

## GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

### Course Curriculum

#### MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

(Code: 3330705)

Diploma Programme in which this course is offered	Semester in which offered
Computer Engineering	3 <sup>rd</sup> Semester

### 1. RATIONALE

The microprocessor is challenging and very dynamic field. This course explores architecture of a microprocessor and its programming in assembly language. The student will be able to apply logics to various given problems and develop programs using assembly language construct that would help them to develop real time microprocessor based application programs.

### 2. COMPETENCY (Programme Outcome according to NBA Terminology):

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				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
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

#### 4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
<b>Unit – I Introduction of Microprocessor</b>	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
<b>Unit – II Instruction Cycle and Timing Diagram</b>	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
<b>Unit – III 8085 Instruction set</b>	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
<b>Unit – IV Programming Techniques of 8085</b>	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
<b>Unit – V 8085 Interrupts</b>	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 5.5 RST 7.5, RST 6.5, RST 5.5
<b>Unit – VI Introduction to Advanced</b>	6a. Draw block diagram and 6b. Explain 8086 microprocessor architecture.	6.1. Block diagram - Architecture of 8086 6.2. Register organization of 8086

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Microprocessor	6c. Explain instruction pipelining and memory segmentation	6.3. Concepts of Instruction pipelining 6.4. Memory segmentation 6.5. Memory address generation
	6d. 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
<b>Total</b>		<b>42</b>	<b>14</b>	<b>35</b>	<b>21</b>	<b>70</b>

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

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly 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 practical skills (Course Outcomes in psychomotor and affective domain) so that students are able to acquire the competencies (Programme Outcomes). Following is the list of practical exercises for guidance.

**Note:** Here only Course Outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of Programme Outcomes/Course Outcomes in affective domain as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

Sr. No.	Unit No	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Apprx. Hrs. Required
1	I	Demonstrate of 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
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
<b>Total</b>			<b>42</b>

## 7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- a. Develop programs related with unit wise topics in computer laboratory.
- b. Develop any module of to be useful in real life application.
- c. Multimedia presentation of module developed by students.

## 8. INSTRUCTIONAL STRATEGIES

Concepts should be explained thoroughly in theory sessions and should be implemented in laboratory appropriately along with the problem solving. Concept should be developed by giving problems to students as assignments.

## 9. SUGGESTED LEARNING RESOURCES

### A. List of Books

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

### 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>

## 10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

### Faculty Members from Polytechnics

- **Prof. R. M Shaikh**, Head Deptt. of Computer Engg. K D Polytechnic, Patan.
- **Prof.(Ms.) M. P. Mehta**, Sr. Lecturer Deptt. of Computer Engg. K. D. Polytechnic, Patan
- **Prof. S. D. Shah**, Lecturer Deptt. of Computer Engg., RCTI, Ahmedabad

### Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Shailendra Singh**, Professor & Head Dept. of Computer Engineering and Applications
- **Dr. M.A. Rizvi**, Associate Professor, Deptt. of Computer Engineering and Applications.