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(CO/CM/CW/DE/EJ/ET/EN/EX/EQ/IE/IS/IC/MU)

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We dedicate this Publication soulfully and wholeheartedly,

in loving memory of our beloved founder director,

Late Shri. Pradeepji Lalchandji Lunawat,

who will always be an inspiration, a positive force and strong support

behind us.

"My work is my prayer to God"

- Lt. Shri. Pradeepji L. Lunawat

Soulful Tribute and Gratitude for all Your Sacrifices, Hardwork and 40 years of Strong Vision…

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Syllabus

Unit	Topics and Sub-topics
Unit - I : Number Systems and Codes **Refer chapter 1**	1.1 **Number system :** Base or radix of number system, Binary, Octal, Decimal and hexadecimal number system. 1.2 **Binary arithmetic :** Addition, Subtraction, Multiplication, Division. 1.3 Subtraction using 1's complement and 2's complement. 1.4 **Codes :** BCD, Gray code, Excess-3 and ASCII code. 1.5 **BCD arithmetic :** BCD addition.
Unit - II : Logic Gates & Logic families **Refer chapters 2 and 3**	2.1 **Logic gates :** Symbol, Diode/Transistor switch circuit and logical expression, Truth table of basic gates (AND, OR, NOT), Universal gates (NAND and NOR) and special purpose gates (EX-OR, EX-NOR), Tristate logic. 2.2 **Boolean algebra :** Laws of Boolean algebra, Duality theorem, De-Morgan's theorems. 2.3 **Logic families :** Characteristics of logic families : Noise margin, Power dissipation, Figure of merit, Fan-in and fan-out, Speed of operation, Comparison of TTL, CMOS, Types of TTL NAND gate.
Unit - III : Combinational Logic Circuits **Refer chapters 4 and 5**	3.1 **Standard Boolean representation** : Sum of Product (SOP) and Product of Sum (POS), Minterm and maxterm, Conversion between SOP and POS forms, Realization using NAND/NOR gates. 3.2 **K-map reduction technique for the Boolean expression :** Minimization of Boolean functions upto 4 variables (SOP and POS form). 3.3 **Design of arithmetic circuits and code converters using K-map :** Half and full adder, Half and full subtractor, Gray to binary and binary to gray (up to 4 bits). 3.4 **Arithmetic circuits :** (IC 7483) adder and subtractor, BCD adder. 3.5 **Encoder/Decoder :** Basics of encoder, Decoder, Comparison, (IC 7447) BCD to 7 segment decoder / driver. 3.6 **Multiplexer and Demultiplexer :** Working, Truth table and applications of multiplexers and demultiplexers, MUX tree, IC 74151 as MUX, DEMUX tree, DEMUX as decoder, IC 74155 as DEMUX. 3.7 **Buffer :** Tristate logic, Unidirectional and bidirectional buffer (IC74LS244, 74LS245).

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Unit	Topics and Sub-topics
Unit - IV : Sequential Logic Circuit **Refer chapters 6, 7 and 8**	4.1 **Basic memory cell :** RS-latch using NAND and NOR. 4.2 **Triggering methods :** Edge trigger and level trigger. 4.3 SR flip flops : SR-flipflop, Clocked SR flip flop with preset and clear, Drawbacks of SR flip flop. 4.4 **JK flip flops :** Clocked JK flip flop with preset and clear, Race around condition in JK flip flop, Master slave JK flip flop, D and T type flip flop, Excitation table of flip flops, Block schematic and function table of IC 7474, 7475. 4.5 **Shift register :** Logic diagram of 4-bit shift register-Serial input serial output, Serial input parallel output, Parallel input serial output, Parallel input parallel output, 4 bit universal shift register. 4.6 **Counters :** Asynchronous counter : 4 bit ripple counter, 4 bit up/down counter, Modulus of counter, Synchronous counter : Design of 4 bit synchronous up/down counter. **Decade counter :** Block schematic of IC 7490 decade counter, IC 7490 as MOD N counter, Ring counter, Twisted ring counter.
Unit - V : Data Converters and PLDs **Refer chapters 9, 10 and 11**	5.1 **Data converter :** DAC : Types, Weighted resistor circuit and R-2R ladder circuit, DAC IC 0808 specifications. **ADC :** Block diagram, Types and working of dual slope ADC, SAR ADC, ADC IC 0808/0809, Specifications. 5.2 **Memory :** RAM and ROM basic building blocks, Read and write operation, Types of semiconductor memories. 5.3 **PLD :** Basic building blocks and types of PLDs, PLA, PAL, GAL. 5.4 **CPLD :** Basic building blocks, Functionality.

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Unit-I

Chapter 1 : Number Systems and Codes 1-1 to 1-45

Syllabus : Number system : Base or radix of number system, Binary, Octal, Decimal and hexadecimal number system, **Binary arithmetic :** Addition, Subtraction, Multiplication, Division, Subtraction using 1's complement and 2's complement. **Codes :** BCD, Gray code, Excess-3 and ASCII code. **BCD arithmetic :** BCD addition.

