3 SEM TDC PHYH (CBCS) C 7

2022

(Nov/Dec)

PHYSICS

(Core)

Paper : C–7

(Digital Systems and Applications)

Full Marks : 53
Pass Marks : 21

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer (any *five*) : 1×5=5

(a) The shift of spot of light on the screen per unit change in voltage across the deflection plate is called

(i) current sensitivity

(ii) voltage sensitivity

(iii) deflection sensitivity

(iv) None of the above

(b) Linear ICs are used in

(i) calculators

(ii) computers

(iii) TV and radio receivers

(iv) counting circuits

(c) The expression $\overline{ABC}$ can be simplified to

(i) $\overline{A} \cdot \overline{B} \cdot \overline{C}$

(ii) $AB + BC + CA$

(iii) $AB + \overline{C}$

(iv) $\overline{A} + \overline{B} + \overline{C}$

(d) A half adder is constructed from

(i) two XOR gates

(ii) one XOR gate and an OR gate with their inputs connected in parallel

(iii) one XOR gate and one AND gate with their inputs connected in parallel

(iv) one XOR gate and one NAND gate

(e) A flip-flop is used to store

(i) two bits of data

(ii) one bit of data

(iii) three bits of data

(iv) None of the above

(f) Microprocessor 8085 has

(i) 8-bit

(ii) 16-bit

(iii) 32-bit

(iv) None of the above

(Continued)

2. Deduce an expression for deflection sensitivity of CRT. 3

Or

What is integrated circuit? How can transistor be fabricated in an IC? 3

3. Convert hexadecimal number 4 DFA into binary numbers. 2

4. Draw a circuit diagram for an AND gate using only NAND gates. 2

Or

How will you assemble an inverter by using NAND gate or NOR gate? 2

5. State and prove De Morgan's theorems. 3

6. What is Karnaugh map? Enter the following function on a Karnaugh map : 1+2=3

$$F = ABC + A\overline{B}C + AB\overline{C}$$

Or

Prove the following expression, using laws of Boolean algebra : 3

$$(AB + C)(AB + D) = AB + CD$$

7. Explain the circuit diagram of a full adder with truth table. 4

Or

What is the difference between adder and subtractor? Explain the circuit diagram of a half-subtractor. 1+3=4

(Turn Over)

8. What is a flip-flop? What is its importance in digital system? Explain the operation of *J-K* flip-flop. 1+1+3=5

9. *(a)* What is multivibrator? Distinguish between astable and monostable multivibrators. 1+1=2

(b) Draw the logic diagram of 4-bit parallel in-parallel out shift register. 2

10. What is a counter? What is the difference between decade counter and synchronous counter? 1+3=4

11. *(a)* Distinguish between volatile memory and non-volatile memory. Draw the block diagram of an 8×8 memory chip. How is information written in memory cell? 2+3+1=6

(b) Define primary and secondary memories. 2

12. *(a)* Explain with necessary diagram, the functions of different pins of 8085 microprocessor. 5

(b) What is data bus? Is it unidirectional? 1+1=2

(c) Define assembler. What is the basic difference between arithmetic instruction and logical instruction? 1+2=3

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