Code No: R203105K **R20** SET - 1

III B. Tech I Semester Regular Examinations, Dec/Jan -2022-23

COMPUTER ORGANIZATION AND ARCHITECTURE

(Common to EEE,ECE)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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UNIT-I

1. a) Explain the Booth's algorithm for multiplication of signed two's complement numbers. [7M]
   b) Discuss about Error Detection codes. [7M]

(OR)

2. a) What is the simplified sum of product form for the Boolean expression:(A + B' + C')(A + B' + C)(A + B + C') [7M]
   b) What do you mean by Universal gate? Show that both NAND gate and NOR gate are universal gates. [7M]

UNIT-II

3. a) Design the full subtractor circuit with using Decoder and explain the working principle. [7M]
   b) Implement the following function Σ (0,1,3,4,8,9,10) using (i)Decoder (ii)Multiplexer [7M]

(OR)

4. a) Differentiate between combinational logic and sequential logic. List some applications of sequential logic. [7M]
   b) List the types of flip-flop. Describe the clocked RS flip-flop. [7M]

UNIT-III

5. a) Define micro-operation and explain the four Basic types of shift micro-operation and their variants [7M]
   b) Discuss about shift micro operations. [7M]

(OR)

6. a) What is register transfer language? With suitable examples, explain the representation of instructions in register transfer language and assembly language [7M]
   b) Describe the phases of instruction cycle briefly. [7M]

UNIT-IV

7. a) What is the purpose of addressing modes? Explain various addressing mode techniques. [7M]
   b) Define and discuss the types of registers. [7M]

(OR)

8. a) What is address sequencing? Explain the conditional branching and mapping of instruction in it [7M]
   b) What are the microinstructions needed for the fetch routine? Explain. [7M]

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UNIT-V

9. a) List the functionalities of I/O interface. Draw and explain a combined input/output interface circuit. [7M]
   b) What do you mean by associative memory? Give applications of associative memory. [7M]

(OR)

10. a) Explain daisy chain priority interrupt. [7M]
    b) Demonstrate the mechanism of DMA [7M]

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Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) Explain various number systems and number representations used in system. [7M]
   b) Explain any two ways of adding decimal numbers. [7M]

(OR)

2. a) Simplify the Boolean function: F(X,Y,Z) = ∑(0, 2, 4, 5, 6) using three variable K-map. [7M]
   b) State and prove De-Morgan's theorem 1st and 2nd with logic gates and truth table. [7M]

UNIT-II

3. a) Design a full adder with truth table and logic gates. [7M]
   b) How does a J-K flip flop differs from an S-R flip flop in its basic operations? Explain. [7M]

(OR)

4. a) What do you mean by triggering of flip flop? Define state table, state diagram and state equation. [7M]
   b) What is Multiplexer? Draw its block diagram and explain its working principle. [7M]

UNIT-III

5. a) Consider the arithmetic statement X= (A+B)*(C+D). Explain the influence of number of addresses on computer program. [7M]
   b) What is the difference between a serial and parallel transfer? Explain how to convert serial data to parallel and parallel data to serial. What type of register is needed? [7M]

(OR)

6. a) What do you mean by shift registers? Mention the different types of shift register. [7M]
   b) Discuss about logic micro operations. [7M]

UNIT-IV

7. a) With neat sketch explain the design of control unit of basic computer. [7M]
   b) Write the format of the micro instruction and micro operations for the control memory. [7M]

(OR)

8. a) Define microinstruction and micro program. Write an example for micro program [7M]
   b) Distinguish between micro programmed and hardwired control unit. [7M]

UNIT-V

9. a) Differentiate Isolated I/O and memory mapped I/O. [7M]
   b) Explain various mapping procedures of cache memory with an example. [7M]

(OR)

10. a) "RAID disks offers excellent performance and large & reliable storage"- Justify this statement through various levels. [7M]
    b) Write short notes on serial communication. [7M]

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COMPUTER ORGANIZATION AND ARCHITECTURE

