Name of Institute: Institute of Technology & Engineering
Name of Faculty: Asst Prof. Hinal Shah

Course code: CE0517
Course name: **Microprocessor & Interfacing**

Pre-requisites:

● Digital Electronics

● Microprocessor 8085

Credit points: 04

Offered Semester: V

Course coordinator (weeks 01 - 15)
Full name: Hinal Shah
Department with siting location: EL,3rd floor, Bhawar Building
Telephone: ext. 3335
Email: hinalshah.el@indusuni.ac.in
Consultation times: 9:00 a.m. to 5:00 p.m.

Course lecturer (weeks 01 - 15)
Full name: Hinal Shah
Department with siting location: EL,3rd floor, Bhawar Building
Telephone: ext. 3335
Email: hinalshah.el@indusuni.ac.in
Consultation times: 9:00 a.m. to 5:00 p.m.

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives
By participating in and understanding all facets of this course a student will:

1. Student will be able to describe the architecture of 8086 microprocessor.
2. Student will be able to understand interfacing of Memory chip with 8086 microprocessors.
3. Student will be able to understand interfacing of I/O devices with 8086 microprocessors.
4. To introduce MASM assembler for programming of Intel microprocessor.
5. Students will be able to understand the multiprocessing and multi programming environment

6. Student will be able to understand the use of various peripheral IC's such as 8255,8254,8237,8259.

Course Outcomes (CO)

1. Identify detailed S/W and H/W architecture of the microprocessor.[BT-4]
2. Understand and classify the instruction set of the 8086 microprocessor and distinguish the use of different instructions. [BT-2]
3. Solve & Compile assembly language programs for 8086 based systems.[BT-3]
4. Build system using 8086 microprocessor and peripherals[BT-4]
5. Develop a multi-tasking system using interrupt.[BT-5]
6. Understand the multiprocessing and multiprogramming environment.[BT-2]

Course Outline

In this course Microprocessor & Micro controller architecture and its application is discussed. In this course assembly and embedded c language are also introduce.

UNIT-I
[10 hours]

Introduction to 8086 Microprocessor

Introduction to 8086 Microprocessor, Bus Interface Unit (BIU), Execution Unit Pin Configuration of 8086, Pin Details of 8086, Memory Organization of 8086

8086 Based System

8086 Minimum Mode Configuration, Demultiplexing of the Multiplexed Buses, Transceiver 8286, Generation of Control Signals, Clock Generator 8284 and Driver, Interfacing of Memory in Minimum Mode, Maximum Mode Configuration of 8086 , Bus Controller 8288 ,Memory Interface of a Maximum-Mode 8086 System , Bus Cycles of 8086 , Minimum Mode Bus Cycles, Maximum mode bus cycles

UNIT-II

[10 hours]

Instruction set of 8086

Introduction, Addressing Modes of 8086, Data Addressing Modes, Address Addressing Modes, Instruction Format, Instruction Set of 8086, Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Shift and Rotate Instructions, String Instructions, Adjustment Instructions, Flag Related Instructions, Control Transfer Instructions, Processor-control Instructions

Assembler Directives

Introduction, Assembly Language, Assembly Language Program Development Tools, Editor, Assembler, Linker, Loader, Debugger, TASM Assembler, MASM Assembler, Assembler Directives, Data Defining Assembler Directives, Segment Defining Directives, Combining Segments, Managing Large Programs, Processor Directives, Initialization of Program Memory Models , Assembly language

UNIT-III

[10 hours]

Interrupts of 8086

Introduction, Advantages of Interrupts, Interrupt Systems, Single Line or Single Level Interrupt System, Multilevel or Multi Line Interrupt System, Classification of Interrupts, Interrupts of 8086, Interrupt Pointer Table, Dedicated Interrupts of 8086, Software Interrupts of 8086, Priority of Interrupts

Memory and I/O Interfacing

Introduction, I/O Devices and their interfacing, I/O addressing, Interfacing of Input Devices, Interfacing of output devices, Memory Interfacing, Address decoding, Interfacing circuit.