1.1 Introduction 1-1

1.2 Signals 1-1

1.2.1 Analog Signals 1-1

1.2.2 Digital Signals 1-1

1.2.3 Sources of Digital Signal 1-1

1.2.4 Advantages of Digital Signals 1-1

1.2.5 Applications of Digital Signals 1-2

1.2.6 Comparison of Digital and Analog Signals 1-2

1.3 System or Circuit 1-2

1.3.1 Analog Circuits or Systems 1-2

1.3.2 Digital Circuits (Systems) 1-2

1.3.3 Advantages of Digital Circuits 1-2

1.3.4 Disadvantages of Digital Systems 1-2

1.4 Comparison of Analog and Digital Circuits 1-2

1.5 Binary Logic and Logic Levels 1-3

1.5.1 Positive Logic 1-3

1.5.2 Negative Logic 1-3

1.6 Number Systems 1-3

1.6.1 Important Definitions 1-3

1.6.2 Various Numbering Systems 1-4

1.7 The Decimal Number System 1-4

1.7.1 Characteristics of a Decimal System 1-4

1.8 The Binary Number System 1-4

1.8.1 Binary Numbers from $(0)_{10}$ to $(15)_{10}$ 1-4

1.8.2 Binary Number Formats 1-5

1.8.3 Disadvantages of the Binary System 1-5

1.9 Octal Number System 1-5

1.9.1 Applications of Octal System 1-5

1.10 Hexadecimal Number System 1-5

1.10.1 Relation between Binary, Decimal, Octal and Hexadecimal Numbers 1-6

1.11 Conversion of Number Systems 1-7

1.12 Conversions Related to Decimal System 1-7

1.12.1 Conversion from Radix r to Decimal 1-7

1.12.2 Conversion from Decimal to Other Systems 1-8

1.13 Conversion from Binary to Other Systems 1-12

1.13.1 Conversion from Binary to Decimal 1-12

1.13.2 Binary to Octal Conversion 1-12

1.13.3 Binary to Hex Conversion 1-13

1.14 Conversion from Other Systems to Binary System 1-13

1.14.1 Conversion from Decimal to Binary 1-13

1.14.2 Octal to Binary Conversion 1-13

1.14.3 Hex to Binary Conversion 1-13

1.15 Conversion from Octal to Other Systems 1-14

1.15.1 Octal to Hex Conversion 1-14

1.15.2 Conversion from Other Systems to Octal 1-14

1.16 Conversions Related to Hexadecimal System 1-15

1.16.1 Other Systems to Hex 1-15

1.16.2 Hex to Other Systems 1-15

1.17 Binary Addition 1-16

1.17.1 Sum and Carry 1-16

1.17.2 Addition of Large Binary Numbers 1-16

1.18 Binary Subtraction 1-18

1.18.1 Subtraction and Borrow 1-18

1.18.2 Subtraction of Larger Binary Numbers 1-18

1.19 1's Complement of a Binary Number 1-19

1.20 2's Complement 1-20

1.21 Binary Subtraction using 1's and 2's Complements 1-20

1.21.1 Subtraction using 1's Complement 1-20

1.21.2 Binary Subtraction using 2's Complement Method 1-22

1.22 Binary Multiplication 1-26
1.23 Binary Division 1-27
1.24 Concept of Coding 1-29
1.24.1 Applications of Binary Codes 1-29
1.25 Classification of Codes 1-29
1.26 Binary Coded Decimal (BCD) Code 1-29
1.26.1 Comparison with Binary 1-30
1.26.2 Advantages of BCD Codes 1-30
1.26.3 Disadvantages 1-30
1.27 BCD Arithmetic 1-30
1.27.1 BCD Addition 1-30
1.28 Non – weighted Codes 1-33
1.29 Excess – 3 Code 1-34
1.30 Gray Code 1-35
1.30.1 Gray-to-Binary Conversion 1-36
1.30.2 Binary to Gray Conversion 1-36
1.31 Code Conversions 1-39
1.31.1 Binary to BCD Conversion 1-39
1.31.2 BCD to Binary Conversion 1-39
1.31.3 BCD to Excess – 3 1-39
1.31.4 Excess – 3 to BCD Conversion 1-40
1.32 Alphanumeric Codes 1-41
1.32.1 ASCII - (American Standard Code for Information Interchange) 1-41
1.33 I-Scheme Solved Examples 1-43
1.34 I-Scheme Questions and Answers 1-45
• **Review Questions 1-42**

Unit-II

Chapter 2 : Logic Gates & Boolean Algebra 2-1 to 2-25

Syllabus : Logic gates : Symbol, **Diode/Transistor switch circuit and logical expression,** Truth table of basic gates (AND, OR, NOT), Universal gates (NAND and NOR) and special purpose gates (EX-OR, EX-NOR), **Boolean algebra :** Laws of Boolean algebra, Duality theorem, De-Morgan's theorems.

