to MATCH if they are equal, otherwise continues in sequence?

13. Write an ALP to transmit 100 bytes of data string starting at location 2000:5000H.

14. Write an ALP to receive 100 bytes of data string and store it at 3000:4000H.

15. How procedure CALL and RET take place in 8086. Explain conditional and unconditional CALL and RET instructions in 8086 instruction set.

16. Write a program to move a block of memory without over lapping.

17. Discuss the following instructions. [8+8]

    i. ADC

    ii. AAS

    iii. IMUL

    iv. CBW

18. Explain the prefix instruction format of 8086 processor? Discuss how these instructions are useful in string manipulation

19. What are assembler directives and micros? Consider one example and show how they are used?

20 Explain different addressing modes in 8086.

21. Explain instruction format for 8086.

22. Explain sorting technique with an example.

Unit :3

1. What do you mean by BSR mode? Explain the BSR mode of operation.
2. Initialize the Port-A as input port in mode-1. Explain the data transfer scheme used through Port-A with the help of handshaking signals. Draw the timing diagram.
3. Interface the stepper motor with 8255 and write an ALP to rotate the steppermotor continuously in clockwise direction.
4. Write an assembly language program to rotate a 200 teeth, 4 phase stepper motor as specified below: Ten rotations clockwise and eight rotations anticlockwise
5. Draw the interfacing scheme of 8255 and 8086 in memory mapped I/O mode.

6. An 8255 is used with port-A input in mode-1, Port-B as output in mode-1 and with Port-C used for handshaking for Port-A and Port-B. Assume the addressof Port-A is 80H.
   i. Determine the control word and write the instruction sequence to program the 8255 for this mode of operation.
   ii. Draw the scheme of connections required.

7. Explain A/D and D/A conversion mechanism
8. Show 8255 PPI in mode1 operation and interface to 8086.
9. Interface 8086 to keyboard and display unit.
10. Explain I/O mapped I/O and memory mapped I/O.
11. What is the interrupt vector table? Draw and explain the interrupt vector table for 8086Describe the response of 8086 to the interrupt coming on INTR pin.
12. List out the advantages of using 8259?
13. Describe the conditions that cause the 8086 to perform each of the following types of interrupts: Type-0, Type-1, Type-2 and Type-3
14. Draw a block diagram to interface two 16K X 8 SRAM (62128) to the 16-bit data bus of 8086 based system. Design the address decoder for the address range from 00000H - 07FFFFH for both the SRAMs.
15. Discuss the sequence of operations performed in the interrupt acknowledge cycle.
16. What is the difference between RET and IRET? Discuss the result, if RET instruction is placed at the end of the interrupt service routine
17. What is the vector address of type-50H interrupt
18. What is an interrupt? Explain, how the 8086 processor recognizes the interrupt? Draw the timing diagram, assuming that INTR is active. Explain interrupt acknowledge cycle with its associated timing diagram
19. Explain the interrupt structure of 8086.
20. Explain interrupt service routine concept.
21. Discuss the mode instruction format of 8251 for synchronous and asynchronous mode of operation.
22. Discuss overrun error and framing error with reference to 8251.
23. Write the sequence of instructions required to initialize 8251 at address A0H and A1H for the configuration given below:

i. Character length - 8 bits.

ii. No parity

iii. Stop bits - 1 1/2

iv. Baud rate - 16X

v. DTR and RTS asserted

vi. Error flag reset.

24. Design the hardware interface circuit for interfacing 8251 with 8086. Set the 8251 in asynchronous mode as a transmitter and receiver with even parity enabled, 2 stop bits, 8-bit character length, frequency 160 KHz and baud rate 10K:
25. Explain the interfacing of RS-232 to 8086.
26. Explain the need for RS232C interface. Explain serial communication standards with respect to voltage levels.
27. Explain 8251 USART.
28. Briefly discuss about the serial communication standards

Unit: 4

1. How does 8051 differentiate between the external and internal program memory?
2. Explain the alternate functions of Port-0, Port-2 and Port-3.
3. Discuss the advantages of microcontroller based system over microprocessor based systems
4. Describe the following registers of 8051:

   i. A i. B iii. SP iv. DPTR

5. Give the complete block schematic of an 8051 based system having following specifications:

   (a) 64 KB program memory

   (b) 64 KB data memory

   (c) Make use of 16 K x 8-bit memory chips and 74LS138 decoders.

   (d) Indicate clearly the address selected for the memory chips.

1. Explain internal and external memory of 8051
2. What is the difference between microprocessor and microcontroller? Give 8051 architecture
3. Explain the timers in 8051 and its modes.

4. Give any five instructions of 8051 and explain each.
5. Explain the stack operation in 8051 microcontroller and also discuss necessary instructions to access the stack
6. Explain the structure of program status word register of 8051

Unit: 5

1. Explain various operation modes of Timer-1 and Timer-0.
2. Describe the Timer control (TCON) and Timer mode control (TMOD) registers
3. Explain programming serial communication interrupts
4. Explain how the interrupts are used in real-time.
5. Explain the timers and counters in 8051.
6 Explain special function registers in 8051 and show how they are used for programming
8. List out the steps involved in programming the 8051 to transfer data serially.

References (Text books/websites/Journals):

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K. M. Bhurchandani,TMH, 2nd Edition 2006.
2. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier,2012

REFERENCE BOOKS:

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K. Uma Rao,Andhe Pallavi, Pearson, 2009.
4. Digital Signal Processing and Applications with the OMAP- L138 Experimenter, Donald Reay,WILEY 2012.

WEBSITES:

1. NPTEL VIDEO LECTURES:
https://nptel.ac.in/courses/108/105/108105102/
https://nptel.ac.in/courses/117/104/117104072/
2. https://www.youtube.com/watch?v=iV4TPnOLvgA
3. https://www.youtube.com/watch?v=Po6Wyb1ltIk
4. https://www.youtube.com/watch?v=0-ljoBEi-WE

5.https://www.youtube.com/watch?v=liRPtvj7bFU-Introduction to Microprocessors & Microcontrollers.