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10 (DL)

[17–HDGKACRM–M1]

PGDCA/MScIT/MCA 1st Semester Exam., 2017

DIGITAL LOGIC

(PGDCA/MScIT/MCA 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) Add hexadecimal numbers 2C and 83.

(b) Show that $AB + \bar{A}C + BC = AB + \bar{A}C$.

(c) Draw XOR gate using basic logic gates.

(d) Define multiplexing.

(e) When is a flip-flop referred to as a latch?

(f) Give two advantages of RAM.

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

(a) Describe Binary Coded Decimal (BCD) code in brief. Convert the decimal number 95·31 into its BCD code equivalent.

(b) Differentiate between parallel adder and serial adder.

(c) Using a suitable block diagram, describe sequential circuits briefly.

(d) Briefly describe the different fuse technologies used in PROMs.

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

(a) Perform the following operations : 2+2+2=6

(i) Convert the decimal number 64 into its binary equivalent.

(ii) Convert the octal number 435 into its decimal equivalent.

(iii) Add the binary numbers 1111 and 0011 using binary addition.

(b) Using tabulation method, simplify 6

$$f(A, B, C, D) = \sum(0, 1, 4, 5, 10, 12, 14)$$

Or

(i) Obtain the canonical sum of product (SOP) form of the function $Y = AC + BD$.

(ii) Obtain the canonical product of sum expression of $Y = (A + \overline{B})(B + \overline{C})(\overline{A} + C)$. 3+3=6

(c) State and prove De Morgan's theorem with truth table of 3-input variables.

(d) Draw the block diagram and truth table of a 2-bit comparator.

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

(a) Using Karnaugh map method, simplify the following Boolean functions : 5+5=10

(i) $f(x, y, z) = \sum(2, 3, 4, 5)$

(ii) $f(w, x, y, z) = \sum(0, 1, 2, 3, 4, 5, 6, 7, 10, 11)$

(b) Define universal logic gates. Realize the basic logic gates using NOR and NAND gates.

(c) Define a decoder. Briefly describe and design a 3-line to 8-line decoder with truth table.

(d) Write the names of the different flip-flops. Briefly describe the operations of *J–K* master-slave flip-flop with suitable diagram. 2+8=10

(e) Write short notes on the following : 5+5=10

(i) Applications of ROM

(ii) Primary memory

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