2.1 Introduction 2-1
2.1.1 NOT Operator (Inversion) 2-1
2.1.2 AND Operator 2-1
2.1.3 OR Operator 2-1
2.1.4 Logic Gates 2-1
2.1.5 Gates, Symbols and Boolean Expression 2-2
2.2 Boolean (Binary) Algebra 2-2
2.3 Boolean Laws 2-2
2.3.1 Commutative Law 2-3
2.3.2 Associative Law 2-3
2.3.3 Distributive Law 2-3
2.3.4 AND Laws 2-3
2.3.5 OR Laws 2-3
2.3.6 INVERSION Law 2-3
2.3.7 Other Important Rules 2-4
2.3.8 Principle of Duality 2-4
2.3.9 Duality Theorem 2-4
2.4 De-Morgan's Theorems 2-5
2.4.1 Examples on Simplification of Logic Expression 2-6
2.5 Logic Gates 2-8
2.5.1 Classification of Logic Gates 2-8
2.6 NOT Gate or Inverter 2-8
2.6.1 NOT Gate Using Switches 2-8
2.6.2 NOT Gate using Transistor 2-9
2.7 AND Gate 2-9
2.7.1 AND Gate Using Switches 2-9
2.7.2 AND Gate Using Diodes 2-10
2.8 The OR Gate 2-10
2.8.1 OR Gate Using Switches 2-10
2.8.2 OR Gate using Diodes 2-11
2.9 The NAND Gate 2-11
2.10 The NOR Gate 2-11
2.11 EX-OR and EX-NOR Gates 2-12
2.11.1 The EX-OR Gate 2-12

2.11.2 The EX-NOR Gate 2-12
2.12 Writing Boolean Expression from a Logic Diagram 2-13
2.13 Construction of a Logic Circuit from the Given Boolean Expression 2-13
2.14 Gates using More than 2 Inputs 2-16
2.14.1 Multiple Input AND Gates 2-16
2.14.2 Multiple Input OR Gate 2-16
2.14.3 Multiple Input NAND Gate 2-17
2.14.4 Multiple Input NOR Gate 2-17
2.14.5 Multiple Input EX-OR Gate 2-17
2.14.6 Multiple Input EX-NOR Gate 2-17
2.15 Universal Gates 2-18
2.15.1 NAND Gate as a Universal Gate 2-18
2.15.2 NOR Gate as a Universal Gate 2-19
2.16 TTL and CMOS Logic Gate ICs 2-23
2.17 I-Scheme Solved Examples....2-24
2.18 I-Scheme Questions and Answers 2-24
- **Review Questions 2-23**

Unit-II

Chapter 3 : Logic Families 3-1 to 3-15

Syllabus : Logic families : Characteristics of logic families : Noise margin, Power dissipation, Figure of merit,

Fan-in and Fan-out, Speed of operation, Comparision of TTL, CMOS, Types of TTL NAND gate. Tristate logic.

3.1 Logic Families....3-1
3.2 Classification of Logic Families 3-1
3.2.1 Classification Based on Devices Used ...3-1
3.2.2 Classification Based on Circuit Complexity 3-1
3.3 Characteristics of Digital ICs 3-2
3.3.1 Voltage and Current Parameters 3-2
3.3.2 Fan-in and Fan-out 3-3
3.3.3 Noise Margin 3-3
3.3.4 Propagation Delay (Speed of Operation) 3-3
3.3.5 Power Dissipation 3-4
3.3.6 Operating Temperature 3-4
3.3.7 Figure of Merit (Speed Power Product SPP) 3-4
3.3.8 Invalid Voltage Levels 3-4
3.3.9 Current Sourcing and Current Sinking ...3-5
3.4 TTL Family 3-5
3.4.1 Standard TTL Characteristics 3-5
3.4.2 Advantages of TTL 3-6
3.4.3 Disadvantages of TTL 3-6
3.5 CMOS Logic 3-6
3.5.1 CMOS Characteristics 3-6
3.6 Advantages and Disadvantages of CMOS 3-6
3.6.1 Advantages of CMOS 3-6
3.6.2 Disadvantages of CMOS 3-7
3.7 Comparison of TTL and CMOS 3-7
3.8 Types of TTL NAND Gates 3-8
3.8.1 The Multiple Emitter Transistor 3-8
3.8.2 Two Input TTL-NAND Gate (Totempole Output) 3-8
3.8.3 Totem-pole (Active Pull up) Output Stage 3-9
3.9 TTL NAND Gate with Open Collector Outputs ...3-10
3.9.1 Disadvantages of Open Collector Output 3-11
3.9.2 Advantage 3-11
3.9.3 Wired ANDing 3-11
3.9.4 Comparison of Totem-pole and Open Collector Output NAND Gates 3-12
3.10 Tristate (Three state) Logic 3-12
3.10.1 Advantages of Tristate 3-13
3.10.2 Tristate Buffers 3-13

3.10.3 Applications of Tristate Buffers (Bus Organization) 3-13

3.10.4 A TRI-STATE Inverter 3-14

3.11 I-Scheme Questions and Answers 3-15

- **Review Questions 3-14**

Unit-III

Chapter 4 : Combinational Logic Circuits – Part I

4-1 to 4-40

Syllabus : Standard Boolean representation : Sum of Product (SOP) and Product of Sum (POS), Minterm and maxterm, Conversion between SOP and POS forms, Realization using NAND/NOR gates, **K-map reduction technique for the Boolean expression :** Minimization of Boolean functions upto 4 variables (SOP and POS form). **Design of arithmetic circuits and code converters using K-map :** Half and full adder, Half and full subtractor, Gray to binary and binary to gray (up to 4 bits). **Arithmetic circuits :** (IC 7483) adder and subtractor, BCD adder.

