## TDC (CBCS) Odd Semester Exam., 2023

# PHYSICS

### ( Honours )

### ( 3rd Semester )

Course No. : PHSHCC–303T

### ( Digital Systems and Applications )

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks for the questions*

## SECTION—A

Answer *ten* questions, selecting any *two* from each Unit :                    2×10=20

### UNIT—I

1. In a CRO, the electron beam is deflected in how many directions? What is the function of electron gun?

2. Write down the logical symbol and truth table of XOR gate for two variables.

3. What is a truth table? For a 3-input NOR gate, there are 8 input combinations. How many of them will result in a high output?

### UNIT—II

4. Prove that $\overline{A} + AB = \overline{A} + B$.

5. Draw the truth table for the SoP expression $\overline{A}\overline{B}C + A\overline{B}C + ABC$.

6. Minimize the Boolean expression $AB + A\overline{B} + B\overline{C} + \overline{A}C$ using K-map.

### UNIT—III

7. What are the differences between combinational and sequential logic circuits?

8. Draw the truth table of a half subtractor. Also draw its circuit diagram.

9. Subtract $(11100)_2$ from $(01101)_2$ using 2's complement method.

### UNIT—IV

10. What are shift registers? What are the basic types of shift registers? 1+1=2

11. Write down the basic difference between shift register and counter.

12. Distinguish between RAM and ROM.

### UNIT—V

13. What are the main features of 8085 microprocessor?

14. What are the functions of ALU? Write the full form of ALU.

15. What do you mean by instructions? What are its different types?

### SECTION—B

Answer *five* questions, selecting *one* from each Unit : 6×5=30

### UNIT—I

16. Discuss the advantages and disadvantages of ICs over discrete circuits. Write down the full names of different classes of ICs on the basis of scale of integration. 4+2=6

17. Convert $(105)_{10}$ to binary and specify the LSB and MSB of the obtained binary number. Realize NOT gate and AND gate using NOR gates. 2+1+3=6

## UNIT—II

18.  (a) Prove that $AB + \overline{AC} + A\overline{B}C(AB + C) = 1.$    3

(b) For three variables $A$, $B$, $C$, write all the possible maxterms and minterms along with their symbol.    3

19.  (a) Using de Morgan's theorem, prove that

$$\overline{\overline{AB} + BC + CA} = \overline{AB} + \overline{B}\,\overline{C} + \overline{AC}$$    3

(b) Draw the symbol, truth table and logical circuit diagram of a demultiplexer.    3

## UNIT—III

20.  (a) What is a flip-flop? Draw the block diagram and logic circuit diagram of an S-R flip-flop.    3

(b) Explain the operation of an S-R flip-flop with the help of truth table.    3

21.  (a) Draw the block diagram and truth table of a full adder.    2

(b) Draw the K-maps for the outputs (SUM and Carry) of a full-adder and hence obtain the corresponding logic expressions for both SUM and Carry.    4

## UNIT—IV

22.  Draw diagrams to explain how data movement takes place in shift registers. Mention some of the applications of shift registers.    4+2=6

23.  Explain various types of primary and secondary memory. State the differences between static and dynamic RAM.    5+1=6

## UNIT—V

24.  Draw the block diagram of 8085 microprocessor. Name different buses used by a microprocessor and explain their respective functions.    2+4=6

25.  (a) Draw the block diagram of IC 555 timer.    2

(b) Explain briefly what you understand by 1-byte and 2-byte instructions.    4

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