

Govt. of Karnataka, Department of Technical Education

Diploma in Computer Science & Engineering

Third Semester

Subject: COMPUTER ORGANIZATION

Contact Hrs / week: 4

Total hrs: 64

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	Seminars and Guest lectures from industry and institutes	5	
	Tests	3	
	Total	64	145

Detailed Contents

1		Basic Structure Of Computers
1.1		Functional Units
	1.1.1	Input Unit
	1.1.2	Memory Unit
	1.1.3	Arithmetic and Logic Unit
	1.1.4	Output Unit
	1.1.5	Control Unit
1.2		Basic Operational Concepts
1.3		Bus Structures
2		Machine Instructions and Programs
2.1		Numbers, Arithmetic operations and Characters
	2.1.1	Number representation
	2.1.2	Addition of positive numbers

	2.1.3	Addition and subtraction of signed numbers
	2.1.4	Overflow in integer arithmetic
	2.1.5	Characters
2.2		Memory Locations and Addresses
	2.2.1	Byte Addressability
	2.2.2	Big Endian and Little Endian Assignments
	2.2.3	Word Alignment
	2.2.4	Accessing numbers, characters and character strings
2.3		Memory Operations
2.4		Instruction and Instruction sequencing
	2.4.1	Register Transfer notation
	2.4.2	Assembly Language notation
	2.4.3	Basic instruction types
	2.4.4	Instruction execution and straight line sequencing
	2.4.5	Branching
	2.4.6	Condition codes
2.5		Addressing modes
	2.5.1	Implementation of variables and constants
	2.5.2	Indirection and pointers
	2.5.3	Indexing and arrays
	2.5.4	Relative addressing
	2.5.5	Additional modes
2.6		Assembly Language
	2.6.1	Assembler directives
	2.6.2	Assembly and execution of programs
2.7		Basic Input- Output Operations
3		Basic Processing Unit
3.1		Some Fundamental Concepts
	3.1.1	Register transfers
	3.1.2	Performing an Arithmetic or Logic operation
	3.1.3	Fetching a word from memory
	3.1.4	Storing a word in memory
3.2		Execution of a complete Instruction
	3.2.1	Branch instructions
3.3		Multiple Bus Organization
3.4		Hardwired Control
	3.4.1	A complete processor
3.5		Microprogrammed Control
	3.5.1	Microinstructions
	3.5.2	Microprogram Sequencing
4		Input Output Organization
4.1		Accessing I/O Devices

4.2		Interrupts
	4.2.1	Interrupt Hardware
	4.2.2	Enabling and Disabling Interrupts
	4.2.3	Handling Multiple Devices
	4.2.4	Controlling Device requests
	4.2.5	Exceptions
4.5		Direct Memory Access
	4.5.1	Bus arbitration
4.6		Buses
	4.6.1	Synchronous bus
	4.6.2	Asynchronous bus
4.7		Interface Circuits
	4.7.1	Parallel port
	4.7.2	Serial port
4.8		Standard I/O Interfaces (Basic concepts only)
	4.8.1	Peripheral Component Interconnect(PCI) Bus
	4.8.2	SCSI Bus
	4.8.3	Universal Serial Bus (USB)
5		The Memory System
5.1		Some Basic Concepts
5.2		Semiconductor RAM Memories
	5.2.1	Internal Organization of memory chips
	5.2.2	Static Memories
	5.2.3	Asynchronous DRAMs
	5.2.4	Synchronous DRAMs
	5.2.5	Structure of larger memories
	5.2.5	Memory system consideration
	5.2.6	Rambus memory
5.3		Read-Only Memories
	5.3.1	ROM
	5.3.2	PROM
	5.3.3	EPROM
	5.3.4	EEPROM
	5.3.5	Flash Memory
5.4		Speed, Size and Cost
5.5		Cache Memories
	5.5.1	Mapping Functions
	5.5.2	Replacement Algorithms
6		Processors
6.1		What is Microprocessor?
6.2		Architectural Advancements of Microprocessors
	6.2.1	Pipelining

6.3		Evolution of Microprocessors
	6.3.1	8-bit Microprocessors
	6.3.2	16-bit Microprocessors
	6.3.3	32-bit Microprocessors

General Objectives:

1. Understand the basic structure of a computer with instructions.
2. Learn about machine instructions and program execution.
3. Learn about the internal functional units of a processor and how they are interconnected.
4. Understand how program controlled I/O is performed.
5. Learn about basic memory circuit, organization and secondary storage.
6. Understand different processor families.