4.1 Introduction.....4-1

4.1.1 Classification of Digital Circuits 4-1

4.1.2 Combinational Circuit Design 4-1

4.1.3 Methods to Simplify the Boolean Equations 4-2

4.2 SOP and POS Representations for Logic Expressions 4-2

4.2.1 Sum-of-Products (SOP) Form 4-2

4.2.2 Product of the Sums Form (POS) 4-2

4.2.3 Standard or Canonical SOP and POS Forms 4-2

4.2.4 Conversion of a Logic Expression to Standard SOP or POS Form 4-3

4.3 Concepts of Minterm and Maxterm 4-5

4.3.1 Representation of Logical Expressions using Minterms and Maxterms 4-6

4.3.2 Writing SOP and POS Forms for a Given Truth Table 4-6

4.3.3 To Write Canonical SOP Expression for a Given Truth Table 4-6

4.3.4 To Write a Canonical POS Expression for a Given Truth Table 4-7

4.3.5 Conversion from SOP to POS and Vice Versa 4-7

4.4 Methods to Simplify the Boolean Functions 4-9

4.4.1 Algebraic Simplification 4-9

4.4.2 Disadvantages of Algebraic Method of Simplification 4-10

4.5 Karnaugh-Map Simplification 4-10

4.5.1 K-map Structure 4-10

4.5.2 K-map Boxes and Associated Product Terms 4-10

4.5.3 Alternative Way to Label the K-map 4-11

4.5.4 Truth Table to K-map 4-11

4.5.5 Representation of Standard SOP Form on K-map 4-12

4.6 K-map Reduction Technique for Boolean Expression 4-12

4.6.1 How does Simplification Take Place ? ..4-13

4.6.2 Way of Grouping (Pairs, Quads and Octets) 4-13

4.6.3 Grouping Two Adjacent One's (Pairs) 4-13

4.6.4 Grouping Four Adjacent Ones (Quad) 4-14

4.6.5 Grouping Eight Adjacent Ones (Octet) 4-16

4.6.6 Summary of Rules Followed for K-Map Simplification 4-16

4.7 Minimization of SOP Expressions (K-map Simplification) 4-18

4.7.1 Elimination of a Redundant Group 4-21

4.7.2 Don't Care Conditions 4-21

4.7.3 Disadvantages of K-map Technique 4-23

4.8 Product of Sum (POS) Simplification 4-23

4.8.1 K-map Representation of POS Form ...4-23

4.8.2 Representation of Canonical POS Form on K-map 4-23

4.9 Simplification of Canonical POS Form using K-map 4-24

4.10 Design Examples 4-26

4.11 Adders 4-26

4.11.1 Half Adder 4-26

4.11.2 Half Adder using Only NAND Gates 4-27

4.11.3 Full Adder 4-27

4.11.4 Full Adder using Half Adders 4-28

4.11.5 Applications of Full Adder 4-29

4.11.6 Comparison of Half Adder and Full Adder 4-29

4.12 Binary Subtractors 4-29

4.12.1 Types of Binary Subtractors 4-29

4.12.2 Half Subtractor 4-29

4.12.3 Half Subtractor using Basic Gates 4-30

4.12.4 Half Subtractor using NAND Gates 4-30

4.12.5 Full Subtractor 4-30

4.12.6 Full Subtractor using Half Subtractors 4-31

4.13 Code Converters 4-32

4.13.1 Binary to Gray Code Converter 4-32

4.13.2 Gray to Binary Code Conversion 4-33

4.14 The n-Bit Parallel Adder 4-34

4.14.1 A Four Bit Parallel Adder Using Full Adders 4-35

4.14.2 Fast Adder IC 74 LS 83 / 74 LS 283 4-35

4.14.3 Four Bit Binary Adder Using IC 7483 4-35

4.14.4 Cascading of Adders 4-36

4.15 n-bit Parallel Subtractor (Use of Adder as Subtractor) 4-36

4.15.1 4 Bit Parallel Subtractor Using 2's Complement 4-36

4.15.2 4-Bit Binary Parallel Adder/ Subtractor 4-36

4.16 BCD Adder Using IC 7483 4-37

4.16.1 Block Diagram of BCD Adder 4-37

4.16.2 Design of Combinational Circuit 4-37

4.17 I-Scheme Solved Examples 4-39

4.18 I-Scheme Questions and Answers 4-40

- **Review Questions 4-38**

Unit-III

Chapter 5 : Combinational Logic Circuits – Part II **5-1 to 5-43**

Syllabus : Encoder/Decoder : Basics of encoder, Decoder, Comparison, (IC 7447) BCD to 7 segment decoder / driver.

