

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Microprocessor and Assembly Language Programming
(code: 3341101)

Diploma Programme in which this course is offered	Semester in which offered
Electronics and Communication	4th Semester

1. RATIONALE:

Microprocessor is the heart of embedded system and computers. This course will provide basic knowledge of microprocessor architecture and programming in assembly language. The basic knowledge of microprocessor and assembly language programming will enable the students to learn microcontroller & embedded systems in the higher semesters. After learning this course student will acquire the knowledge to maintain microprocessor based electronic equipments.

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:

- Maintain microprocessor based electronic equipments.

3. COURSE OUTCOMES:

1. Understands the main components and working principals of the Intel 8085 microprocessor.
2. Calculate the execution time for single instruction and entire program
3. Identify addressing modes and its applications
4. Develop assembly language program and subroutine for real world applications
5. Connect various peripheral devices to microprocessor

4. TEACHING AND EXAMINATION SCHEME:

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

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

5. COURSE DETAILS:

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics	
<u>Unit-I</u> Microprocessor Architecture & Microprocessor System	1a. Comparison of various microprocessors	1.1 Comparison of Intel Microprocessors on following parameter: Internal data bus/external data bus, address bus, physical memory size, Clock speed.	
	1b. List the operations of microprocessor	1.2 Microprocessor Operations : Internally initiated operation, Internal data operation, Externally initiated Operations.	
	1c. Define various buses 1d. (Address and Data) and their functions	1.3 Bus organisation: Address and Data bus	
	1e. List the function of each register and flags	1.4 Registers and flags: sign ,zero, carry, auxiliary carry ,parity	
	1f. Draw internal block diagram of 8085 with label and list its functions	1.5 8085 Microprocessor internal Block diagram and its functions	
	1g. List functions of various pins (signal) of 8085 microprocessor IC 1h. List the type and name of interrupt of 8085microprocessor	1.6 8085 signal and its function : Address and data bus, Control and status signals, Power-supply and clock frequency, Interrupts and serial I/O ports	
	1i. Describe multiplexing and de - multiplexing of address and data bus from multiples bus.	1.7 Multiplexing De multiplexing of address and data bus	
	1j. Draw and explain the circuit to generate control signal for microprocessor base system.	1.8 Generation of control signals.	
	<u>Unit-II</u> 8085 Instructions & Timing and	2a. Describe opcode structures with example	2.1 Machine language instruction format : Single byte, two byte, three byte instructions opcode format of

machine cycle	2b. Define T-state, machine cycle and instruction cycle	2.2 Timing diagram, T-state, Machine Cycle, Instruction cycle
	2c. Draw timing diagram for memory read/write cycle 2d. Draw timing diagram for I/O read/write cycle	2.3 Memory read and Memory write ,I/O read and I/O write cycle
	2e. Sketch timing diagram for relevant instruction	2.4 Instruction Timings and operation status
Unit-III Addressing mode and Instruction Set of 8085	3a. Define addressing modes.	3.1 Type of addressing mode
	3b. List the type of instructions base on number of bytes .	3.2 Instruction classification
	3c. Classify instructions based on operation performed	3.3 Based on size of instruction
	3d. List the function of various instructions	3.4 Based on operation performed: Data transfer instructions, Arithmetic and instructions, Logical operations, Branch operations, Stack, I/O and Machine control Instructions.
	3e. Write and execute simple assembly language program	3.5 Simple assembly language programs using 8085 Instructions set.
Unit-IV Programming Techniques	4a. Write and execute various assembly language programs using looping and counting concept.	4.1 Looping, Counting and Indexing.
	4b. Write an assembly language program using logical functions	4.2 Logic operations viz. AND, OR, NOR, NAND NOT, EXOR.
	4c. Write an assembly language to generate delay of specific time.	4.3 Counter and Timing delays.
	4d. Write an assembly language sub program based on Stack and Subroutine concept.	4.4 Stack and Subroutines.
Unit-V Interfacing concepts	5a. Define memory mapping. 5b. Classify I/O map	5.1 Memory and I/O maping. 5.2 Memory map I/O, I/O map I/O.
	5c. List the function of chip select signal.	5.3 Interfacing: chip selection and decoding.
	5d. Draw interfacing circuit for	5.4 Interfacing to EPROM and R/W

	relevant problem.	Memory
	5e. Draw the interfacing circuit for LED using 74LS245	5.5 Interfacing LEDs and Switches using 74LS245
	5f. Draw the block diagram of IC 8255 and explain its function.	5.6 Programmable Peripheral Interface- IC 8255, Block Diagram, Configuration, Modes and Operation
	5g. Write an assembly language program to read and display the data from IC 8255 ports.	

