Dr. SNS RAJALAKSHMI COLLEGE OF ARTS & SCIENCE (Autonomous)
Coimbatore -641049

Accredited by NAAC(Cycle–III) with ‘A+’ Grade
(Recognized by UGC, Approved by AICTE, New Delhi and
Affiliated to Bharathiar University, Coimbatore)

DEPARTMENT OF GRAPHIC & CREATIVE DESIGN AND DATA ANALYTICS

COURSE NAME : COMPUTER SYSTEM ARCHITECTURE (23UCU402)

I YEAR /I SEMESTER

Unit II- LOGICAL GATES

Topic 1: Introduction to Gates

Gates Definition

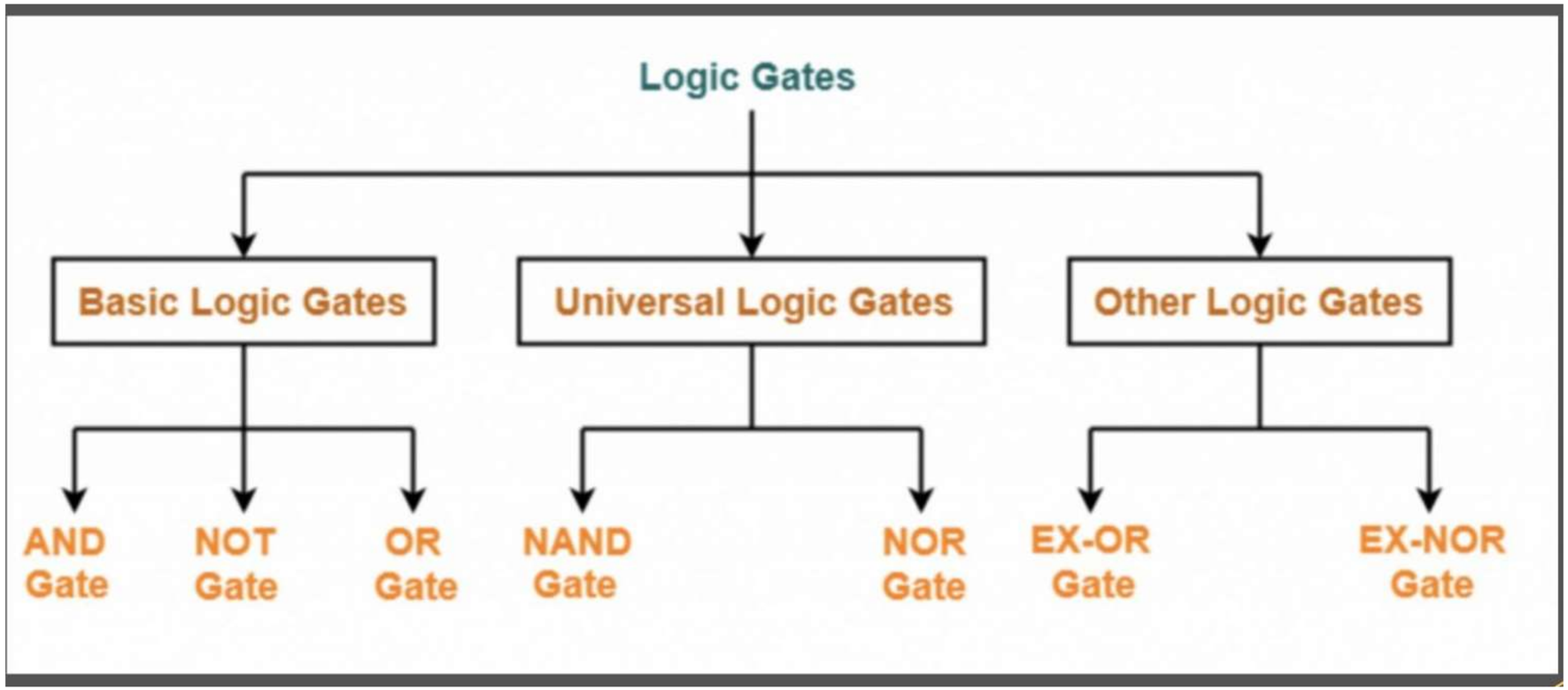
✓ A logic gate is a device that acts as a **building block for digital circuits.**

✓They perform basic **logical functions** that are fundamental to digital circuits.

