

Con. 3855-11.

RK-1912

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is **compulsory**.
 (2) Solve any **four** questions from remaining **six** questions.
 (3) Assume **suitable** data wherever **required**.

1. (a) Explain with aspect to T Flip-Flop the following terms with the help of waveforms. 4

- (i) Level triggering
 (ii) Positive edge triggering
 (iii) Negative edge triggering.

	0	1	M
Q	0	0	0
Q'	1	1	1

(b) Convert 1291.53 to— 4

- (i) Binary
 (ii) Hexadecimal
 (iii) Octal
 (iv) BCD.

(c) Do the following :— 4

- (i) $(1101.001)_2 + (101.0011)_2$
 (ii) $(872.5)_{BCD} + (295.83)_{BCD}$
 (iii) $(2CH.5A)_H - (53A.2)_H$ [use 15's compliment]

(d) Explain the terms : 4

- (i) implicant
 (ii) prime implicant
 (iii) essential prime implicant :

(e) Draw the circuit for BCD subtractor using 7483. 4

2. (a) Perform the following using Boolean Algebra : 12

(i) Reduce $AB + AB(C + \bar{D}) + \bar{B}(B + D)$

(ii) Reduce $\overline{\overline{AB} + ABC + A(B + \bar{A})}$

(iii) Reduce $ABC [AB + \bar{C}(BC + AC)]$

(iv) Show that $\bar{A}\bar{B}C + B + B\bar{D} + AB\bar{D} + \bar{A}C = B + C$

(b) Reduce the following using kMap. 8

(i) $AB + \bar{A}\bar{B}C + \bar{A}BC + B\bar{C}D + AD$

(ii) $y = \sum m(5, 6, 7, 9, 10, 11, 13, 14, 15)$

[TURN OVER]

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3. (a) Reduce the following function using Quine McCluskey Algorithm and implement using NAND gates. 10

$$f(A, B, C, D) = \sum m(0, 1, 4, 5, 6, 7, 9, 10, 15) + d(11, 14)$$

- (b) Convert Jk FlipFlop to 10
- T FF
 - D FF
 - MN FlipFlop with following truth table

M	N	Q_{n+1}
0	0	0
0	1	\bar{Q}_n
1	0	Q_n
1	1	1

4. (a) Implement $f(A, B, C, D) = \pi M(1, 2, 3, 5, 6, 7, 8, 12, 13)$ using 10
- 16 : 1 MUX
 - 8 : 1 MUX (one only) and NOT gate
 - 4 : 1 MUX (one only) and gates
- (b) Design and implement 4 digit binary to gray code converter. 10
5. (a) Draw 3 line to 8 line decoder [De-MUX] using NAND gates. Explain the working. Implement A Full adder using this decoder and NAND gates. 10
- (b) Design a MOD-10 synchronous counter using Jk FlipFlop. Draw transition table Excitation table and kMaps. 10
6. (a) What is the difference between synchronous and asynchronous counter. Draw a bit asynchronous up-down counter using T Flip Flop. Explain the working with waveform. 10
- (b) Compare the TTL and CMOS logic families. Draw the circuit of TTL NAND gate and explain the concept of totempole output. 10
7. (a) Explain the working of 4 bit universal bidirectional shift register with the help of circuit diagram. Draw a 4 bit ring counter using shift register. 10
- (b) Explain any two in detail. 10
- Diode ROM structure
 - Binary Codes
 - Half and Full Adder design.