Multiplexer and Demultiplexer : Working, Truth table and applications of multiplexers and demultiplexers, MUX tree, IC 74151 as MUX, DEMUX tree, DEMUX as decoder, IC 74155 as DEMUX.

Buffer : Tristate logic, Unidirectional and bidirectional buffer (IC 74LS 244, 74LS245).

5.1 Introduction 5-1

5.1.1 Analysis of a Combinational Circuit 5-1

5.1.2 Design of Combinational Logic 5-2

5.2 Multiplexer (Data Selector) 5-3

5.2.1 Need of Multiplexers 5-4

5.2.2 Advantages of Multiplexers 5-4

5.3 Types of Multiplexers 5-4

5.3.1 2 : 1 Multiplexer 5-4

5.3.2 A 4 : 1 Multiplexer 5-5

5.3.3 8 : 1 Multiplexer 5-6

5.3.4 16 : 1 MUX 5-6

5.4 Applications of a Multiplexer 5-7

5.5 Study of Different Multiplexer ICs 5-7

5.5.1 8 : 1 Multiplexer (74151) 5-8

5.6 Multiplexer Tree 5-8

5.7 Use of Multiplexers in Combinational Logic Design 5-12

5.7.1 Implementing a Standard POS Expression using Multiplexer 5-16

5.7.2 Implementation of Boolean SOP Expression with Don't Care Conditions 5-16

5.8 Demultiplexers 5-16

5.8.1 Demultiplexer Principle 5-16

5.9 Types of Demultiplexers 5-17

5.9.1 1 : 2 Demultiplexer 5-17

5.9.2 1 : 4 Demultiplexer 5-18

5.9.3 1 : 8 Demultiplexer 5-19

5.9.4 1 : 16 Demultiplexer 5-19

5.10 IC 74155 Dual 1 : 4 Demux or Dual 2 : 4 Decoder 5-19

5.10.1 General Description 5-19

5.10.2 Features 5-19

5.10.3 Connection of IC 74155 as 1 : 4 Demultiplexer 5-21

5.11 Demultiplexer Tree 5-21

5.11.1 Comparison of Multiplexer and Demultiplexer 5-25

5.11.2 Use of DEMUX in Combinational Logic Design 5-25

5.11.3 Applications of Demultiplexer 5-25

5.12 Encoders 5-25

5.12.1 Types of Encoders 5-26

5.13 Priority Encoder 5-26

5.13.1 Priority Encoders in the IC Form 5-27

5.13.2 Decimal to BCD Encoder 5-27

5.13.3 Decimal to BCD Encoder IC 74147 5-27

5.13.4 Octal to Binary Encoder 5-28

5.13.5 Encoder IC 74148 (Octal to Binary Encoder) 5-28

5.14 Decoder 5-29

5.14.1 2 to 4 Line Decoder 5-29

5.14.2 Difference between Decoder and Demultiplexer 5-30

5.14.3 Demultiplexer as Decoder 5-30

5.14.4 IC74155 as 2 : 4 Decoder 5-30

5.14.5 3 to 8 Line Decoder 5-31

5.14.6 1 : 8 DEMUX Operated as 3:8 Decoder 5-31

5.14.7 Comparison of Encoder and Decoder 5-31

5.14.8 Implementation of Boolean Function using Decoder 5-32

5.14.9 4 Line to 16 Line Decoder using 3 : 8 Decoder 5-32

5.15 Seven Segment LED Display 5-32

5.15.1 Types of Seven Segment Displays 5-33

5.15.2 Common Anode Display 5-33

5.15.3 Common Cathode Display 5-33

5.15.4 Use of a Decoder for Driving the Seven Segment Display 5-33

5.15.5 Driving a Common Cathode Seven Segment Display 5-34

5.15.6 BCD to Seven Segment Display Code Converter (Common Anode Display) 5-34

5.15.7 BCD to Seven Segment Decoder IC 7446A, IC 7447A and 74LS47 5-36

5.15.8 Use of 7447 to Drive a Common Anode Display 5-37

5.16 Tristate (Three state) Logic 5-38

5.16.1 Tristate Buffers 5-39

5.16.2 Applications of Tristate Buffers 5-39

5.16.3 DM 74LS244 : Octal Tristate Buffer/Line Driver/Line Receiver 5-39

5.16.4 Tristate Octal-Bidirectional Buffer IC DM 74LS245 5-40

5.17 MSBTE Questions and Answers 5-41

5.18 I-Scheme Questions and Answers 5-42

5.19 I-Scheme Questions and Answers 5-42

- **Review Questions 5-40**

Unit-IV

Chapter 6 : Flip Flops 6-1 to 6-22

Syllabus : Basic memory cell : RS-latch using NAND and NOR, **Triggering methods :** Edge trigger and level trigger, **SR flip flops :** SR-flipflop, Clocked SR flip flop with preset and clear, Drawbacks of SR flip flop. **JK flip flops :** Clocked JK flip flop with preset and clear, Race around condition in JK flip flop, Master slave JK flip flop, D and T type flip flop, Excitation table of flip flops, Block schematic and function table of IC 7474, 7475.

