5. (a) Explain the working of ECL by making a NOR gate through it. **5**

(b) Implement Ex-NOR, NAND and NOR gate using CMOS Logic. **5**

(c) What precautions are necessary for handling MOS devices ? **5**

6. (a) Explain the working and advantages of Successive approximation register type ADC. **5**

(b) Why is it difficult to build an accurate 8-bit binary-weighted D/A converter ? **5**

(c) How Single-Slope and Dual-Slope ADC differs ? Discuss advantage and disadvantage of both. **5**

7. (a) Implement the full adder circuit sing PLA by deriving the PLA programming table. **10**

(b) How does a programmable logic device differ from a fixed logic device ? What are the primary advantages of using programmable logic devices ? **5**

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December 2024

B. Tech. (EEIoT) (Third Semester)

Digital Electronics (EEN-301)

Time : 3 Hours] [*Maximum Marks : 75*

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

1. (a) Describe the function of pull-up resistor when it is used with an open-collector TTL output. **1.5**

(b) How many BCD bit are required to drive a 3-digit thermometer display ? **1.5**

(c) Give the equivalent of decimal number 297 in the following : **1.5**

(i) Excess-3 Code

(ii) BCD

(iii) Hexadecimal.

(d) Which logic family offers the fastest speed ? What is the parameter which supports this behaviour ? **1.5**

(e) What is the maximum possible number of states in a ripple counter consisting of 5 flip-flops ? **1.5**

(f) How does a synchronous counter differ from an asynchronous counter ? **1.5**

(g) Draw diagram of full adder. **1.5**

(h) Give the characteristic equation of J-K flip- flop. **1.5**

(i) What are the uses of PAL ? **1.5**

(j) A 10-bit DAC has a step size of 10 mV. Determine the full-scale output voltage and the percentage resolution. **1.5**

Part B

2. (a) Minimize the following using Quine Mcluskey method :

$f(A, B, C, D) = \pi M\ (1, 2, 3, 7, 8, 11, 12, 15) + d(0, 4, 14)$. **10**

(b) The decimal number 6 is to be transmitted using a Hamming error correcting code : **5**

(i) What are the values of $P_1P_2P_3$?

(ii) What 7-digit binary number is transmitted ?

(iii) If the binary number 1100111 is received, how can the location of error be determined ?

3. (a) Implement the following Boolean function using an 8 : 1 multiplexer considering D as the input and A,B, C as selection lines :

$F(A, B, C, D) = AB' + BD + B'CD'$. **10**

(b) With the help of a truth table, briefly describe the functioning of a 10-line to four-line priority encoder with active LOW inputs and outputs and priority assigned to the higher-order inputs. **5**

4. (a) Design a counter for the following irregular binary count sequence using 'T flip-flops':

$001 \rightarrow 010 \rightarrow 101 \rightarrow 111 \rightarrow 001$(recycles). **10**

(b) Design S-R flip flop using J-K flip-flop. **5**