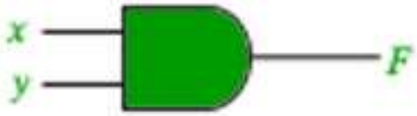
✓Logic gates are used to carry out logical operations on single or multiple binary inputs and give binary output.

✓ In simple terms, logic gates are the electronic circuits in a digital system.

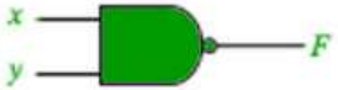
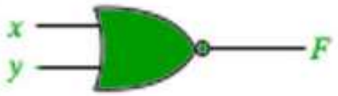
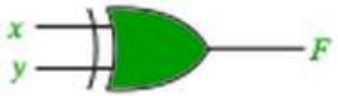
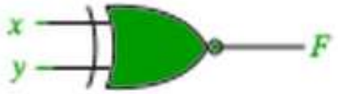
Logical Gates Types



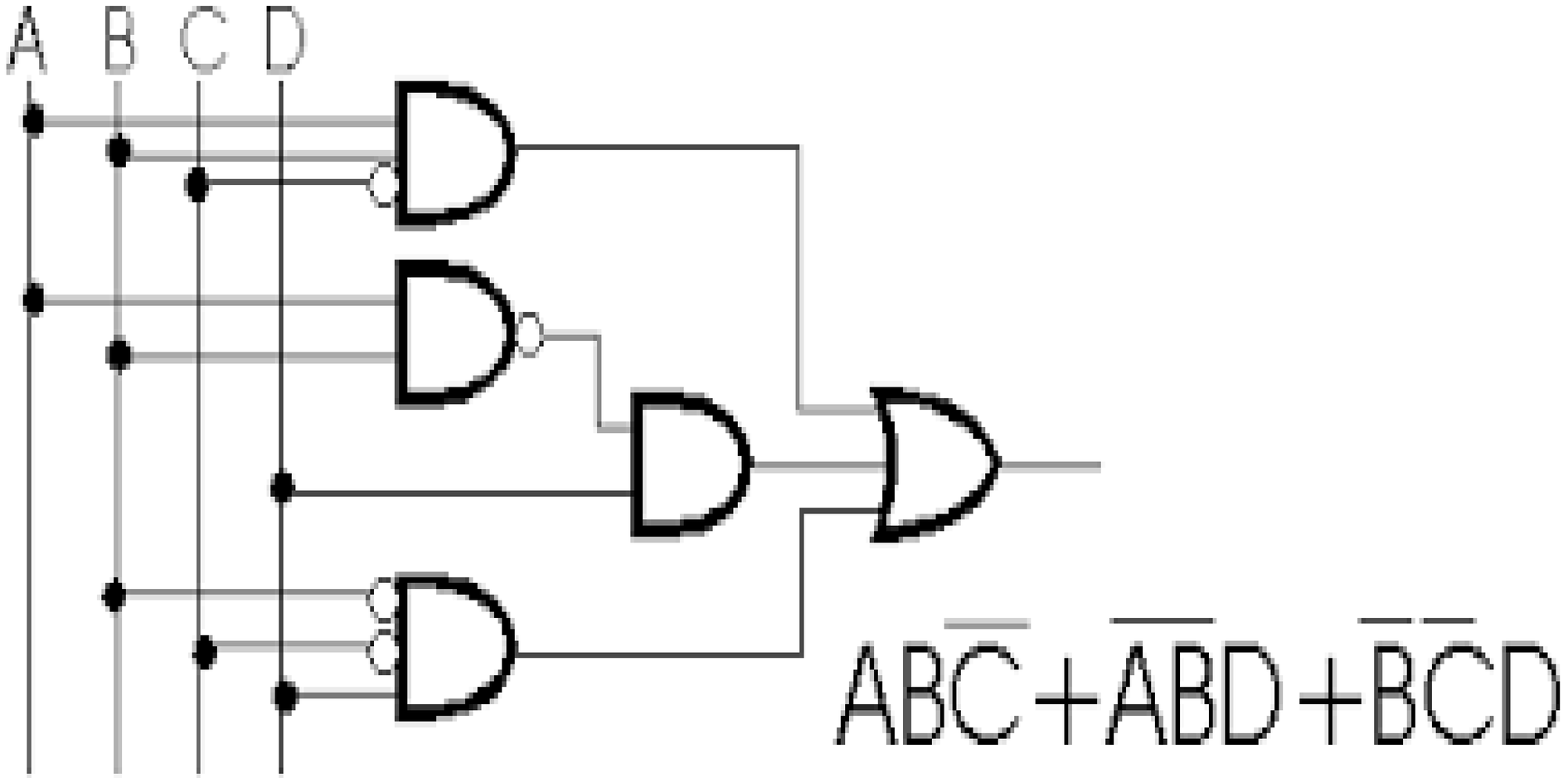
Logical Gates Types

Name	Graphic symbol	Algebraic function	Truth table
AND		$F = x \cdot y$	x y F 0 0 0 0 1 0 1 0 0 1 1 1
OR		$F = x + y$	x y F 0 0 0 0 1 1 1 0 1 1 1 1
Inverter		$F = x'$	x F 0 1 1 0

