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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70071

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Third Semester

Computer Science and Engineering

CS 3351 — DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION

(Common to : B.E. Computer and Communication Engineering/B.Tech. Artificial Intelligence and Data Science/B.Tech. Computer Science and Business Systems/B.Tech. Information Technology)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the four possible elementary operations simple binary addition consists of.
2. What is a multiplexer?
3. Outline the difference between a synchronous sequential circuit and an asynchronous sequential circuit.
4. Define a latch and a flip-flop.
5. What are data transfer instructions?
6. Outline instruction cycle with a diagram.
7. What is a program counter?
8. Define pipelining.
9. What is hit time?
10. What is a direct-mapped cache?

PART B — (5 × 13 = 65 marks)

11. (a) Present the graphic symbol, algebraic expression and truth table for the following digital logic gates: AND, OR, Inverter, Buffer, NAND, NOR, Exclusive OR and Exclusive NOR. (13)

Or

(b) What is a K-map? Simplify the Boolean function $F(w, x, y, x) = \Sigma(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ using K-Map. (13)

12. (a) (i) What is an SR latch? Outline the design of SR latch using NOR gates. Also, present the function table for the same. (7)

(ii) Outline the design of a D flip-flop with two D latches and an inverter with a diagram. (6)

Or

(b) (i) Outline the Mealy model and Moore model of sequential circuits with a diagram. (6)

(ii) What is a shift register? Outline the design of a four-bit shift register with a diagram. (7)

13. (a) Outline the Von Neumann architecture with a diagram. (13)

Or

(b) What is an addressing mode? Outline the types of addressing mode with an example. (13)

14. (a) (i) Outline a control unit with a diagram and state the functions performed by a control unit. (8)

(ii) Outline the difference between hardwired control and micro programmed control. (5)

Or

(b) What are pipeline hazards? Outline the types of pipeline hazards. (13)

15. (a) Present an outline of virtual address, physical address, address translation, segmentation, page table, swap space and page fault. (13)

Or

(b) (i) Present an outline of interrupt driven I/O. (5)

(ii) Outline direct memory access with a diagram. (8)

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PART C — (1 × 15 = 15 marks)

16. (a) Outline the design of a three to eight line decoder circuit using "inverters" and "AND" gates. Also, present the truth table for the same. (15)

Or

(b) Outline the design of a BCD ripple counter using JK flip-flops with state diagram and logic diagram. (15)

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