

Duration: 3 Hours

[Max Marks: 80]

NB:

1. Question no. 1 is compulsory.
2. Out of remaining questions, attempt any 3 questions.
3. All questions carry equal marks.
4. Assume suitable data, if required and state it clearly.

Q1. Attempt the following. (Any four)

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| a) | Explain Excess-3 code and Gray code with examples | 5 |
| b) | Implement OR operation using Universal gates. | 5 |
| c) | Implement a 4:1 multiplexer. | 5 |
| d) | Differentiate between Latches and Flip-Flops. | 5 |
| e) | Compare asynchronous and synchronous counters. | 5 |
| f) | Give classification of PAL & PLA. | 5 |
| Q2 | a) Solve using Quine McClusky method | 12 |
| | $f(A,B,C,D) = \sum m(0,1,2,4,6,8,9,11,13,15)$ | |
| | b) Implement a full adder using half adder. | 08 |
| Q3 | a) What is a binary comparator? Design 2-bit magnitude comparator and implement using logic gates. | 10 |
| | b) Draw the block diagram of BCD adder using IC 7483 and show with example the addition of two BCD numbers. | 10 |
| Q4 | a) Design a MOD-10 (BCD) counter using flip-flops.. | 10 |
| | b) A combinational circuit is defined by the following functions.
$F_1(A, B, C) = \sum m(0, 1, 3, 4)$. $F_2(A, B, C) = \sum m(1, 2, 3, 4, 5)$
Implement the circuit with PLA having 3-inputs, 4 product terms and 2 outputs | 10 |
| Q5 | a) Convert i) SR flip-flop to JK flip-flop [5]
ii) D flip flop to T flip flop [5] | 10 |
| | b) What is the difference between a ring counter and a twisted ring counter? Draw and explain the 4-bit ring counter. | 10 |
| Q6 | a) Write short note on any two:
i) Carry Look ahead Adder
ii) Serial -In- Parallel -Out Shift Register
iii) Characteristics of logic families
iv) VHDL | 10 |
| | b) Write a VHDL code for a 4-bit binary adder. | 10 |
