

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

**Course Title: Microprocessor and Assembly Language Programming
(Code: 3330705)**

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering	Third

1. RATIONALE

The microprocessor is challenging field. This course explores architecture of a microprocessor and assembly language programming. The student will be able to apply logics to various given problems and develop programs using assembly language construct which helps them to develop real time microprocessor based application programs.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Develop code, debug, test and execute various assembly language programs using 8085 instruction set.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE - End Semester Examination; PA - Progressive Assessment

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Introduction of Microprocessor	1a. Classify types of microprocessor.	1.1 Evolution of microprocessor and it's types
	1b. Define various buses and their functions	1.2 Microprocessor Bus organization : Data Bus, Address Bus and Control Bus
	1c. List the operations of microprocessor	1.3 Operations of microprocessor: internal data manipulation, microprocessor initiated and peripheral or external initiated
	1d. Draw and Explain microprocessor architecture.	1.4 Pin diagram and block diagram of 8085 1.5 Architecture of 8085 1.6 Internal registers organization of 8085 1.7 Limitations of 8085
Unit – II Instruction Cycle and Timing Diagram	2a. Explain the bus timing diagram	2.1 8085 machine cycle and bus timings to fetch, decode and execute instruction from memory
	2b. Draw machine cycle with timing diagram	2.2 Memory read and write 2.3 Input/Output read and write cycle with timing diagram
Unit – III 8085 Instruction set	3a. Interpret machine language format, addressing modes and operations with various types of instructions	3.1 Machine language instruction format : Single byte, two byte, three byte instructions 3.2 Various addressing modes 3.3 Data transfer operation and instruction 3.4 Arithmetic operation and instruction 3.5 Logical operation and instruction 3.6 Branch operation and instruction 3.7 Stack operation and instruction 3.8 Input/Output and machine control operation and instruction
	3b. Develop simple programs	3.9 Simple programs with 8085 instruction
Unit – IV Programming Techniques of 8085	4a. Develop programs using control structures	4.1 Looping, Counting and indexing 4.2 Counter and Timing delays
	4b. Implement subroutines, procedures.	4.3 Stack and subroutine basic concepts 4.4 Procedure and macro
Unit – V 8085 Interrupts	5a. Classify interrupts and list its applications	5.1 Interrupts and its need 5.2 classification of interrupts 5.3 8085 interrupts: software, hard ware, and priorities of interrupts 5.4 8085 vectored interrupts:TRAP,INTR RST 7.5, RST 6.5, RST 5.5
Unit – VI Introduction to Advanced Microprocessor	6a. Draw block diagram and Explain 8086 microprocessor architecture.	6.1 Block diagram - Architecture of 8086 6.2 Register organization of 8086
	6b. Explain instruction pipelining and memory segmentation	6.3 Concepts of Instruction pipelining 6.4 Memory segmentation 6.5 Memory address generation

Unit	Major Learning Outcomes	Topics and Sub-topics
	6c. Differentiate maximum and minimum mode operation with diagram	6.6 Minimum and Maximum mode operation and diagram

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction of Basic Microprocessor	6	7	7	0	14
II	Instruction Cycle and Timing Diagram	4	0	7	0	07
III	8085 Instruction set	12	0	7	7	14
IV	Programming Techniques of 8085	8	0	0	14	14
V	8085 Interrupts	4	0	7	0	07
VI	Introduction to Advanced Microprocessor	8	7	7	0	14
Total		42	14	35	21	70

Legends:R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competency.

Following is the list of practical exercises for guidance:

Sr. No.	Unit No	Practical/Exercise	Apprx. Hrs. Required
1	I	Demonstrate the kit/simulator of 8085	2
2	III	Implement program to perform arithmetic operations(Add, subtract, multiply and divide) on signed and unsigned two 8 bit numbers.	6
3	III	Implement a program to mask the lower four bits of content of the memory location.	2
4	III	Implement a program to set higher four bits of content of the memory location to 1.	2
5	III	Implement a program to perform Exclusive OR of two numbers.	2
6	III	Implement a program to exchange the content of two memory locations.	2
7	III	Implement program to add/subtract 16 bit numbers	2
8	III	Implement program to copy content of one memory location to another memory location.	2

Sr. No.	Unit No	Practical/Exercise	Apprx. Hrs. Required
9	III	Implement a program to check whether given no is odd or even.	2
10	IV	Implement a program to compare two numbers.	2
11	IV	Implement a program to sum integers from 0 to 9.	2
12	IV	Implement a program to count no of zero value in given block of data.	2
13	IV	Implement program to add an array of data	2
14	IV	Implement program to find the smallest and the largest number from an array of n number	2
15	IV	Implement a program to move/copy block of memory to another given location and length of block is given in specific memory location.	2
16	IV	Implement a program to calculate the length of a string given starting and ending location.	2
17	IV	Implement a program to reverse a string using stack operations and stored in same memory area.	2
18	IV	Implement a program to find minimum and maximum from block data using subroutine provided length of block stored at memory location.	2
19	IV	Implement program to count no of negative values in given block of data.	2
Total			42

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- 1) Develop programs related with unit vice topics in computer laboratory.
- 2) Develop any module of to be useful in real life application.
- 3) Multimedia presentation of module developed by students.

8. SUGGESTED LEARNING RESOURCES

(A) List of Books

Sr. No.	Title of Books	Author	Publication and year
1	Microprocessor Architecture, Programming, and Application with the 8085 (5th edition)	Gaonkar, Ramesh	Penram Mumbai 2009 edition or latest
2	8085 Microprocessor and its application	Kani, A. Nagoor	Mc Graw Hill 2013
3	Microprocessor & Interfacing Programming and hardware Revised second edition	Hall, Douglas	Tata Mc Graw Hill 2006

(B) List of Major Equipment/Materials

- i. 8085 microprocessor kits
- ii. Computer Systems with minimum PIII processor (or equivalent) and 512 MB RAM.
- iii. Multimedia Projector

(C) List of Software/Learning Websites

- i. Simulator such as : <http://8085simulator.codeplex.com/>
<http://gnusim8085.org/> or its equivalent
- ii. Latest processor configuration :
<http://www.intel.com/pressroom/kits/quickreffam.htm>
- iii. Intel 8085 microprocessor architecture: <http://www.cpu-world.com/Arch/8085.html>
- iv. 8085 sample programs :<http://www.8085projects.info/page/free-programs-for-8085-microprocessor.aspx>
- v. 8085 ppts: <http://www.slideshare.net/shashank03/assembly-language-programming-of-8085>
- vi. Intel 8086 microprocessor architecture: <http://www.cpu-world.com/Arch/8086.html>

1. INSTRUCTIONAL STRATEGIES

The course activities include: Formal Lecture: 30% Supervised Classroom Work: 30% Supervised Laboratory Tutorials: 30% Unsupervised Directed Learning: 10%

- i. Concepts will be introduced in lectures.
- ii. Problem solving will be done through tutorials.
- iii. Practical work will be through laboratory sessions.

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

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|--------------------|-------------------------------|------------------------|
| 1. R. M Shaikh | Head of Computer Engg. Dept. | KD Polytechnic, Patan. |
| 2. Ms. M. P. Mehta | Sr. Lecturer Computer Engg. | K.D.Polytechnic, Patan |
| 3. Mr.S. D. Shah | Lecturer Computer Engg. Dept. | RCTI , Ahmedabad |

Coordinator and Faculty Members from NITTTR Bhopal

1. Dr. Shailendra Singh, Professor & Head Dept. of Computer Engineering and Applications, NITTTR, Bhopal.