10 (DL)

[19-HBPGKOW–M1S(O) 20M]

MScIT/PGDCA/MCA 1st Semester (Old) Exam., 2019 (W)

DIGITAL LOGIC

[MScIT/PGDCA/MCA S1-02]

Full Marks : 80

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer any *five* from the following questions : 2×5=10

(a) Convert 0.6773_{10} into its binary form.

(b) Obtain the canonical sum of product form of the function $Y = ABC + AC$.

(c) Give the timing diagram of three-input AND gate.

(d) Write the truth table for half adder.

(e) What is sequential circuit?

(f) Write the memory hierarchy of a personal computer in terms of storage.

2. Answer any *three* from the following questions : 4×3=12

(a) Explain the different types of ROM.

(b) Give the timing diagram of Mod-16 ripple counter.

(c) Give the logic diagram and the truth table of 2-to-4 line decoder.

(d) Implement the logic function specified by the following truth table and simplify the same :

Input				Output
A	B	C	D	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
1	0	0	0	1
1	0	0	1	1

3. Answer any *three* from the following questions : 6×3=18

(a) Reduce the minterm expression using K-map

$$X = \Sigma m(2, 3, 5, 7, 9, 11, 12, 13, 14, 15)$$

(b) Determine the single error correcting code for the information code 101101010 for odd parity.

(c) Explain De Morgan's theorem. What is duality principle?

(d) Explain serial in-serial out (SISO) shift registers using *J-K* flip-flop and timing diagram.

4. Answer any *four* from the following questions : 10×4=40

(a) Do the following :

(i) Convert 5083_{10} to BCD

(ii) Convert $4FE_{16}$ to decimal

(iii) Convert 712_8 to hexadecimal

(iv) Convert $1E2_{16}$ to octal

(v) Add $2C_{16}$ and 81_{16}

(Continued)

(c) Give the logic diagram and the truth table of 2-to-4 line decoder.

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(Continued)

(b) Do the following (assume A, B, C are Boolean variables) :

(i) Prove that $A+B=(A+B+C)(A+B+\overline{C})$

(ii) Prove that $\overline{A+B}+\overline{A}.\overline{B}$

(c) Do the following :

(i) Design one XOR gate using NAND gate

(ii) Design one full adder and give the truth table

(d) Explain master-slave *J-K* flip-flop with the truth table and timing diagram.

(e) Give the logic structure and block diagram of a 4×1 multiplexer. Mention the use of multiplexer.

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