(Common to EEE,ECE)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1.	a)	Dividend A=01110 Divisor B=10001. Explain flowchart for divide operation	[7M]
	b)	Define (r -1)'s complement and r's complement.	[7M]
		(OR)	
2.	a)	Demonstrate the procedure for obtaining product-of-sums using k-maps?	[7M]
	b)	State and prove commutative laws, associative laws and distributive law using logic gate and truth table.	[7M]

UNIT-II

3.	a)	What do you mean by full adder and full subtractor? Design a half subtractor using only NOR gates.	[7M]
	b)	What is State reduction table? How JK flip flop can convert into a D-flip flop?	[7M]
		(OR)	
4.	a)	Differentiate between a MUX and a DEMUX. Draw a logic circuit of 8*1 multiplexer.	[7M]
	b)	Differentiate between Synchronous Sequential circuit and Asynchronous Sequential Circuit. What do you mean by D-flip-flop?	[7M]

UNIT-III

5.	a)	What are the functional units of a computer system? Explain the way of handling information by each of them.	[7M]
	b)	What is register transfer notation? Write and explain these notations to three-address, two-address, single address and zero-address instruction types.	[7M]
		(OR)	
6.	a)	Discuss in detail about various Arithmetic micro operations?	[7M]
	b)	Briefly write about instruction codes.	[7M]

UNIT-IV

7.	a)	Explain with neat diagram the address selection for control memory.	[7M]
	b)	Give a brief note on general register organization.	[7M]
		(OR)	
8.	a)	Formulate a mapping procedure that provides eight consecutive microinstructions for each routing. The operation code has six bits and the control memory has 2048 words.	[7M]
	b)	Explain instruction format?	[7M]

UNIT-V

9. a) Define Virtual Memory. Explain the process of converting virtual addresses to physical addresses with a neat diagram. [7M]
   b) Explain different types of I/O communication techniques with merits and demerits. [7M]

(OR)

10. a) Explain in detail about Asynchronous data transfer. [7M]
    b) What is direct memory transfer? Give an overview and the block diagram of a DMA controller. [7M]

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Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Convert the $(256)_{10}$ into following codes [7M]
   i) Binary Coded Decimal (BCD) ii) Excess 3 codes
   iii) Gray code iv) Reflected Code
   b) Discuss about Error Correction codes. [7M]

(OR)

2. a) Using Boolean identities, reduce the given Boolean expression: [7M]
   F(X, Y, Z) = X′Y + YZ′ + YZ + XY′Z′
   b) What is a logic gate? What are the types of basic gate? Explain. [7M]

UNIT-II

3. a) Explain design Procedure of clocked Sequential Circuit with suitable example. [7M]
   b) What is encoder? Design a 3 to 8 line decoder using two 2 to 4 line decoder and explain it. [7M]

(OR)

4. a) What is Demultiplexer? Draw its block diagram and explain its working principle. [7M]
   b) What is master-slave flip-flop? Explain master slave J-K flip-flop. [7M]

UNIT-III

5. a) List and explain computer types with their applications in real world environment. [7M]
   b) What do you mean by register transfer language? What are the uses of register transfer language? [7M]

(OR)

6. a) Write about various general purpose registers involved in the typical computer system [7M]
   b) Explain the mapping from instruction code to micro instruction address. Give the first micro instruction for the 0010, 1011 and 1111. [7M]

UNIT-IV

7. a) Write the format of the micro instruction and micro operations for the control memory [7M]
   b) Define and discuss the differences between hardwired control unit and micro programmed control unit. [7M]

(OR)

8. a) What are addressing modes? Give an overview of the addressing modes. [7M]
   b) Explain the data transfer and manipulation instructions? [7M]

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UNIT-V

9. a) What do you mean by virtual memory? Discuss how paging helps in implementing virtual memory [7M]
   b) Show internal configuration of a DMA controller with diagram and explain how it's working. [7M]

(OR)

10. a) Explain in detail various I/O modes of transfer. [7M]
    b) Give an overview of parallel priority interrupt hardware. [7M]