

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

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

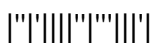
3. a) Design the full subtractor circuit with using Decoder and explain the working principle. [7M]
 b) Implement the following function $\Sigma (0,1,3,4,8,9,10)$ using (i)Decoder (ii)Multiplexer [7M]
 (OR)
4. a) Differentiate between combinational logic and sequential logic. List some applications of 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]

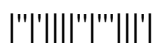
UNIT-IV

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]



UNIT-V

9. a) List the functionalities of I/O interface. Draw and explain a [7M]
combined input/output interface circuit.
- b) What do you mean by associative memory? Give applications of [7M]
associative memory.
- (OR)
10. a) Explain daisy chain priority interrupt. [7M]
- b) Demonstrate the mechanism of DMA [7M]



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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: $F(X,Y,Z) = \sum(0, 2, 4, 5, 6)$ 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)

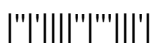
6. a) What do you mean by shift registers? Mention the different types of shift register. [7M]
 b) Discuss about logic micro operations. [7M]

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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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

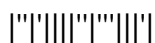
3. a) What do you mean by full adder and full subtractor? Design a half subtractor using only NOR gates. [7M]
- b) What is State reduction table? How JK flip flop can convert into a D-flip flop? [7M]
- (OR)
4. a) Differentiate between a MUX and a DEMUX. Draw a logic circuit of 8*1 multiplexer. [7M]
-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

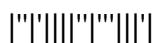
UNIT-IV

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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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 [7M]
 suitable example.
 b) What is encoder? Design a 3 to 8 line decoder using two 2 to 4 [7M]
 line decoder and explain it.

(OR)

4. a) What is Demultiplexer? Draw its block diagram and explain its [7M]
 working principle.
 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 [7M]
 world environment.
 b) What do you mean by register transfer language? What are the [7M]
 uses of register transfer language?

(OR)

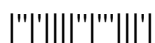
6. a) Write about various general purpose registers involved in the [7M]
 typical computer system
 b) Explain the mapping from instruction code to micro instruction [7M]
 address. Give the first micro instruction for the 0010, 1011 and
 1111.

UNIT-IV

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

(OR)

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



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]