Programmable peripheral Interfacing chips

Introduction, Programmable peripheral Interfacing chip 8255, 8254 Programmable Timer

UNIT-IV

[10 hours]

Programmable peripheral Interfacing chips

8237 DMA Controller, 8259 Programmable Interrupt Controller, 8279 Display and Keyboard controller.

Multiprocessing and Multiprogramming

Introduction, 8086 based multiprocessing system, coprocessor configuration, closely coupled configuration, loosely coupled configuration, bus allocation schemes.

Method of delivery

Face to face lectures, Assignments, Quiz

Study time
3-hour lecture and 2-hour laboratory per week

CO-PO Mapping (PO: Program Outcomes)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	3	2	-	-	-	-	-	-	-	-	-
CO2	2	2	3	-	1	-	-	-	-	-	-	-
CO3	2	3	3	-	-	-	-	-	-	-	-	-
CO4	1	3	3	3	2	-	-	-	-	-	-	-
CO5	2	2	3	2	1	-	-	-	-	-	-	-
CO6	-	2	3	2	2	-	-	-	-	-	-	-
EL0517	1.6	2.5	2.8	2.3	1.5	-	-	-	-	-	-	-

1-Lightly Mapped 2- Moderately Mapped   3- Highly Mapped

Blooms Taxonomy and Knowledge retention (For reference)
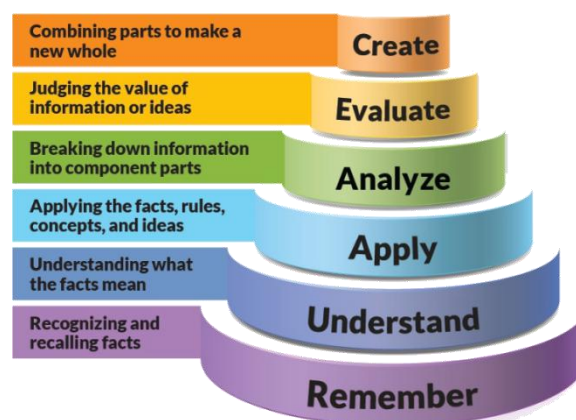(Blooms taxonomy has been given for reference)
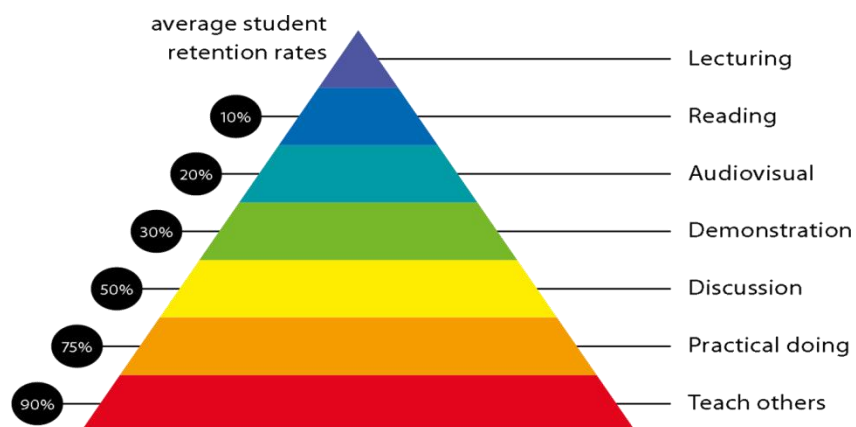

Figure 1: Blooms Taxonomy

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered
(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____ Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	**4 Problem solving skills**
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage	**5 Written communication**
	6 Oral communication
	7 Teamwork

with people in different settings. Recognize how culture can shape communication.	
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

1. Introduction to 8086 Simulator, Assembler and debugger.

2. Assembly language programming based on data transfer and branch operation.

3. Assembly Level Programming based on Arithmetic operation.

4. Assembly level programming based on logical operations.

5. Assembly level programming based on data transfer & branch operations.

6. Simulate program based on code converter.

7. Assembly program based on specific operation.

8. Simulate the program based on string operation.

9. Simulate program based on interrupt operation

10. Simulate 8086 Program based interfacing

Lecture/tutorial times
(Give lecture times in the format below)

> **Lecture**
>
> Tuesday 12:20-1:20pm
> Thursday 9:00-10:00am
> Friday 9:00-10:00am
>
> **Lab**
> Monday 11:10-1:10pm, A2 Batch
> Tuesday 2:00 to 3:00 pm, Thursday 3:10-4:10pm, A1 Batch