6.1 Introduction to Sequential Logic Circuits 6-1
6.1.1 Combinational Circuits 6-1
6.1.2 Sequential Circuits 6-1
6.1.3 Comparison of Combinational and Sequential Circuits 6-1
6.2 Clock Signal 6-2
6.3 Latches 6-2
6.3.1 1-Bit Memory Cell (Cross Coupled Inverter) 6-2
6.4 RS Latch 6-3
6.4.1 S-R Latch using NOR Gates 6-3
6.4.2 S-R Latch using NAND Gates 6-5
6.5 Triggering Methods 6-6
6.5.1 Difference between Latch and Flip-flop.....6-6
6.5.2 Level Triggering 6-6
6.5.3 Types of Level Triggered Flip-flops 6-6
6.5.4 Edge Triggering 6-7
6.5.5 Types of Edge Triggered Flip Flops 6-7
6.6 Clocked SR Flip Flops 6-7
6.6.1 Positive Edge Triggered SR Flip Flop 6-7
6.6.2 Negative Edge Triggered S - R Flip Flop.....6-8
6.6.3 Drawback of S-R Flip Flop 6-8
6.7 Clocked D Flip-flop 6-9
6.7.1 Positive Edge Triggered D Flip-flop 6-9
6.7.2 Negative Edge Triggered D Flip Flop 6-9
6.7.3 Applications of D Flip-flop 6-10
6.8 Edge Triggered (Clocked) J-K Flip Flop 6-10
6.8.1 Positive Edge Triggered JK Flip Flop ...6-10
6.8.2 Negative Edge Triggered JK Flip-Flop 6-12
6.9 Level Triggered JK Flip Flop or JK Latch 6-12
6.9.1 Race Around Condition in Level Triggered JK FF 6-12
6.9.2 How does an Edge Triggered JK FF Avoid Race Around Condition ?.....6-13
6.10 Toggle Flip Flop (T Flip Flop) 6-14
6.10.1 Positive Edge Triggered T-FF 6-14
6.10.2 Negative Edge Triggered T Flip Flop ...6-15
6.10.3 Application of T FF 6-15
6.11 Master Slave (MS) JK Flip Flop 6-16
6.12 Clocked FFs with Preset and Clear Inputs 6-17
6.12.1 S-R Flip-Flop with Preset and Clear Inputs 6-17
6.12.2 JK Flip Flop with Preset and Clear Inputs 6-18
6.13 Excitation Table of Flip-Flop 6-18
6.13.1 Excitation Table of SR Flip Flops 6-18
6.13.2 Excitation Table of D Flip Flop 6-19
6.13.3 Excitation Table of JK Flip Flop 6-19
6.13.4 Excitation Table of T Flip Flop 6-19
6.14 Conversion of Flip Flops 6-20
6.15 Applications of Flip Flops 6-20
6.16 Flip-Flop ICs 6-20
6.16.1 SN74LS74A : Dual D-Type Positive Edge-triggered Flip-Flop Low Power Schottky 6-20
6.16.2 SN 74LS75 : 4-Bit Bistable Latches 6-21
6.17 Comparisons 6-21
6.17.1 Comparison of D Flip-flop and T Flip-flop 6-21
6.17.2 Comparison of SR Flip-flop and JK Flip-flop 6-21
6.18 I-Scheme Questions and Answers.....6-22
- **Review Questions 6-22**

Unit-IV

Chapter 7 : Shift Registers 7-1 to 7-16

Syllabus : Logic diagram of 4-bit shift register-Serial input serial output, Serial input parallel output, Parallel input serial output, Parallel input parallel output, 4 bit universal shift register, Ring counter, Twisted ring counter.

7.1 Introduction 7-1
7.2 Data Formats 7-1
7.3 Classification of Registers 7-1
7.4 Buffer Registers 7-2

7.5 Shift Registers 7-2
7.5.1 Serial Input Serial Output (Shift Left Mode) 7-3
7.5.2 Serial In Serial Out (Shift Right Mode) 7-4
7.5.3 Applications of Serial Operation 7-5
7.6 Serial In Parallel Out (SIPO) 7-7
7.7 Parallel In Serial Out Mode (PISO) 7-7
7.8 Parallel In Parallel Out (PIPO) 7-8
7.9 Bidirectional Shift Register 7-8
7.9.1 A 3-bit Bidirectional Register using the JK Flip Flops 7-9
7.10 Applications of Shift Registers 7-10
7.11 Universal Shift Register 7-10
7.11.1 Universal Shift Register IC 7495 7-11
7.11.2 Parallel Loading (PIPO) 7-12
7.11.3 Serial Shift Right Operation 7-12
7.11.4 Serial Shift Left Operation 7-12
7.12 Ring Counter 7-12
7.13 Johnson's Counter (Twisted Ring Counter) 7-14
7.14 I-Scheme Questions and Answers 7-16
- **Review Questions 7-15**

Unit-IV

Chapter 8 : Counters 8-1 to 8-29

Syllabus : Asynchronous counter : 4 bit ripple counter, 4 bit up/down counter, Modulus of counter, Synchronous counter : Design of 4 bit synchronous up/down counter.