Specific Objectives:

1.1	Understand the Functional Units
1.2	Learn about Basic Operational Concepts
1.3	Classify the Bus Structures
2.1	Understand about Numbers, Arithmetic operations and Characters
2.2	Learn about Memory Locations and Addresses
2.3	Understand Memory Operations
2.4	Understand Instruction and Instruction sequencing
2.5	Define Addressing modes
2.6	Learn about Assembly Language
2.7	Understand Basic Input- Output Operations
3.1	Study Some Fundamental Concepts
3.2	Understand Execution of a complete Instruction
3.3	Learn about Multiple Bus Organization
3.4	Understand Hardwired Control
3.5	Understand Micro programmed Control
4.1	Understand accessing I/O Devices
4.2	Classify Interrupts
4.5	Know about Direct Memory Access
4.6	Understand Buses
4.7	Understand Interface Circuits
4.8	Learn Basic Concepts of Standard I/O Interfaces

5.1	Learn Some Basic Concepts of memory
5.2	Understand Semiconductor RAM Memories
5.3	Understand Read-Only Memories
5.4	Know about Speed, Size and Cost
5.5	Understand Cache Memories
6.1	Define Microprocessor
6.2	Learn Architectural Advancements of Microprocessors
6.3	Understand Evolution of Microprocessors

Text book:

1. For Chapters 1-6 : **Computer Organization**, 5th edition, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, McGraw Hill, International edition.
2. Computer Organization By- Niranjan A, Sapna Publications.
3. For Chapter 7: **Microprocessors and Microcontrollers**, Third printing, Krishna Kant, PHI, And ISBN: 9788120331914
(Section 2.4, 2.10.1, 2.11.1, 2.11.2, 2.11.3)

Reference : 1. Computer Organization By- Dr. B S Pradeep

2. Computer architecture and organization , 4th edition , P Chakraborty , JAICO publishers

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Third Semester

Subject: Computer Organization

Max. Marks: 100

Max. Time: 3 Hours

Model Question Paper

- Note: 1. Section –I is compulsory.
2. Answer any TWO questions from each remaining Sections.

Marks

Section – I

1. a) Fill in the blanks with appropriate word/s 5x1=5
- i.
 - ii.
 - iii .
 - iv.
 - v.
- b) Write a note on bus arbitration. 5

Section – II

2. a) With a layout explain basic operational concepts with . 10
b) Distinguish between Multiprocessors and multicomputers. 5
3. a) Distinguish between Big-endian and little-endian. 5
b) Explain basic instruction types. 5
c) How instruction execution is carried out? 5
4. a) List the addressing modes. Explain any two with general format. 10
b) What is the significance of assembler directives? 5

Section – III

5. a) How basic I/O operations carried out ? Explain. 5
b) Explain single bus organization of the data path inside a processor. 10
6. a) List out the instructions to fetch a word memory. 5
b) Explain how a complete instruction execution takes place inside a processor. 5
c) Write a note on micro instructions. 5
7. a) Explain the concept of micro programmed control. 4
b) With block diagram describe a complete processor. 6
c) Explain the I/O gating for the registers inside a processor. 5

Section – IV

8. a) Explain the vectored interrupts. 5
b) What is an exception? Explain its types. 5
c) Write a diagram of a computer system using different interface standards. 5
9. a) Explain the organization of bit shell in a memory chip. 10
b) Explain the technique of LRU replacement algorithm. 5
10. a) With a neat figure explain direct mapping technique. 5
b) Explain briefly the Intel 8088 elementary block diagram. 10