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

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Microprocessor Architecture & Microprocessor Systems	10	8	6	4	18
2	8085 Instruction & Timing	6	2	4	4	10
3	Addressing mode and 8085 instruction set	10	4	6	6	16
4	Programming Techniques	8	2	6	4	12
5	Interfacing concepts	8	4	4	6	14
	Total	42	20	26	24	70

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

Sr. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology) (Minimum Fourteen practical)	Apprx. Hrs. Required
1.	1	Demonstrate Hardware & Software development tool for 8085	2
2.	2	Write and Execute an Assembly language programs based on 8 bit data transfer instructions	2
3.	2	Write and Execute an Assembly language programs based on 16 bit data transfer instructions	2
4.	2	Write and Execute an Assembly language programs based on 8 bit Arithmetic instructions.	2
5.	2	Write and Execute an Assembly language programs based on 16	2

		bit Arithmetic instructions.	
6.	2	Write and Execute an Assembly language programs based on 8 bit Logical instructions.	2
7.	2	Write and Execute an Assembly language programs based on Machine control instructions.	2
8.	3	Write and Execute an Assembly language programs to find bit to bit similarity between two numbers	2
9.	4	Write and Execute an Assembly language program to check whether given no is odd or even	2
10	4	Write and an Assembly language program to sum integers from 0 to 9.	2
11	4	Write and Execute an Assembly language program to multiply two 8 bit numbers.	2
12	4	Write and Execute program to move block of memory to given location and length of block is given in specific memory location	2
13	4	Write and Execute program to find smallest number from an array of N number	2
14	4	Write and Execute an Assembly language program to count negative values in given block of data.	2
15	4	Write a Subroutine to find the square of given integer. Use this subprogram to find the square of an array of 4 numbers.	2
16	4	Write and an Assembly language program to find Hexadecimal to ASCII code conversion.	2
17	4	Write and an Assembly language program to convert BCD number to an equivalent Hexadecimal number.	2
18	4	Write and Execute an Assembly language programs to sort given array of ten bytes in descending order.	2
19	4	Write & Execute an Assembly language programs to alternatively blink LEDs connected on Port –B of 8255 at an interval of 0.1 second. Draw Interface diagram.	2
20	5	Interface keypad and LED with 8255 and write program to read key status and display it on LED.	2

8. SUGGESTED LIST OF STUDENT ACTIVITIES.

Following is the list of proposed student activities like:

1. Develop unit wise topics related programs in laboratory.
2. Develop any module of to be useful in real life application.
3. Multimedia presentation of module developed by students.
4. Prepare the charts of block diagram, circuit diagram and timing diagrams
5. Learn interfacing with IC 8259,IC 8279,IC 8254,IC 8251

9. SUGGESTED LEARNING RESOURCES

A) List of Books

No.	Title of Books	Author	Publication
1	Microprocessor Architecture Programming & Application	Ramesh Ganonker	PHI, latest edition
2	The 8080/85 Family: Design, Programming & Interfacing	John Ufferbeck	PHI India, latest edition
3	Introduction to Microprocessor	A.P.Mathur	TMH, latest edition
4	Microprocessor & its application	B.Ram	BPB, latest edition
5	Microprocessor & Interfacing	Douglas Hall	TMH, latest edition
6	Microprocessors and Microcontrollers	Senthil Kumar, Saravanan, Jeevananthan	Oxford University , latest edition

B) List of Major Equipment/Materials with Broad Specifications

1. 8085 microprocessor trainer kits (More preferable than simulator) and simulator
2. Peripheral Interfacing circuit board of IC 8255.
3. CRO & Logic Analyser
4. Computer Systems with minimum PIII processor (or equivalent) and 512 MB RAM.
5. Multimedia Projector

C) List of Software/Learning Websites

1. Simulator such as : <http://8085simulator.codeplex.com/> <http://gnusim8085.org/> or its Equivalent.
2. Latest processor configuration:
<http://www.intel.com/pressroom/kits/quickreffam.htm>
3. Intel 8085 microprocessor architecture: <http://www.cpu-world.com/Arch/8085.html>

10. INSTRUCTIONAL STRATEGIES

1. Power point presentation.
2. Animation/Video presentation session.

3. Group discussion and seminar.

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Polytechnic Group

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|-----------------------|---|
| 1. Shri D.B.VAGADIA, | HOD (EC), Government Polytechnic, Rajkot |
| 2. Shri R.D.RAGHANI, | HOD (EC), L.E. Collage, Morbi |
| 3. Shri T. R. PARMAR, | Sr.Lecturer (EC), Government Polytechnic , Palanpur |
| 4. Smt.K.N.VAGHELA, | Sr.Lecturer (EC) , Government Polytechnic , Ahmedabad |
| 5 Shri. J D Chauhan | Sr. Lecturer (EC) , BBIT institute ,Vallabh Vidhyanagar |

Co ordinator and Faculty Members from NITTTR Bhopal

Dr. (Mrs.) Anjali potnis, Assistant Professor, DEEE, NITTTR, Bhopal