Decade counter : Block schematic of IC 7490 decade counter, IC 7490 as MOD N counter, Ring counter, Twisted ring counter.

8.1 Introduction 8-1
8.1.1 Types of Counters 8-1
8.1.2 Classification of Counters 8-1
8.2 Asynchronous Up Counters 8-1
8.2.1 3 Bit Asynchronous Up Counter 8-1
8.2.2 4 Bit Asynchronous Up Counter 8-3
8.2.3 State Diagram of a Counter 8-4
8.2.4 Modulus of the Counter 8-4
8.2.5 Frequency Division in Asynchronous Counters 8-4
8.3 Decade Asynchronous Up Counter (MOD-10 Counter) 8-7
8.4 Asynchronous Down Counter 8-8
8.4.1 3-Bit Asynchronous Down Counter 8-8
8.5 Up / Down Counters 8-10
8.5.1 Up/Down Ripple Counters 8-10
8.5.1.1 3-bit and Up Down Ripple Counters 8-11
8.5.1.2 4-bit Asynchronous Up/Down Counter 8-11
8.6 Disadvantages of Ripple Counters 8-12
8.7 Synchronous Up Counters 8-12
8.7.1 2-Bit Synchronous Up Counter 8-12
8.7.2 3-Bit Synchronous Binary Up Counter 8-13
8.7.3 Synchronous Counter using T Flip Flops 8-15
8.7.4 Four Bit Synchronous Up Counter 8-15
8.8 Design of the 3 Bit Synchronous Counter 8-15
8.8.1 Design using T Flip Flops 8-16
8.8.2 Design using JK Flip Flops 8-17
8.9 Modulo – N Synchronous Counters 8-18
8.9.1 Synchronous Decade Counter 8-18
8.10 UP / DOWN Synchronous Counter 8-20
8.10.1 3-bit Up/Down Synchronous Counter 8-20
8.10.2 Advantages of Synchronous Counter 8-21
8.10.3 Comparison of Synchronous and Asynchronous Counters 8-21
8.11 Ripple Counter IC 7490 (Decade Counter) 8-22
8.11.1 The Internal Diagram of IC 7490 8-23
8.11.2 IC 7490 as MOD-N Counter 8-24
8.12 Applications of Counters 8-26
8.12.1 Comparison of Counter and Shift Register 8-27

8.13 MSBTE Questions and Answers 8-27

8.14 I-Scheme Solved Examples..... 8-27

8.15 I-Scheme Questions and Answers 8-28

- **Review Questions 8-27**

Unit-V

Chapter 9 : A-D and D-A Converters 9-1 to 9-23

Syllabus : Data converter : DAC : Types, Weighted resistor circuit and R-2R ladder circuit, DAC IC 0808 specifications.

ADC : Block diagram, Types and working of dual slope ADC, SAR ADC, ADC IC 0808/0809, Specifications.