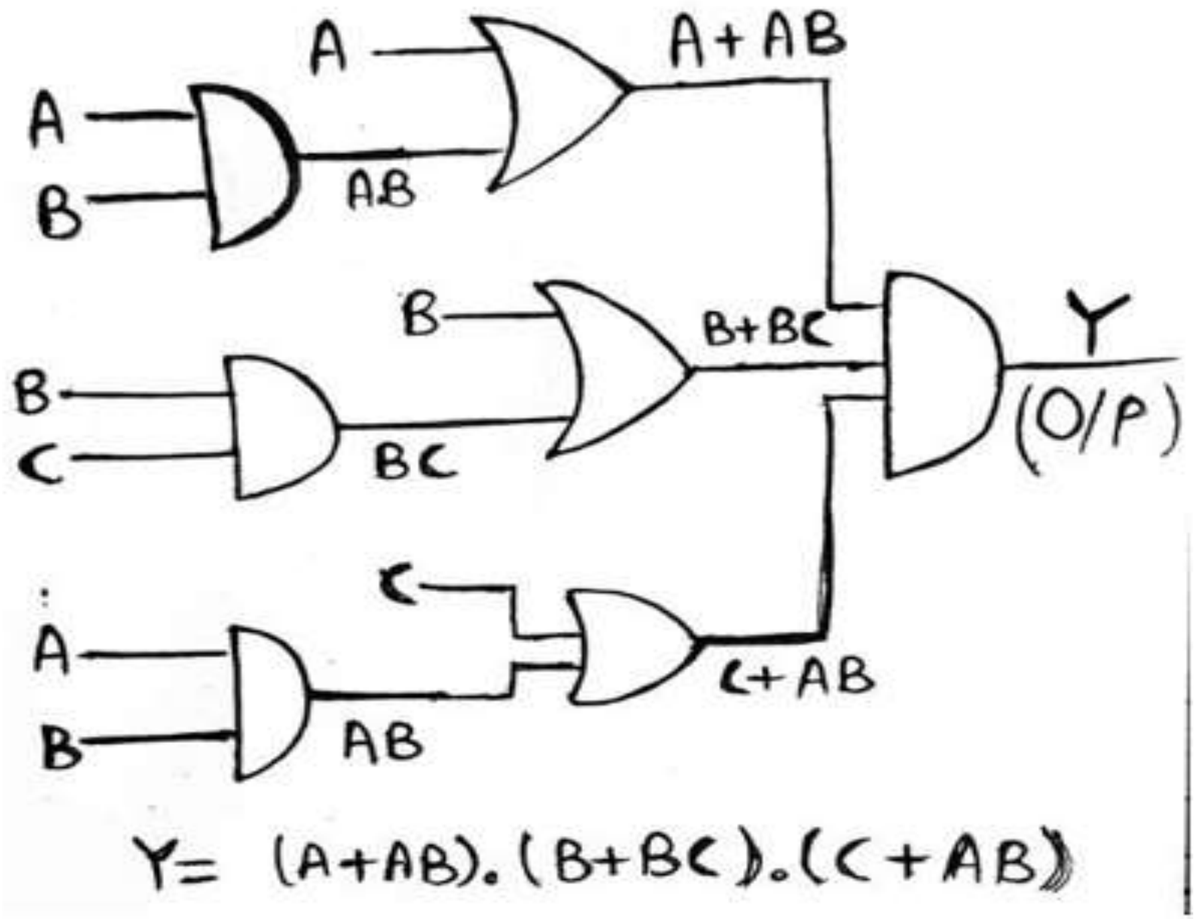
Logical Gates Types

Buffer		$F = x$	x | F 0 | 0 1 | 1
NAND		$F = (xy)'$	x y | F 0 0 | 1 0 1 | 1 1 0 | 1 1 1 | 0
NOR		$F = (x + y)'$	x y | F 0 0 | 1 0 1 | 0 1 0 | 0 1 1 | 0
Exclusive-OR (XOR)		$F = xy' + x'y$ $= x \oplus y$	x y | F 0 0 | 0 0 1 | 1 1 0 | 1 1 1 | 0
Exclusive-NOR or equivalence		$F = xy + x'y'$ $= (x \oplus y)'$	x y | F 0 0 | 1 0 1 | 0 1 0 | 0 1 1 | 1

Logical Diagram of Boolean Expression

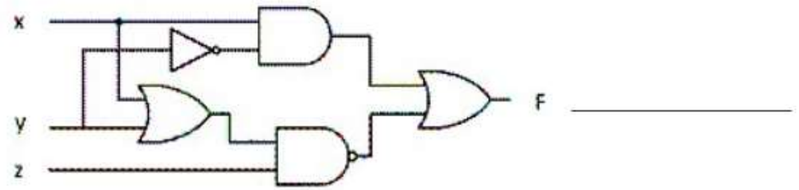


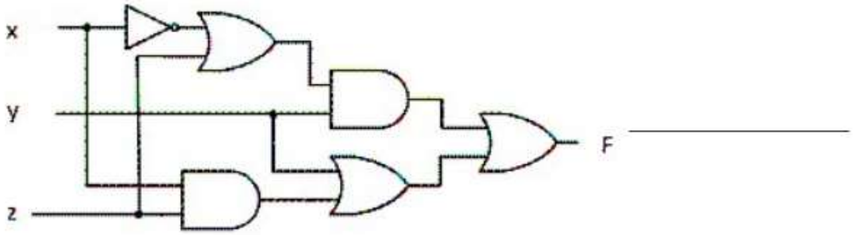
Logical Diagram of Boolean Expression

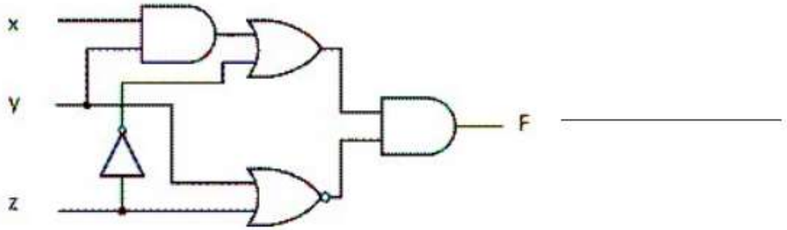


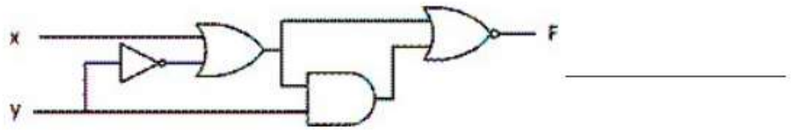
Assessment - Questions

Create a Boolean expression for the logic circuit shown in the diagram below?









Assessment - Answer

1. CPU referred as **Central Processing Unit**
2. CPU is a Combination of **Control Unit** , **Arithmetic & Logical Unit** and **Memory Unit**
3. Example of Input device – **Keyboard, Scanner**
4. Example of Output Device – **Monitor, Printer**
5. **Digital** computers are used for mathematical and logical operations.
6. **Analog** computer has no state
7. **Digital** computers has discrete value

References

1.M.Morris Mano, “Computer System Architecture” 3rd Edition, Prentice Hall of India ,2000, ISBN-10: 0131663631

2. V.K. Puri, —DIGITAL ELECTRONICS CIRCUITS AND SYSTEMS” McGraw Hill Education (1 July 2017). ISBN-10: 9780074633175 , ISBN-13: 978-0074633175

3.William Stallings, “Computer Organization and Architecture, Designing for Performance” PHI/ Pearson Education North Asia Ltd., 10th Edition 2016, ISBN 978-0- 13-410161-3 — ISBN 0-13-410161-8.

Thank You