

# END SEMESTER EXAMINATION

Odd Semester 2022-2023

ROLL NO. 

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Subject Code & Name: EC3306 Digital Electronics

Program/Branch/Year: B.Tech CSE /CSE(CSSQ)/CSE(AIML)/CSE+MBA SEM III JAN 2023

Max Marks: 100

Time: 3 Hrs

General Instructions. Read all instructions carefully.

1. Do not write anything on the question paper except your Roll No.
2. Answers should be written in clear and legible handwriting. Neatly labeled diagrams will fetch better marks.
3. Students must clearly write the question number & sub-part of question that they are attempting.
4. This question paper consists of 5 questions and all are compulsory. All questions carry 20 marks each.
5. Students are expected to take about 30 minutes each for Questions 1 to 5 and remaining 30 minutes are for reading the question paper and revision.

Parts i) and ii) of each question are compulsory and each part carries 2 marks. Parts iii), iv) and v) carry 8 marks each and the student may attempt any 2 parts.

Q1.

i) If the number of bits in the sum exceeds the number of bits in each added numbers, it results in Overflow.

- a) TRUE
- b) FALSE

(2 marks)

ii) On subtracting  $(01010)_2$  from  $(11110)_2$  using 1's complement, we get

- a) 01001
- b) 11010
- c) 10101
- d) 10100

(2 marks)

iii) Write a short notes on:

- a) Hamming code
- b) ASCII code
- c) Floating point representation

(8 marks)

iv) Explain unit distance code and sequential code with example. A Hamming code received as 1010111 using even parity find whether the code is correct or not if not correct it.

(8 marks)

v) Distinguish between gray codes and excess 3 codes. Explain BCD code?

(8 marks)

Q2.



i) There are \_\_\_\_\_ cells in a 4-variable K-map

- a) 12
- b) 16
- c) 18
- d) 8

(2 marks)

ii) The expression  $Y = AB + BC + AC$  shows the \_\_\_\_\_ operation

- a) EX-OR
- b) SOP
- c) POS
- d) NOR

(2 marks)

iii) Explain sum-of-products and product-of-sums. Explain expanded form and canonical form of Boolean expression using example.

(8 marks)

iv) Consider the function  $f(A, B, C, D) = \sum (0, 1, 2, 3, 5, 7, 8, 10, 12, 13, 15) + D(4)$ . Solve using Tabular method and obtain diagram by NAND gates.

(8 marks)

v) Write a short note on 5 variable K Map and Solve this expression using K Map  
 $Y(ABCDE) = m(0, 1, 5, 6, 9, 13, 14, 17, 21, 22, 25, 29)$

(8 marks)

Q3.

i) Transistor is used as an inverter while considering switch circuit in logic family circuit

- a) TRUE
- b) FALSE

(2 marks)

ii) CMOS logic dissipates \_\_\_\_\_ power than NMOS logic circuits

- a) Less
- b) Equal
- c) More
- d) Very high

(2 marks)

iii) Distinguish between Mux and Encoder. Discuss Octal to Binary Encoder.

(8 marks)

iv) Explain Bi-CMOS Inverter. Compare with CMOS.

(8 marks)

v) Realise using decoder  $F(A, B, C, D) = \prod M(0, 3, 5, 9, 11, 12, 13, 15)$ . Give the difference between encoder and decoder.

(8 marks)

Q4.

i) A comparison between ring and Johnson counters indicates that  
a) a ring counter has fewer flip-flops but requires more decoding circuitry  
b) a ring counter has an inverted feedback path  
c) a Johnson counter has more flip-flops but less decoding circuitry  
d) a Johnson counter has an inverted feedback path

(2 marks)

ii) One of the major drawbacks to the use of asynchronous counters is that  
a) low-frequency applications are limited because of internal propagation delays  
b) high-frequency applications are limited because of internal propagation delays  
c) Asynchronous counters do not have major drawbacks and are suitable for use in high- and low-frequency counting applications  
d) Asynchronous counters do not have propagation delays, which limits their use in high-frequency applications.

(2 marks)

iii) Convert as indicated

- a) SR into D flip-flop
- b) JK to T flip-flop

(8 marks)

iv) Describe race-around condition? How does it get eliminated in Master-Slave J-K flip flop? Explain.

(8 marks)

v) Explain the difference between: synchronous, asynchronous and shift counters

(8 marks)

Q5.

i) Outputs of the AND gate in PLD is known as \_\_\_\_\_

- a) Input lines
- b) Output lines
- c) Strobe lines
- d) Control lines

(2 marks)

ii) Which one is more economical-

- a) ROM
- b) RAM
- c) EROM
- d) PROM

(2 marks)

iii) Realize the following functions using PAL,  $F = m(3, 4, 5, 7)$ ,  $G = m(1, 3, 5, 6, 7)$  and  $H = m(1, 4, 5)$

(8 marks)

iv) Write short notes on designing PLA and PAL.

(8 marks)

v) Design 3 bit binary to gray code converter using PLA.

(8 marks)