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3 SEM TDC PHYH (CBCS) C 7

2024

(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 : 1×5=5

(a) For observing a signal in an oscilloscope, it is to be applied

(i) across its X-plates

(ii) across its Y-plates

(iii) to the horizontal amplifier

(iv) to the trigger circuit

(b) 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)* $\overline{A} + \overline{B} + \overline{C}$

(c) An X-OR gate produces high output only when its two inputs are

(i) high

(ii) low

(iii) different

(iv) same

(d) The half adder is constructed from

(i) two X-OR gates

(ii) one X-OR gate and one OR gate with their inputs connected in parallel

(iii) one X-OR gate and one AND gate with their inputs connected in parallel

(iv) one X-OR gate and one NAND gate

(e) If an inverter is placed at the input of an *S-R* flip-flop, the result is

(i) *D* flip-flop

(ii) *J-K* flip-flop

(iii) *T* flip-flop

(iv) BCD decade counter

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

Or

Deduce an expression for deflection sensitivity of CRT.

3. (a) Convert hexadecimal number 4DFA into binary number. 2

(b) Describe how NOR gate can be constructed using diodes and transistors. Explain their action with their truth table. 3

4. (a) State and prove De Morgan's two theorems. 3

(b) Show that $AB + A\bar{B}C + B\bar{C} = AC + B\bar{C}$ using Boolean algebra. 3

Or

Simplify the expression

$$Y = ABCD + ABC\bar{D} + A\bar{B}CD + A\bar{B}C\bar{D}$$

using Karnaugh map and draw the logic circuit for the reduced expression. 3

5. Draw the logic diagram of multiplexer and explain it. 3

6. (a) 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

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

7. What is flip-flop? Explain the operation of *J-K* flip-flop. 1+3=4

8. *(a)* Explain the operation of astable multivibrator using IC-555. 3

Or

Draw and explain the functional diagram of IC-555.

(b) What is the difference between decade counter and synchronous counter? 2

9. Write a short note on asynchronous counter. 4

10. *(a)* Write a short note on Random Access Memory (RAM). 2

(b) Define primary and secondary memories. 2

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

(b) Draw and explain the timing diagram for instruction MVI reg, data. 3

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