

**2020**

**BCA**

**1st Semester Examination**

**DIGITAL ELECTRONICS**

**PAPER—1104**

*Full Marks : 100*

*Time : 3 Hours*

*The figures in the right-hand margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Illustrate the answers wherever necessary.*

**Group A**

Answer any *three* questions.

20×3

1. (a) Minimize the following expression using k-map method

$$F(w, x, y, z) = \sum m(1, 5, 6, 12, 13, 14) + d \sum (2, 4).$$

- (b) Implement X-OR gate using NAND gate and NAND gate using NOR gate.

*(Turn Over)*

- (c) Explain Full-subtractor with truth table and implement it using logic gates. 8+7+5
2. (a) What is universal logic gate? Implement Boolean expression  $XY+XZ$  using NOR gate.
- (b) State and prove De-Morgan's theorem.
- (c) Simplify the expression  $Y = (A+B)(A+C')(B'+C')$
- (d) Explain fixed and floating point number representations with examples. 7+5+3+5
3. (a) What is gray code? Convert  $(1010)_2$  into gray code.
- (b) Add two BCD numbers 298 and 421.
- (c) Compare PROM, EPROM and EEPROM.
- (d) Represent -5 in signed magnitude, 1's complement and 2's complement representations. 4+5+5+6
4. (a) What is combinational circuit? Compare it with sequential circuit.
- (b) Draw the block diagram of digital multiplexer and explain its function.
- (c) Give functional truth table of a 4:1 multiplexer and realize it using AND, OR and NOT gates.

(d) Implement the expression using a multiplexer

$$F(A, B, C, D) = \sum m(0, 2, 3, 6, 8, 9, 12, 14)$$

5+5+5+5

5. (a) What is Flip-Flop? What is the difference between Flip-Flop and latch?
- (b) Define the terms-setup time, hold time and propagation delay.
- (c) Explain J-K master slave Flip-Flop with diagram. What is the advantage of it?
- (d) What is the meaning of toggle? 4+6+8+2
6. (a) What is the difference between level clocking and edge triggering?
- (b) Explain edge triggered D Flip-Flop with diagram.
- (c) Distinguish between decoder and encoder circuits.
- (d) Explain preset and clear of a Flip-Flop. 4+6+6+4
7. (a) What is shift register? What are the different types of shift registers based on the input and output terminal?
- (b) Explain serial-in, serial-out and serial-in, parallel-out shift registers.
- (c) What are the applications of shift register?
- (d) What is half-adder? Implement it using NOR gates only. 4+8+2+6

**Group B**Answer any *one* question.

10×1

8. (a) State the difference between static and dynamic RAM.
- (b) Prove the following
- (i)  $A+A'B=A+B$
- (ii)  $(A+B)(A'+C)=AC+AB(4+6)$
9. (a) Implement a Full Adder using a decoder and two OR gates.
- (b) Design a 32:1 multiplexer using two 16:1 multiplexers and OR gate. 5+5
- 10.(a) Design a BCD to decimal decoder.
- (b) Explain Minterm and Maxterm. 5+5

[ **Internal Assessment : 30** ]

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