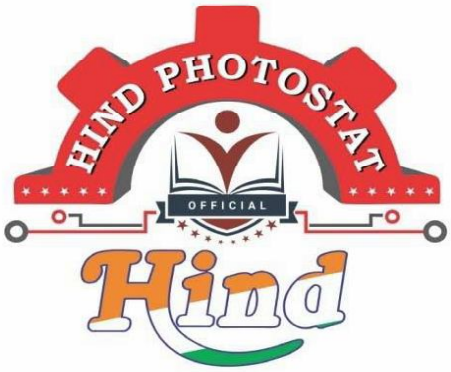

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Digital Logic

By-Sriniwas sir

- Theory
- Explanation
- Derivation
- Example
- Shortcuts
- Previous Years Question With Solution

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DIGITAL LOGIC [5-8 Marks]

Boolean Algebra

$r = 2$ { Binary Number System }

{0, 1}

B. Variables ⇒ A, B, C, ...
a, b, c, ...

Operators ⇒ {OR, AND, NOT}

Algebra

$r = 10$ {0, 1, 2, ... 9}

SYLLABUS

** (ii) (2024) Boolean Algebra

- Boolean Variables
- Boolean operators → Basic Operators { OR, AN, NOT }
  → Derived Operators { NAND, NOR, EX-OR, EX-NOR }
- Boolean Algebra Properties
- SOP, POS
- Universal logic Gates
- Simplification of Boolean Expressions or Boolean functions using properties
- Realising ~~it~~ or BF using minimum of NAND gates or min. no. of NOR gates.
- EX-OR & EX-NOR Relations.

(ii) Number System:

- $(\ )_{r1} = (\ )_{r2}$

eg. $(\ )_{10} = (\ )_8 = (\ )_2 = (\ )_4 = (\ )_6$

- (r-1)'s or r's complement
- Signed Binary Number system
- Range of Numbers in Signed Binary No. System.

(iii) K-Map :

- Implicant, Prime implicant, Essential PI
- Dont Care combinations
- Reading Minimal Expressions using K-Maps. (SOP or POS).

(iv) Combinational Circuits :

Digital circuits → Combinational circuit, Sequential circuit

Code converters ⇒ BCD to E3
E-3 to BCD.
Binary to Gray code, etc.

Arithmetic Circuit ⇒ Half Adder, Full Adder
Half Subtractor, Full Subtractor
Binary Adder, Binary Subtractor
BCD Adder, BCD subtractor
Magnitude comparator
Multiplexer, De Multiplexer.
Encoder, Decoder, Priority Encoder

(v) Sequential Circuits

- Binary Latch, Flip-Flops (FF)
- Conversions ⇒ FF1 → FF2
  DFF → J-K FF
  D FF → T FF
- Registers
- Counters → Asynchronous Counter (Asynchronous)
  → Synchronous Counter (Synchronous)

Book:
Modern Digital Electronics
– ~~RJain~~ R.P.Jain

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Mention : GATE 2024 Offline student from Delhi

BOOLEAN ALGEBRA

Binary Operaters: OR, AND

Unary Operater: NOT.

Basic operaters: {AND, OR, NOT}

(i) OR: ⇒ + , U, V

$Y = A \cup B = A + B = A \vee B$

$Y = A + B + C + \cdots$

	A	B	A+B	AB
0	0	0	0	0
1	0	1	1	0
2	1	0	1	0
3	1	1	1	1

$n = 2 \Rightarrow 4$

	A	B	C	A+B+C	ABC
0	0	0	0	0	0
1	0	0	1	1	0
2	0	1	0	1	0
3	0	1	1	1	0
4	1	0	0	1	0
5	1	0	1	1	0
6	1	1	0	1	0
7	1	1	1	1	1

$n = 3 \Rightarrow 8$.

Stmt: The result of operation is zero if and only if all the variables are zero.

Truth Table:

n 2^n Rows

$\{0, 1, 2, \ldots, (2^n - 1)\}$

Hardware components:

Logic gates

Integrated circuit (IC)

↳ Using PN Junction Diode

Transistors → BJT, FET

'OR' GATE:

Logic gates are available for any no. of inputs.