Duration: 3 Hours   Max. Marks 80

N.B.

1. **Q.1** is compulsory. Attempt **any three** from the remaining questions.
2. All questions carry equal marks.
3. Figures to the Right indicate full marks.
3. Assume suitable data if necessary

Q.1   Attempt **any four**   20

  a.   Perform the following arithmetic operations-
     (i) Multiply $(10101)_2$ and $(11)_2$.
     (ii) Add $(1101)_2$ from $(1001)_2$.

  b.   What are priority encoders? Explain their usage in detail.

  c.   Design 32:1 Decoder using 8:1 Decoder and suitable gates.

  d.   Explain working of JK flip-flop.

  e.   Simplify the given expression $(A + B)(\overline{\overline{A}(\overline{B} + \overline{C})}) + \overline{A}(B + C)$.

  f.   Encode the following binary words into even parity Hamming code.
     (i) 1110 (ii) 1001.

Q.2 A.   Simplify the following function using Quine-McCluskey technique :   10

$$f(A, B, C, D) = \sum m(1, 4, 8, 12, 13)$$

  B.   Explain working of Bi-directional universal shift register.   10

Q.3 A.   Explain the difference between synchronous and asynchronous counters by giving   10
     suitable examples.
  B.   Design a 4-bit ripple counter.   10

Q.4 A.   Explain and construct Look Ahead Carry Generator.   10
  B.   Simplify the following boolean expression using Karnaugh Map method :   10

$$Y = \prod M(1, 2, 3, 8, 9, 10, 11, 14) * d(7, 15)$$

Q.5 A.   Design a Mod-5 synchronous counter.   10
  B.   Explain Hazards in combinational circuits.   10

Q.6   Write short notes on the following   20
  a. Comparison of features of TTL, ECL and CMOS family.
  b. Hamming code.
  c. Multiplexer Tree.
  d. Dynamic RAM Cell.

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