Digital Electronics

(USIT102)

F. Y. B. Sc. (Information Technology)
Semester I
(Mumbai University)

Strictly as per the New Revised Syllabus of

Mumbai University w.e.f. academic year 2016-2017

J. S. Katre

M.E. (Electronics and Telecommunication)
Formerly, Assistant Professor
Department of Electronics Engineering
Vishwakarma Institute of Technology (V.I.T.), Pune.
Maharashtra, India

TechKnowledge™ Publications

MIO1C Price ₹ 340/-

(Book Code : MIO1C)

Digital Electronics (USIT102)
(F. Y. B. Sc. (Information Technology), Semester I, Mumbai University)
J. S. Katre

First Printed in India : January 2002
First Edition : July 2016
Second Revised Edition : June 2017
Third Revised Edition : June 2018
Fourth Revised Edition : June 2019 **(TechKnowledge Publications)**
Fifth Revised Edition : October 2020
Sixth Revised Edition : October 2021

ISBN : 978-93-89233-45-2

Published by

TechKnowledge Publications

Head Office : B/5, First floor, Maniratna Complex, Taware Colony, Aranyeshwar Corner,
Pune - 411 009. Maharashtra State, India
Ph : 91-20-24221234, 91-20-24225678.
Email : info@techknowledgebooks.com,
Website : www.techknowledgebooks.com

[USIT102] (FID : MIO1) (Book Code : MIO1C)

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…

(Book Code : MIO1C)

Syllabus…

Digital Electronics : Sem. I, (Information Technology (MU-BSc))

Unit I

Number System :

Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, floating point numbers, weighted codes binary coded decimal, non-weighted codes, Excess – 3 code, Gray code, Alphanumeric codes – ASCII Code, EBCDIC, ISCII Code, Hollerith Code, Morse Code, Teletypewriter (TTY), Error detection and correction, Universal Product Code, Code conversion. **(Refer chapters 1 and 2)**

Binary Arithmetic :

Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement, Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system, BCD and Excess – 3 arithmetic. **(Refer chapter 3)**

Unit II

Boolean Algebra and Logic Gates :

Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates, Input bubbled logic, Assertion level. **(Refer chapter 4)**

Minterm, Maxterm and Karnaugh Maps :

Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/5/6 variable K-maps, Grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-map and obtain K-map from Boolean expression, Quine Mc Cluskey Method. **(Refer chapter 5)**

Unit III

Combinational Logic Circuits :

Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations.

Arithmetic Circuits :

Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator. **(Refer chapter 6)**

Unit IV

Multiplexer, Demultiplexer, ALU, Encoder and Decoder :

Introduction, Multiplexer, Demultiplexer, Decoder, ALU, Encoders. **(Refer chapter 7)**

(Book Code : MIO1C)

Sequential Circuits : Flip-Flop :

Introduction, Terminologies used, S-R flip-flop, D flip-flop, JK flip-flop, Race-around condition, Master – slave JK flip-flop, T flip-flop, conversion from one type of flip-flop to another, Application of flip-flops. **(Refer chapter 8)**

Unit V

Counters :

Introduction, Asynchronous counter, Terms related to counters, IC 7493 (4-bit binary counter), Synchronous counter, Bushing, Type T Design, Type JK Design, Presettable counter, IC 7490, IC 7492, Synchronous counter ICs, Analysis of counter circuits. **(Refer chapter 9)**

Shift Register :

Introduction, parallel and shift registers, serial shifting, serial–in serial–out, serial–in parallel–out , parallel–in parallel–out, Ring counter, Johnson counter, Applications of shift registers, Pseudo-random binary sequence generator, IC7495, Seven Segment displays, analysis of shift counters. **(Refer chapter 10)**

❑❑❑

Unit I

Syllabus : Analog system, Digital system, Numbering system, Binary number system, Octal number system, Hexadecimal number system, Conversion from one number system to another floating point numbers.

Unit I

Syllabus : Weighted codes, Binary coded decimal, Non-weighted code, Excess-3 code, Gray code, Alphanumeric codes - ASCII code, EBCDIC, ISCII code, Hollerith code, Morse code, Teletypewriter (TTY), Error detection and correction, Universal product code, Code conversion.

Unit I

Syllabus : Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement, Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system, BCD and Excess-3 arithmetic.

Unit II

Syllabus : Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's theorem, Perfect induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, Exclusive OR and Exclusive NOR gates, Universal logic gates, Implementation of other gates using universal gates, Input bubbled logic, Assertion level.

Syllabus : Minterm, Maxterm and Karnaugh Maps : Introduction, Minterms and sum of minterm form, Maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/5/6 variable K-maps, Grouping of variables in K-maps, K-maps for product of sum form, Minimize Boolean expression using K-map and obtain K-map from Boolean expression, Quine Mc Cluskey Method.

Unit III

Syllabus : Combinational Logic Circuits : Introduction, Multi-input, Multi-output combinational circuits, Code converters design and implementations

Arithmetic Circuits : Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator.

Syllabus : Introduction, Asynchronous counter, Terms related to counters, IC 7493 (4-bit binary counter), Synchronous counter, Bushing, Type T Design, Type JK Design, Presettable counter, IC 7490, IC 7492, Synchronous counter ICs, Analysis of counter circuits.

Syllabus : Introduction, Parallel and shift registers, Serial shifting, Serial in serial out, Serial in parallel out, Parallel in parallel out, Ring counter, Johnson counter, Applications of shift registers, Pseudo-random binary sequence generator, IC 7495, Seven segment displays, Analysis of shift counters.

❑❑❑