# PNS SCHOOL OF ENGINEERING & TECHNOLOGY

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**DEPARTMENT OF**
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**

**QUESTION BANK**
**ON**

# DIGITAL ELECTRONICS & MICROPROCESSOR

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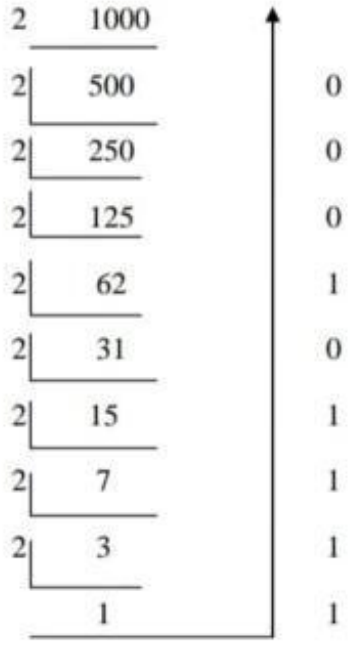
# CHAPTER-1

# Basics of Digital Electronics

## Short questions

**1.Convert the decimal no.$(1000)_{10}$ into binary.**




Ans.( $1111101000)_2$

**2.Convert (10110101) from binary to gray code.**

1 0 1 1 0 1 0 1 (binary)

↓

1 1 1 0 1 1 1 1 (gray)

**3. Perform 2's complement substraction of 1000011-1010111.**

$(67)_{10} - (87)_{10} = (-20)_{10}$

Convert substrate part into 2's complement

1010111 1's → 0101000 → 2's comp

+ 1

0101001

Then add both manuent and substrant

1000011

$$\begin{array}{r} + \quad 0101001 \\ \hline 1101100 \end{array}$$

Here there is no carry ,if there is no carry then substrate 1 from the result then recomplement it.

$$\begin{array}{r} 1101100 \\ - \quad 1 \\ \hline 1101011 \end{array}$$

Then recomplement of this $(0010100)_{10}$

**4.What is the difference between weighted and non weighted binary code.**

The weighted codes are those that obey the position weighting principle ,which states that the position of each number represent a specific weight .

The non-weighted codes are not positionally weighted .In other words codes that are not assigned with any weight to each digit position.

**5.Convert the binary no.$(10110111.1101)_2$ to decimal.**

$(10110111.1101)_2$

$1\times2^7+1\times2^5+1\times2^4+1\times2^2+1\times2^1+1\times2^0+1\times2^{-1}+1\times2^{-2}+1\times2^{-4}$

$128+32+16+4+2+1+1/2+1/4+1/16$

183.81

**6.What are the application of gray code.**

- Used as counter
- Used for asynchronous fifo's adress pointer
- Help to reduce the digital noise
- High speed decode circuit
- Also use in computers to address program memory .

**7.What is parity bit.**

It is an error detection scheme used to detect a change in the value of a bits (0 or 1) during transmission to detect error .

**8.What is the base or radix of a number system.**

The Radix of a number system is defined as the number of different digits which can occur in each position in the number system for example :Decimal number system has a base or radix of 10

**9.Convert $(FADE)_{16}$ to binary and octal.**

In the binary form

FADE is $(1111\ \ 1010\ \ 1101\ \ 1110)_2$

In octal form

001 111 101 011 011 110

1 7 5 3 3 6

Answer is $(175336)_8$

**10.Convert $(7743)_d$ to binary and hexadecimal.**

For binary

7 7 4 3

111 111 100 011

In the binary form the answer is $(111\ \ 111\ \ 100\ \ 011)_2$

For hexadecimal

First octal is converted to binary then to hexadecimal .

7 7 4 3

111 111 100 011

15 14 3

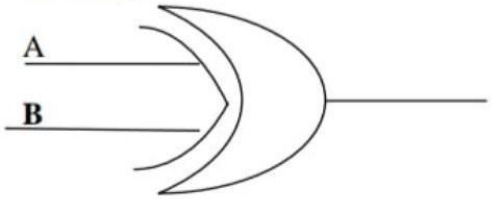
In the hexadecimal form the answer is $(FE3)_{16}$

**11. Write down the truth table of 2 input ex-or gate.**

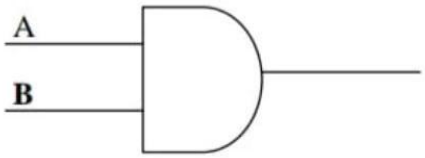
| A | B | C=AB'+A'B |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

**12.Draw the symbol ,truth table and expression for ex-or and AND gates.**

EX-OR gate




AND gate




**Truth table**

| A | B | Y=AB'+A'B |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

**Truth table**

| A | B | Y=AB |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

## 13.Define demorgan's law.

This law states that the complement of any expression can be obtained by replacing each variable and element with its complement and changing OR operators with AND operators and AND operators to OR operators .These can be expressed

