FACULTY OF ENGINEERING & TECHNOLOGY

Second Year Bachelor of Engineering

Course Code: 102040401

Course Title: Computer Organization & Architecture

Type of Course:Engineering Science Course

Course Objectives: To provide students with basic concepts in computer system as its logic operations. To make the students understand the basic operations involved in execution of an instruction. Explain the basic concept of interrupts and their usage to implement I/O control and data transfers. Students identify the different architectural design issues that can affect the performance of a computer such as, RISC architecture, instruction set design, and addressing modes.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	40 / 14	20 / 7	60/21	30 / 10	150 / 52

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Computer Data Representation:** Basic computer data types, Complements, Fixed point representation, Floating Point Representation.	3
2	**Register Transfer and Micro operations:** Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro operations, Logic Micro-operations, Shift Micro operations, Arithmetic Logic Shift Unit.	5
3	**Basic Computer Organization and Design:** Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input output and interrupt, Complete computer description, Design of Basic computer, design of Accumulator Unit.	6
4	**Programming Basic Computer:** Introduction, Machine Language, Assembly Language, assembler, Program loops, Programming Arithmetic and logic operations, subroutines. **Computer Arithmetic:** Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms	11

Opp. Shastri Maidan, Beside BVM College, Vallabh Vidyanagar, Dist: Anand, Gujarat - 388120
(O): 02692-238001 | Email: adminoffice@cvmu.edu.in | www.cvmu.edu.in

5	**Micro programmed Control and Central Processing Unit:** Control Memory, Address sequencing, Micro program Example, design of control Unit, General Register Organization, Stack Organization, Instruction format, Addressing Mode.	**6**
6	**Memory Organization and Input-Output Organization**: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA	**6**
7	**Pipeline and Vector Processing**: Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline.	**3**

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
20%	20%	25%	15%	10%	10%	

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.

Reference Books:

1	M. Morris Mano, Computer System Architecture, Pearson
2	Andrew S. Tanenbaum and Todd Austin, Structured Computer Organization, Sixth Edition, PHI
3	John Hayes, Computer Architecture and Organization, McGrawHill
4	Hall D, Microprocessors and Interfacing 2E. McGraw-Hill Education (India) Pvt Limited
5	R. S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Demonstrate and understand the basic principles and operations of digital computers	**15**
CO-2	Understand and classify the instruction set and distinguish the use of different instructions and apply it in assembly language programming.	**25**
CO-3	Design processing unit using the concepts of ALU and control logic design.	**20**
CO-4	Understand the architecture and functionality of central processing unit	**25**
CO-5	Design circuits for interfacing memory and I/O with processors.	**15**

Opp. Shastri Maidan, Beside BVM College, Vallabh Vidyanagar, Dist: Anand, Gujarat - 388120
(O): 02692-238001 | Email: adminoffice@cvmu.edu.in | www.cvmu.edu.in

List of Practicals / Tutorials:

1	Write a C program to perform the following conversions. a)Decimal to Binary Conversion b)Decimal to Hexadecimal Conversion c) Binary to Decimal Conversion
2	Write a C program to perform the following compliment Operations. a)1's Complement b)2's Complement
3	Write a C program to perform the following Micro-operations. a) Circular Shift left b) Circular Shift Right
4	Introduction to GNU Simulator 8085.
5	Write an Assembly Language Program to perform the addition of two 8-bit numbers.
6	Write an Assembly Language Program to perform the subtraction of two 8-bit numbers.
7	Write an Assembly Language Program to find 1's & 2's complement of an 8-bit number.
8	Write an Assembly Language Program to find the sum of 5 numbers using loop.
9	Write an Assembly Language Program to find smallest Number From an array.
10	Write an Assembly Language Program to arrange given numbers in ascending order.
11	Write an Assembly Language Program to find the factorial of a given number.

Supplementary learning Material:	
1	NPTEL courses

Curriculum Revision:	
Version:	**1**
Drafted on (Month-Year):	Apr-21
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	

Opp. Shastri Maidan, Beside BVM College, Vallabh Vidyanagar, Dist: Anand, Gujarat - 388120
(O): 02692-238001 | Email: adminoffice@cvmu.edu.in | www.cvmu.edu.in