Course Title: **Microprocessor Systems** Credit: **3**
Course No.: CSIT.125
Nature of the Course: **Theory +Lab** Total hours: **48**
Level: **B.Sc. CSIT** Year: **First** Semester: **Second**

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1. Course Description

This course contains of fundamental concepts of different microprocessors, assembly language programming, basic I/O Interfaces and Interrupt operations.

2. Course Objectives

The course objective is:

- To introduce the operation, programming, and application of microprocessor.
- To teach students how the various components of the computer works and their inter relationship from the processor to other units.

3. Specific Objectives and Contents

Specific Objectives	**Contents**
• Explain what a microprocessor is? • Give historical development of the microprocessors • Discuss technological innovations of microprocessors.	**Unit 1. Introduction (3 Hrs.)** 1.1 Introduction to Microprocessors 1.2 Evolution of Microprocessors 1.3 Basic organization 1.4 Components of Microprocessor
• Understand SAP architectures • Compare SAP1 and SAP2 architecture • Discuss Instruction cycle of basic computers	**Unit 2: Basic Computer Architectures (10 Hrs.)** 2.1. SAP Architectures, Instructions, Microprogram; Bus, Registers, Memory, cycle controller, Adder, Subtractor 2.2. SAP-1 Instructions, Fetch & Execution, microprogram, fetch cycle, execution cycle, microprogram, controller implementation 2.3. SAP 2 Architecture, architectural differences with SAP-1, bi-directional registers, instruction set, flags.
• Understand and create Timing Diagrams • Explain Fetch and Execute Operations\ • Discuss Machine Cycle	**Unit 3: Instruction Cycle (3 Hrs.)** 3.1. Fetch Operation and Timing Diagram 3.2. Execute Operation and Timing Diagram 3.3. Machine Cycle and States

• Describe 8085 and 8086 microprocessor architectures • Understand Timing and Control Unit • Understand addressing modes • Chop and unchop instructions • Explain Interrupts and Data flow	**Unit 4: Intel 8085/8086 Microprocessors (8 Hrs.)** 4.1. Functional Block Diagram and Pin configuration 4.2. Timing and Control Unit 4.3. Registers, Data and Address Bus 4.4. Instructions, Operation Code and Operands 4.5. Addressing Modes 4.6. Interrupts, Flags, Instructions and Data Flow
• Be Familiar with 8085 instruction set • Write small assembly language programs • Use addressing modes • Learn assembling linking and debugging	**Unit 5: Assembly language programming (10 Hrs)** 5.1. Assembly language and assembly language format 5.2. 8085 assembly language instruction set and Assembly instruction format 5.3. Instruction Types, Mnemonics, and Operands 5.4. Macro assemblers, Linking, Assembler directives 5.5. Simple sequence programs, Flags, Branch, Jumps, Loops, Selection (conditional) statements 5.6. Addressing Modes and Arrays 5.7. Debugging.
• Describe IO and memory read/write operations • Explain what a interrupts is • Discuss the interrupts priorities • Understand interrupt vector and interrupt processing	**Unit 6: I/O, Memory and Interrupt Operations (5 Hrs.)** 6.1. Memory read & write 6.2. IO read & write 6.3. DMA with advantages and drawbacks 6.4. Interrupts, Types, Interrupt Priorities, and Interrupt Masking 6.5. Interrupt vector and interrupt processing 6.6. The 8259A Programmable Interrupt Controller(PIC) 6.7. Interrupt Examples
• Explain input and output device interfaces • Understand Timer Interface • Discuss interfacing of Serial devices	**Unit 7: Interfacing (5 Hrs.)** 7.1. Basic I/O Interfacing :Parallel I/O, Programmed I/O, I/O port address decoding, Interface examples – Keyboard matrix, Printer 7.2. Timer Interfacing: The 8254 Programmable Interval Timer (PIT), Timing applications. 7.3. Serial I/O Interface: Asynchronous communication, interfacing serial I/O devices- mouse, modem, PC Keyboard.

• Discuss Modern processor architectures • Understand RISC and CISC architectures • Explain hyper threading	**Unit 8: Modern Processors (4 Hrs.)** 8.1. Technical overview (only features) of the architecture including Pentium-Pro, MMX 8.2. Hyper Threading, Core-2-duo, Concepts of RISC, RISC vs CISC architecture of SUN SPARC.

Recommended Books:

1. Ramesh S. Gaonkar, **Microprocessor Architecture, Programming, and Applications with 8085**, Prentice Hall
2. A. P. Malvino and J, A. Brown, **Digital Computer Electronics**, 3rd Edition, Tata McGraw Hill
3. D. V. Hall, **Microprocessors and Interfacing - Programming and Hardware,** McGraw Hill
4. P. K. Gosh and P.R. Sridhar, 0000 to 8085 **Introduction to 8085 Microprocessor for Engineers and Scientists**, 2nd edition, Prentice Hall, 2001.
5. Malvino Leach, **Digital principals and applications**, Tata McGraw Hill, 4th Edition

Course Title: **Microcomputer Organization and Microprocessors LAB** Credit: **1**
Course No.: CSIT.125
Nature of the Course: **LAB** Total hours: **48**
Level: **B.Sc. CSIT** Year: **First** Semester: **Second**

Laboratory Work Guidelines: Students will have to complete the assigned practical work throughout the semester and Practical examination will be conducted at the end of academic semester. The practical exam will be graded on the basis of the following marking scheme:

In-Semester Evaluation (Lab Book or Journal)	25 %
Final Exam Written	50 %
Final Exam Oral	25 %

Following are the guideline for the lab work:

1. There should be a lab book for the practical work related to the subject
2. The lab book will contain details of all practical's to be conducted in the lab
3. Students should read the lab book before coming to the lab
4. Every practical should have:
    a. Title
    b. Objectives
    c. Description
    d. Examples
    e. Self Activities
        i. Objective questions
        ii. Sample programs to be typed and executed
    f. Task list to be decided by the lab in-charge.
    g. Outputs to be verified by the lab in-charge.
5. Each practical should be conducted in the following manner:
    a. Explanation by lab in-charge – 10 minutes
    b. Self activities by students
    c. Lab in-charge will allocate tasks to each student (selection from a list / modify given task / specify new task)
    d. At the end of the slot, the lab in-charge has to verify the outputs and give a remark (Complete / Incomplete / Needs Improvement)

Assignment List for Lab Work

The main objective of Practical work in the course is to familiarize students with Assembly Language instruction set and programming using various microprocessors such as 8085\8086\8088 using trainer kit. The programming should include: Arithmetic operation, base conversion, conditional branching etc. Lab in-charge should assign lab work to each student. Sample Lab work list may include:

1. Assembly language program using 8085 microprocessor kit.
2. Program should comprise the use of all types of instructions and addressing modes.
3. The programming should include the concept of Arrays and the concept of Multiplications and Division operations on Microprocessor.
4. Assembly language programming, using any type of Assembler, which should include the different functions of Int 10h, and Int 21h.

Recommended Books

6. Ramesh S. Gaonkar, **Microprocessor Architecture, Programming, and Applications with 8085**, Prentice Hall
7. A. P. Malvino and J, A. Brown, **Digital Computer Electronics**, 3rd Edition, Tata McGraw Hill
8. D. V. Hall, **Microprocessors and Interfacing - Programming and Hardware,** McGraw Hill
9. P. K. Gosh and P.R. Sridhar, 0000 to 8085 **Introduction to 8085 Microprocessor for Engineers and Scientists**, 2nd edition, Prentice Hall, 2001.
10. Malvino Leach, **Digital principals and applications**, Tata McGraw Hill, 4th Edition