A) $\overline{X + Y} = \overline{X} \cdot \overline{Y}$

B) $\overline{X \cdot Y} = \overline{X} + \overline{Y}$

**LONG QUESTION :**

1. Explain the difference between weighted binary code and non-weighted binary code with suitable example.
2. Draw the logic symbol, truthtable of 3 input XOR and NAND gate ?
3. State and proof Demorgan's Theorem.
4. Simplify F(A, B, C, D) = m (0, 2, 5, 7, 8, 10, 13, 15).
5. Simplify F(P, Q, R, S) = m (1, 3, 4, 6, 8, 9, 11, 13, 15) + d (0, 2, 14)

# PNS SCHOOL OF ENGINEERING & TECHNOLOGY
## Nishamani Vihar, Marshaghai, Kendrapara
### QUESTION BANK ON UNIT-2(COMBINATIONAL LOGIC CIRCUIT)
***Prepared by : Er. Aditya Narayan Jena, Lecturer in ETC Dept.***

## CHAPTER-2
## COMBINATIONAL LOGIC CIRCUIT

**2 Marks**

1. What is CLC ?

Ans It is a logic circuit whose output depends on present input only.
For Example : Adder, Mux

2. What is encoder ?

Ans. It is a CLC, whose inputs are decimal digits and outputs are coded of input.

3. What is half adder ?

Ans. It is a CLC which performs addition of two binary bits.

4. What is full substractor ?

Ans. It is a CLC which performs substraction of only three binary bits.

5. Define MUX ?

Ans. It is a CLC which takes several inputs and gives only one output.

6. Give the application of DMUX ?

Ans. It is used in computer, any time information from one source to several places.

7. List the application of MUX ?

Ans. (i) Data routing
(ii) Control sequence.
(iii) Function generator.
(iv) Parallel to serial converter.

8. List the application of Decoder ?

Ans. (i) Counter System
(ii) Analog to digital converter.
(iii) Display system.

**LONG QUESTION :**

1. Explain the working principle of full substractor with logic diagram and truth table.
2. Explain the working of 2-bit magnitude comparator.
3. Explain the working of 1 x 4 DMUX & 4 x 1 MUX.
4. Explain the working principle of 3 to 8 decoder and 8 to 3 encoder ?
5. Explain the working principle of full adder with logic diagram and truth table.

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# QUESTION BANK ON
## UNIT-3 (Sequential Logic Circuit)

1. *What do you mean by Sequential Circuits ?*

Ans. *The digital cicuits in which present output depends on the present input, past input and past output are called Sequential Ciruits.*

2. *What is Flip Flop ? Mention its types.*

Ans. *FF is a 1-bit memory element used in SLC.*

*Types :*
- *(i) SR - FF*
- *(ii) D-FF*
- *(iii) JK - FF*
- *(iv) T-FF*

3. *Define Counter ?*

Ans. *Counter is a Sequential Logic Circuit use to court binary numbers.*

4. *Define Shift Register.*

Ans. *Shift register is a sequential logic circuit used to store the binary data as well as shift the binary data.*

5. *Differentiate between Synchronous and Asynchronous Counters.*

Ans. *Synchronous Counter :- A common clock pulse triggers all the Flip-Flops simultaneously.*
*Eg; 2-bit Synchronous Counter*
*Asyrchronous Counter : - First FF is triggered by a clock pulse and remaining FFs are triggered by output of previous FF.*
*Eg; 4-bit Ripple Counter.*

6. *Draw the Truth Table of JK FF ?*

Ans.

| J | K | Qn | Qn+1 | State |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | Qn(No Change) |
| 0 | 0 | 1 | 1 | |
| 0 | 1 | 0 | 0 | Reset |
| 0 | 1 | 1 | 0 | |
| 1 | 0 | 0 | 1 | Set |
| 1 | 0 | 1 | 1 | |
| 1 | 1 | 0 | 1 | Toggle |
| 1 | 1 | 1 | 0 | |

7. *What is Race around condition ? How it can be avoided ?*

Ans. *In JK-FF, when J = 1, K-1 ; Toggle state occurs. So when Qn = 1, Qn+1 = 0 and when Qn = 0, Qn+1 = 1.*
*So, output will oscillate between 0 and 1. This is called Race around condition.*
*It can be avoided by using; Master - Salve JK-FF and when $t_p < \Delta t$ ; where $t_p$ = width of CLK Pulse and $\Delta t$ = Propagation delay.*

8. *State the types of Sequential Circuits ?*

Ans. *2 types. (i) Synchronous SLC*
*(ii) Asynchronous SLC*

9. *Define Modulus of a counter ?*

Ans. *The number of states a counter can count is called Modulus of a Counter.*

10. *What is Ripple Counter ?*

Ans. *In Ripple counter first FF is triggered by a clock pulse and remaining FFs are triggered by clock pulse of previous FF.*

11. *What are application of shift register ?*

Ans. *(i) Time delay.*
*(ii) Serial to parrel converten*
*(iii) Parallel to serial converter*
*(iv) Shift Register.*