Attendance Requirements
The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course

outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of referencing system to be used in written work

Text books

1. Microprocessor 8086 Architecture, Programming and Interfacing- Sunil Mathur, PHI learning private limited.
2. 8086/8088 family: Design Programming and Interfacing: By John Uffenbeck (Pearson Education).
3. The 8088 And 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications, Pearson Education India, Walter A Tribel, Avtar Singh

Additional Materials

1. 8086 Microprocessor Programming and Interfacing the PC: By Kenneth Ayala

Web Resource

https://nptel.ac.in/courses/108105102/59

MOOCS:

1. https://www.edx.org/
2. https://www.nptel.ac.in/
3. https://www.coursera.org/

ASSESSMENT GUIDELINES
Your final course mark will be calculated from the following:

> **Mid semester (20 marks)**
> **Assignment (10 marks)**
> **Innovative/Project/Presentation/Attendance (10 marks)**
> **Final exam (*closed book*)   (40 marks)   Objectives (1-6)**

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary

assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:
A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work
Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment

Course schedule (subject to change)
(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
Weeks 1	**Introduction to 8086 Microprocessor** Introduction to 8086 Microprocessor, Bus Interface Unit (BIU), Execution Unit Pin Configuration of 8086, Pin Details of 8086, Memory Organization of 8086	1	BB
Weeks 2	**8086 Based System** 8086 Minimum Mode Configuration, Demultiplexing of the Multiplexed Buses,Transceiver 8286, Generation of Control Signals, Clock Generator 8284 and Driver,	1	BB
Week 3	Interfacing of Memory in Minimum Mode, Maximum Mode Configuration of 8086 , Bus Controller 8288 ,Memory Interface of a Maximum-Mode 8086 System	1,2	BB
Week 4	Bus Cycles of 8086 , Minimum Mode Bus Cycles, Maximum mode bus cycles, Introduction, Addressing Modes of 8086	1,2	BB

	Week 5	Data Addressing Modes, Address Addressing Modes, Instruction Format, Instruction Set of 8086, Data Transfer Instructions, Arithmetic Instructions	2,3	BB
	Week 6	Logical Instructions, Shift and Rotate Instructions, String Instructions, Adjustment Instructions	2,3	BB
	Week 7	Flag Related Instructions, Control Transfer Instructions, Processor-control Instructions **Assembler Directives** Introduction,Assembly Language,Assembly Language Program Development Tools, Editor, Assembler, Linker, Loader, Debugger	2,3	BB
	Week 8	TASM Assembler, MASM Assembler, Assembler Directives, Data Defining Assembler Directives, Segment Defining Directives, Combining Segments, Managing Large Programs, Processor Directives, Initialization of Program Memory Models , Assembly language	1,2,3	BB
	Week 9	**Interrupts of 8086** Introduction, Advantages of Interrupts, Interrupt Systems, Single Line or Single Level Interrupt System, Multilevel or Multi Line Interrupt System	3,4	BB
	Week 10	Classification of Interrupts, Interrupts of 8086, Interrupt Pointer Table, Dedicated Interrupts of 8086, Software	3,4	BB

		Interrupts of 8086, Priority of Interrupts		
	Week 11	**Memory and I/O Interfacing** Introduction, I/O Devices and their interfacing, I/O addressing, Interfacing of Input Devices, Interfacing of output devices, Memory Interfacing, Address decoding, Interfacing circuit.	4	BB
	Week 12	**Programmable peripheral Interfacing chips** Introduction, Programmable peripheral Interfacing chip 8255, 8254 Programmable Timer	4	BB
	Week 13	**Programmable peripheral Interfacing chips** 8237 DMA Controller, 8259 Programmable Interrupt Controller, 8279 Display and Keyboard controller.	4	BB
	Week 14	**Multiprocessing and Multiprogramming** Introduction, 8086 based multiprocessing system, co-processor configuration, closely coupled configuration	5,6	BB
	Week 15	loosely coupled configuration, bus allocation schemes.	5,6	BB

COMPUTER ENGINEERING DEPARTMENT COURSE DEPENDANCY CHART