

ECE 202

B. Tech. IIIrd SEMESTER EXAMINATION, 2025-26

Bachelor of Technology

(CSE, IT & ECE)

Digital Electronics and Logic Design

Time : Three Hours]

[Maximum Marks : 75

Note: There are **three** sections (A, B and C) and candidate has to attempt questions from all sections. Marks are indicated against each section.

Section-A

1. Answer **all** questions : 5×3=15
- (a) Consider 3 input variables. The output is equal to 1 if the input variables have more 1's than 0's. The output is 0 otherwise. Design a combinational circuit along with truth table.
- (b) Minimize the following Boolean function –
$$F(A, B, C, D) = \Sigma m(0, 2, 8, 10, 14) + \Sigma d(5, 15)$$

- (c) Differentiate between TTL, ECL and CMOS logic families.
- (d) What is Shift register ? Draw and define the four types of shift registers.
- (e) An 8-bit DAC has a full-scale output voltage of 20V. What will be the output voltage when the input is 11011011.

Section-B

Note: Answer all questions of the following : $4 \times 5 = 20$

2. (a) Draw truth table, logic circuit and give expression for :
- (i) Half adder
- (ii) Half subtractor

Or

- (b) Use Boolean algebra to simplify the following Boolean functions :
- (i) $F = AB + (AC)' + AB'C(AB + C)$
- (ii) $F = ((XY' + XYZ)' + X(Y + XY'))'$

3. (a) State the characteristics table, excitation table and excitation equation for

(i) D-type

(ii) JK flip-flops

Or

(b) Differentiate between asynchronous and synchronous counters with examples.

Convert SR flip flop to JK flip flop.

4. (a) Write short note on

(i) Propagation delay

(ii) Power Dissipation

(iii) Figure of merit

(iv) Noise Margin

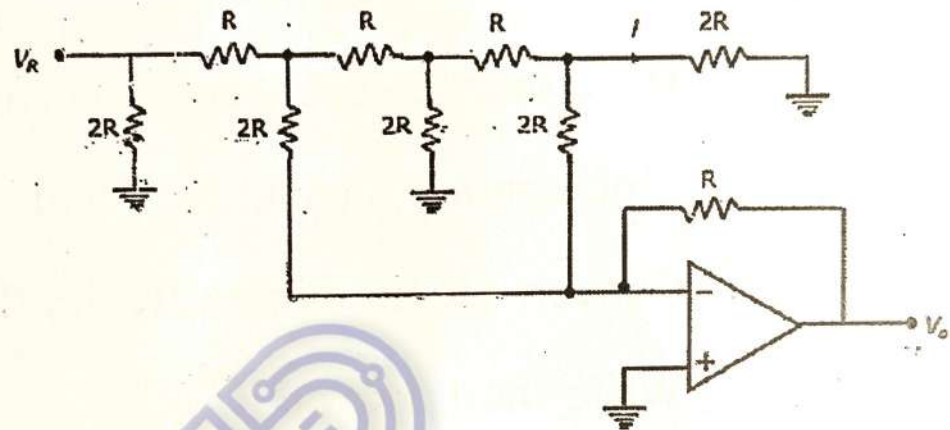
Or

(b) Explain the working of Transistor-Transistor Logic (TTL) with the diagram.

Writes its few characteristics and advantages. Also write about the types of TTL.

5.

- (a) What are the two types of DACs ? In the digital-to-Analog converter circuit shown in the figure below, $V_R=10V$ and $R=10K\Omega$ the what is the output voltage V_0 .



Or

- (b) What do you mean by Resolution ? Write few characteristics of DAC and ADC.

Section-C

Note: Answer any two questions of the following : $2 \times 20 = 40$

6. (a) Convert the following from one number system to another :
- $(1267.3125)_{10} = ()_2$
 - $(10110.101)_2 = ()_{10}$

(iii) $(1234)_8 = ()_{16}$

(iv) $(B2C)_{16} = ()_2$

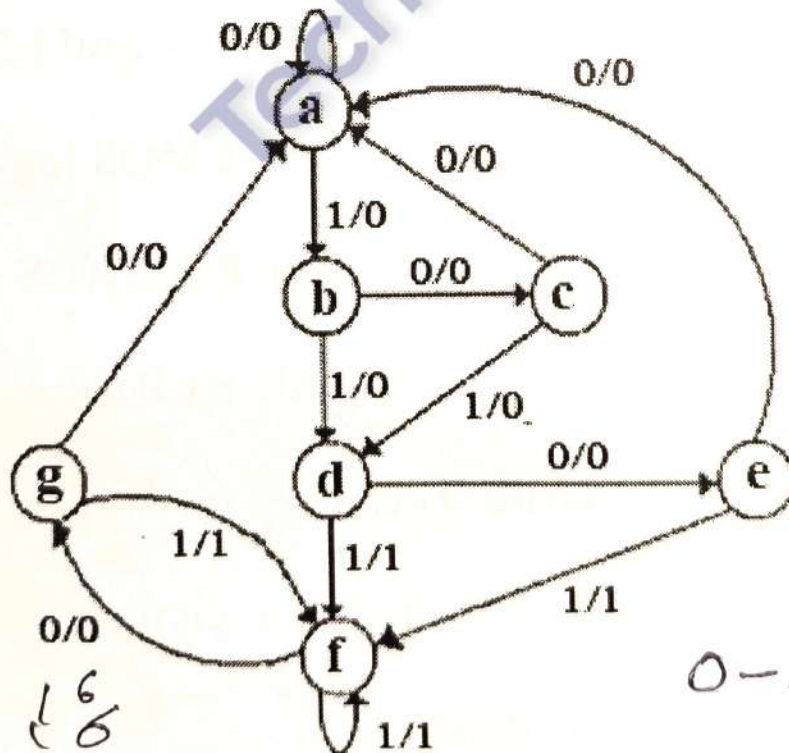
(v) $(10110111.1)_2 = ()_8$

$$\begin{array}{r} 120 \\ 55 \\ \hline 183 \end{array}$$

(b) Solve using Quine Mc Cluskey method and find essential prime implicants using PI table : Minterm = 0, 1, 2, 5, 6, 7, 8, 9, 10, 14

7. (a) For the following :

- (i) Tabulate the related state diagram
- (ii) Reduce the table
- (iii) Draw the reduced state diagram



$$\begin{array}{r} 25 \\ 1 \\ \hline 26 \end{array}$$

0-9 A-E

(b) Design 3-bit Ripple counter along with the table and its working. What is the disadvantage of JK flip flop ? What is the solution of this drawback and explain with the help of diagram.

8. (a) What is ROM ? What are the various types of ROM ? Explain in detail.

Implement the following Boolean expression using PROM :

(i) $F_1(A, B, C) = \Sigma m(0, 2, 4, 7)$

(ii) $F_2(A, B, C) = \Sigma m(1, 3, 5, 7)$

(b) Implement using CMOS logic :

(i) $Y = (A + B + C)(DE + F)G$

(ii) $Y = [(AB + CD)(E + F)]'$

9. (a) Write short notes on Flash type and Counter type Analog to digital converter along with the diagram.

- (b) For the 4-bit DAC shown in Figure, the output voltage is :

