Total number of printed pages–4

44 (2) BCA–2·3

2023

DIGITAL LOGIC FUNDAMENTALS

Paper : BCA–2·3

Full Marks : 80

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Fill in the blanks with appropriate words : 1×5=5

   (i) For a 2 input logic gate the output will be 1 when both the inputs are 1 is _____ gate.

   (ii) Flip-flop is a _____ circuit.

   (iii) The _____ gate is known as a universal logic gate.

   (iv) $x.x =$ _____ .

Contd.

(v) The POS in Boolean logic stands for _____.

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

(a) Draw the symbol and give the truth table of NOR gate.

(b) Explain De Morgan's theorem.

(c) Explain state table.

(d) Mention *two* examples of combinational circuit.

(e) What are the main *two* types of sequential circuit ? Define.

(f) What is ADDER ? Define its types.

(g) What do you mean by shift register ?

3. Answer ***any four*** questions from the following : 5×4=20

(a) What are the different types of shift registers used in digital system design ? Explain briefly.

(b) Show that $x + x = x$.

(c) Write a short note on the different postulates and basic theorems of Boolean algebra.

(d) What is Demultiplexer ? Draw the logic diagram.

(e) Explain the working of Encoder.

(f) Simplify the Boolean function
$F(w, x, y, z) = \Sigma (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$

4. (a) What is a counter ? Design a 3-bit binary counter and give logic diagram. 2+8=10

Or

What is JK flip-flop ? Write the truth table of a JK flip-flop and discuss its operation.

(b) What do you mean by parallel load ? Explain the working and design of a registers with parallel load. 2+8=10

Or

Explain the working of Magnitude comparator.

5. *(a)* What is excitation tables? Give excitation table for RS flip-flop.

2+3=5

(b) Using De Morgan's theorem show that $A + A'B + A'B' = 1$.

5

Or

Given the Boolean function

$$F = xy'z + x'y'z + xyz$$

Draw the logic diagram using the original Boolean expression.

6. Write short notes on : ***(any three)***

5×3=15

(a) Multiplexer

(b) State reduction and Assignment

(c) D flip-flop

(d) Binary ripple counter

(e) State diagram and state equation