12. *State application of D-FF.*

Ans. *(i) Used as Temporary Memory Device.*
*(ii) Used as storage registers.*

***LONG QUESTIONS :***

1. *Differentiate between combinational logic circuit and sequential logic circuit ?*
2. *State the working principle of clocked SR-FF with logic diagram and truth table.*
3. *Explain the working principle of JK-FF with Truth Table.*
4. *Explain working of Master-Slave JK-FF.*
5. *Explain working of 4-bit Ripple counter with Truth Table and Timing Diagram.*
6. *Explain different types of shift registers (SISO, SIPO, PIPO, PISO).*

# CH-4: 8085 Microprocessor

**Short questions:**

**(1) What is Microprocessor?**

**Ans-** When a CPU is built in a single IC-chip, that IC-chip is called as microprocessor .

For eg; 8085 microprocessor

**(2) What is microcomputer?**

**Ans-** The digital computer in which microprocessor acts as a CPU, that computer is known as microcomputer .

For eg; Palmtop, Laptop etc.

**(3) What do you mean by 8-bit microprocessor?**

**Ans-** The microprocessor having word length 8 is known as 8-bit microprocessor. It means it can process maximum up to 8-bit data.

**(4) What are the applications of microprocessor?**

**Ans-**

- Used in Traffic light control.
- Used in personal desktop.
- Used in calculator, game machine.
- Used in medical application and military application.

**(5) Define Interrupt. Write down the interrupt signals according to priority?**

**Ans-** Interruption means interrupting or disturbing a work or process, by some other work or process.

TRAP (Highest priority)

RST 7.5

RST 6.5

RST 5.5

INTR (Lowest priority)

**(6) Write down the types of flags in 8085 microprocessor?**

**Ans-**

(i) Sign flag
(ii) Zero flag
(iii) Auxillary carry flag
(iv) Parity flag
(v) Carry flag

**(7) Give one example of 1-byte, 2-byte, 3-byte instruction?**

**Ans-**

1-byte- MOV A, B

2-byte- MVI B,32H

3-byte- JMP 2085H

**(8) Define opcode and operand?**

**Ans-** opcode- The operation to be performed, is called the opcode or operation code.

Operand-The data to be operated on, is called the operand.

**(9) Write down the difference between MOV and MVI instruction?**

**Ans-** MOV

→ It is a 1-byte instruction.
→ It moves the data between registers.

MVI

→ It is a 2-byte instruction.
→ It moves an immediate data into a register.

**(10) Define stack, stack top and stack pointer?**

**Ans-** Stack- It is a sequence of memory location used to store or retrieve the contents of accumulator, flags, GPRs etc.

Stack Top- The Last memory location of the occupied portion of the stack, is called stack-top.

Stack pointer- It is a 16-bit special purpose Register used to store the address of stack top .

**(11) What is the function of program counter?**

**Ans-**

- It is a 16-bit special purpose Register.
- It is used to store the memory address of the next instruction to be executed.

**(12) Define instruction cycle, machine cycle, T-state?**

**Ans-**

- Ic: The instruction cycle is defined as the time required by the microprocessor to complete the execution of an instruction.
- Mc: The time required to complete 1 operation of memory and I/o devices. It consists of 3-6 T-state.
- T-state: 1 subdivision of the operation performed in 1 clock period, is Known as T-state.

**(13) Define counter?**

**Ans-**

- Counter is a Sequential Logic circuit which counts Binary numbers.
- It consists of Group of Flip-Flops.

**Long questions:**

**(1) Explain the Bus structure of 8085 microprocessor?**
**(2) Explain the pin diagram of 8085 microprocessor with function of each pin?**
**(3) Explain the functional block diagram of 8085 microprocessor?**
**(4) What is addressing modes? Explain types of Addressing modes in 8085 microprocessor?**
**(5) Discuss about various Arithmetic Instructions and Logical instruction.**
**(6) Draw the Timing diagram of MOV B,C?**

# CH-5: Interfacing and Support Chips

**Short Questions:**

**(1) Define Interfacing?**

**Ans-** Designing the logic circuits (Hard ware) and writing the instruction (Software) to enable the microprocessor to communicate with the peripherals, are called Interfacing.

**(2) Write down different modes of operation of 8255 PPI?**

**Ans-** There are 2 basic modes of 8255 PPI

(i) Bit Set/Reset mode (BSR mode)
(ii) Input/output mode (I/o Mode)

**(3) Define memory mapping?**

**Ans-**

- In this device, address is 16-bit.
- Data transfer is between any register and I/o device.
- Decoding is more complex and expensive.

**(4) Define I/o mapping?**

**Ans-**

- In this I/o device, address is 8-bit.
- Data transfer is between Accumulator and I/o device.
- Decoding is easier and cheaper.

**(5) What are Interfacing devices?**

**Ans-** The logic circuits used to enable the communication between microprocessor and peripheral, are called Interfacing devices.

For eg; Programmable peripheral Interface (PPI)

Programmable Interrupt controller (PIC) etc.

**Long Questions:**

**(1) Explain the Internal Architecture of 8255 PPI?**
**(2) Explain different modes of operation of 8255 PPI?**