9.1 Need of Data Converters 9-1

9.1.1 Types of Data Converters 9-1

9.2 DAC Fundamentals 9-1

9.2.1 Circuit Symbol and Transfer Characteristics 9-1

9.2.2 Input-Output Equation 9-2

9.2.3 Types of D to A Converters 9-2

9.3 Binary Weighted Resistor DAC 9-3

9.3.1 Expression for Analog Output Voltage ... 9-3

9.3.2 Output Voltage Waveform of a 3-Bit DAC 9-4

9.3.3 Disadvantages of Weighted Resistor DAC 9-4

9.3.4 Advantages of Weighted Resistor DAC 9-5

9.4 R-2R Ladder Network 9-6

9.5 R-2R Ladder DAC 9-6

9.5.1 Operation of R-2R ladder DAC 9-7

9.5.2 Advantages of R/2R Ladder DACs 9-8

9.5.3 Applications of D/A Converters 9-8

9.5.4 Comparison of DACs 9-8

9.6 Specifications for DAC 9-9

9.7 Monolithic IC DAC 0808 9-10

9.7.1 Pin Configuration and Functional Block Diagram 9-10

9.7.2 Typical Connection Diagram 9-11

9.7.3 Connection Diagram with a Negative Reference Voltage 9-11

9.7.4 Specification of DAC 0808 9-11

9.8 Analog to Digital Converters (ADC) 9-11

9.9 Types of A to D Converters 9-12

9.10 ADC Circuits 9-12

9.10.1 Counter Type ADC (Staircase Ramp) 9-12

9.10.2 Successive Approximation ADC (SA - ADC) 9-13

9.10.3 Single Slope Integrating ADC 9-15

9.10.4 Dual Slope Integrator ADC 9-17

9.10.5 Comparison of A/D Converters 9-18

9.10.6 Comparison of Dual Slope and Ramp Type ADCs 9-18

9.10.7 Comparison of Ramp and Successive Approximation Type ADC 9-19

9.10.8 Comparison of Single and Dual Slope ADC 9-19

9.11 ADC Characteristics (Specifications) 9-19

9.11.1 Resolution 9-19

9.11.2 Conversion Time 9-19

9.11.3 Quantization Error 9-19

9.12 ADC Applications 9-20

9.13 ADC DAC ICs 9-20

9.13.1 Monolithic IC ADC 0809 9-20

9.13.2 Features of ADC 0809 9-20

9.13.3 Pin Configuration of ADC 0809 9-20

9.13.4 Typical Connection Diagram of ADC 0809 9-22

9.13.5 Specifications of ADC 0809 9-22

9.14 MSBTE Questions and Answers 9-22

9.15 I-Scheme Solved Examples 9-23

9.16 I-Scheme Questions and Answers 9-23

- **Review Questions 9-22**

Unit-V

Chapter 10 : Memories 10-1 to 10-16

Syllabus : Memory : RAM and ROM basic building blocks, Read and write operation, Types of semiconductor memories.

10.1 Introduction 10-1

10.1.1 Advantages of Semiconductor Memory 10-1

10.2 Memory Organization and Operation 10-1

10.2.1 Memory Size 10-1

10.2.2 Block Diagram of a Memory Device 10-2

10.3 Classification and Characteristics of Memories 10-3

10.4 Classification Based on Principle of Operation 10-3

10.4.1 Sequential Memories 10-3

10.4.2 Random Access Memory (RWM or RAM) 10-3

10.4.3 Read Only Memories (ROM) 10-4

10.4.4 Content Accessible Memories (CAM) ... 10-4

10.5 Classification Based on Physical Characteristics 10-4

10.5.1 Erasable or Non-erasable Memories 10-4

10.5.2 Ultraviolet Erasable Programmable ROM (UV EPROM) 10-5

10.5.3 Volatile or Non-volatile Memories 10-5

10.6 Classification Based on Mode of Access 10-5

10.6.1 Sequential Access 10-6

10.6.2 Random Access 10-6

10.7 Classification Based on Fabrication Technology 10-6

10.8 Read Only Memory (ROM) 10-6

10.8.1 Application of ROM 10-6

10.8.2 ROM Manufacturing 10-6

10.8.3 ROM Organization 10-6

10.9 Internal Organization of RAM 10-7

10.9.1 Write Operation 10-7

10.9.2 Read Operation 10-7

10.10 Expanding the Memory Size 10-8

10.10.1 Expanding the Word Size 10-8

10.10.2 Expanding Word Capacity 10-9

10.11 Random Access Memory (RAM) 10-11

10.11.1 Static RAM (SRAM) 10-11

10.11.2 TTL Static RAM Cell 10-11

10.11.3 MOS Static RAM Cell 10-12

10.12 Dynamic RAM (DRAM) 10-13

10.12.1 Advantages of Dynamic RAM 10-13

10.12.2 Disadvantage of Dynamic RAM 10-13

10.12.3 Dynamic MOS RAM Cell 10-13

10.12.4 Comparison of SRAM and DRAM 10-14

10.13 Comparison of RAM and ROM 10-15

10.14 Comparison of EPROM and EEPROM 10-15

10.14.1 Comparison of PROM and EPROM ... 10-15

10.15 I-Scheme Questions and Answers 10-16

- **Review Questions 10-15**

Unit-V

Chapter 11 : Programmable Logic Devices 11-1 to 11-15

Syllabus : PLD : Basic building blocks and types of PLDs, PLA, PAL, GAL. CPLD : Basic building blocks, Functionality.

11.1 Introduction to PLDs 11-1

11.1.1 Advantages of PLDs 11-1

11.2 Types of PLDs 11-1

11.3 Programmable Logic Array (PLA) 11-1

11.3.1 Input Buffers 11-2

11.3.2 And Matrix 11-2

11.3.3 The OR Matrix 11-3

11.3.4 Invert/Non-invert Matrix 11-4

11.3.5 Output Buffer 11-5

11.3.6 Output through Buffers and Flip Flops 11-5

11.3.7 The Programming Procedure for PLA 11-5

11.3.8 Expansion of PLA Capacity 11-5
11.3.9 Application Areas of PLA 11-6
11.3.10 Designing of Combinational Circuit using PLA 11-6
11.4 Programmable Array Logic (PAL) 11-8
11.4.1 Input Buffers 11-8
11.4.2 AND Matrix 11-8
11.4.3 OR Matrix 11-8
11.4.4 Input and Output Circuits 11-9
11.4.5 Solved Examples on PAL 11-9
11.4.6 Types of PAL Devices 11-11
11.4.7 Registered PALs 11-11
11.4.8 Configurable PAL 11-11
11.5 Generic Array Logic Devices (GAL) 11-11
11.5.1 Comparison of PLA and PAL 11-11
11.6 Complex Programmable Logic Devices (CPLDs) 11-11
11.6.1 Basic Architecture of CPLD 11-11
11.6.2 PAL like Block 11-12
11.7 Programming of PLDs 11-12
11.7.1 CPLD Packaging 11-12
11.8 I-Scheme Questions and Answers 11-13
- **Review Questions 11-13**

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