

DIGITAL LOGIC DESIGN

(Common to CSE & IT)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Draw the truth table of the function $F = xy + xy' + y'z$
 - What is the advantage of 2's complement representation of data?
 - What are universal logic gates, realize AND, OR gates using universal gates?
 - Given the two binary numbers $X = 1010100$ and $Y = 1000011$, perform the subtraction: (i) $X - Y$. (ii) $Y - X$ using 2's complements.
 - Give comparisons between combinational and sequential logic circuits.
 - Construct the full adder circuit using two half adders.
 - Write the difference between latches and flip-flops.
 - Write the difference between synchronous and asynchronous counters.
 - Write a short note on programmable array logic.
 - Give the comparison between PROM and PLA.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2
- Convert (9 B 2 .1A) Hexadecimal to its decimal equivalent
 - Convert (4310)₅ to decimal
 - Convert (4021.2)₅ to its equivalent decimal
 - Convert 0.640625 decimal numbers to its octal equivalent

OR

- 3 Reduce the following Boolean Expressions to the indicated number of literals:
- $A'C' + ABC + AC' + AB'$ to two literals.
 - $(X'Y' + Z') + Z + XY + WZ$ to three literals.
 - $A'B(D' + CD) + B(A + A'CD)$ to one literal.

UNIT – II

- 4 Simplify the following Boolean function, using five variable maps:
 $F(A,B,C,D,E) = \sum(0,1,4,5,16,17,21,25,29)$

OR

- 5 Simplify the following Boolean function F, together with don't-care conditions d, and then express the simplified function in sum-of-minterms form:
 $F(A,B,C,D) = \sum(0,6,8,13,14)$ $d(A,B,C,D) = \sum(2,4,10)$

UNIT – III

- 6 Design a combinational circuit with three inputs and one output:
- The output is 1 when the binary value of the inputs is less than or equal to 3. the output is 0 otherwise.
 - The output is 1 when the binary value of the inputs is an even number.
 - The output is 1 when the binary value of the inputs is an odd number.

OR

- 7
- Design a 4-bit adder-subtractor circuit and explain the operation in detail.
 - Explain the functionality of a multiplexer.

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UNIT - IV

8 Explain the working of the following:

- (a) J-K flip-flop.
- (b) S-R flip-flop.
- (c) D-flip-flop.

OR

9 Explain the design of a 4-bit binary counter with parallel load in detail.

UNIT - V

10 (a) Given the 8-bit data word 01011011, generate the 13-bit composite word for the hamming code that corrects single errors and detects double errors.

(b) Write about error detection and correction.

OR

11 Write about the following:

- (a) Transistor-transistor logic (TTL)
- (b) Emitter-coupled Logic (ECL)
- (c) CMOS logic

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