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3 SEM TDC PHYH (CBCS) C 7

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(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) : $1 \times 5 = 5$

(a) Linear ICs are used in

(i) calculators

(ii) computers

(iii) TV and radio receivers

(iv) counting circuits

(2)

- (b) The signal to be observed on the screen of an oscilloscope is applied
- (i) across its X-plates
 - (ii) across its Y-plates
 - (iii) to the horizontal amplifier
 - (iv) to the trigger circuit
- (c) An XOR gate produces an output only when its two inputs are
- (i) high
 - (ii) low
 - (iii) different
 - (iv) same
- (d) 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) $\overline{A} + \overline{B} + \overline{C}$
- (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

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(Continued)

(3)

- (f) Microprocessor 8085 has
- (i) 8-bit
 - (ii) 16-bit
 - (iii) 32-bit
 - (iv) None of the above
2. Deduce an expression for deflection sensitivity of CRT. 3
- Or
- What is integrated circuit? How can a transistor be fabricated in an IC?
3. Convert hexadecimal number E79A.6A4 into binary number. 2
4. Draw a circuit diagram for an OR gate using only NAND gates. 2
- Or
- Why are NAND and NOR gates called universal gates?
5. Draw the logic diagram and write the truth table of an even parity bit generator using XOR gate (consider 4-bit input). 3

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(Turn Over)

(4)

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

$$F = ABC + \bar{A}\bar{B}C + A\bar{B}\bar{C}$$

Or

Reduce the expression $f = \sum m(0, 2, 3, 4, 5, 6)$ using K-map and implement it using AOI logic. 2+1=3

7. Draw the block diagram of a 4-bit binary adder/subtractor and explain its working. 4

Or

What is half adder? Draw the logic diagram for half adder using only NAND gates. 1+3=4

8. How does a J-K flip-flop differ from an S-R flip-flop in its operation? Draw the logic diagram of an active-high S-R latch using only NAND gates and describe its operation. 1+2+2=5

Or

What is race around condition in flip-flop? Explain how master-slave flip-flops can eliminate this condition. 2+3=5

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

(5)

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

10. What is ring counter? Describe the working of a 4-bit ring counter. 1+3=4

11. (a) What are different types of secondary memory? Write one advantage of DDR RAM. 1+1=2

- (b) Explain the functions of different buses present in a computer. 3

- (c) Write about central processing unit of a computer. What is the function of ALU? 2+1=3

12. (a) What are various registers of 8085 microprocessor? 2

- (b) Draw the simplified block diagram of 8085 microprocessor showing the main units. 5

Or

Draw and discuss the timing diagram of MVI M, 32 H.

- (c) What is an instruction? Define opcode and operand. 1+2=3

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