**2021/TDC/CBCS/ODD/
PHSHCC–303T/152**

TDC (CBCS) Odd Semester Exam., 2021
held in March, 2022

# PHYSICS

## ( 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 any *ten* of the following questions :

$2 \times 10 = 20$

1. Obtain the expression for deflection sensitivity of a CRO.

2. Give two examples each of linear and digital ICs.

3. Convert 4DF hexadecimal number to octal number.

*( Turn Over )*

( 2 )

4. What do you mean by minterms and maxterms?

5. Draw the block logic diagram of the following Boolean equation :
$$Y = AC + B\overline{C}$$

6. Write briefly about decoders.

7. Discuss how 2's complement method is used in representing a negative number.

8. What do you mean by race-around conditions in a *J-K* flip-flop?

9. Briefly describe the working of a 2-bit binary adder.

10. What is the function of shift registers in digital computers?

11. Describe briefly how data is stored in digital computers.

12. Write a brief note on ring counters.

13. Draw the block diagram of the organization of an 8085 microprocessor.

( 3 )

14. Why is stack memory used in microprocessors?

15. Write MOV and MVI instructions used in 8085 microprocessor.

SECTION—B

Answer any *five* of the following questions : 6×5=30

16. Using labelled diagram, realize two-input OR and AND gates using diodes and hence explain their working.　　3+3=6

17. (a) Explain active and passive components used in electronics with examples.　2

(b) Explain how phase difference between two sinusoidal signals is measured by using a CRO.　4

18. (a) Verify the following Boolean laws :　2
(i) $A \cdot \overline{A} = 0$
(ii) $A + \overline{A} = 1$

(b) State and prove De Morgan's laws.　4

19. (a) Simplify the following expression :　1
$$\overline{\overline{AB} + \overline{A} + AB}$$

(b) What is a multiplexer? Explain the working of a 4-bit multiplexer.　5

**20.** *(a)* What is the function of $D$ flip-flop in digital electronics?     2

    *(b)* Develop the truth table for a half-adder and then draw its logic circuit diagram along with its Boolean expressions.     4

**21.** Explain the working of a $J$-$K$ flip-flop with proper logic diagram.     6

**22.** Describe in detail about parallel-in parallel-out shift register used in digital computers.     6

**23.** With proper diagram, describe various functional units of a digital computer.     6

**24.** *(a)* Write an example of instruction code each for 1-byte and 2-byte instructions.     2

    *(b)* With proper diagram, describe the internal organization of an 8085 micro-processor.     4

**25.** Explain the pin-out configurations of a 555 timer IC. Explain its working as a monostable multivibrator of a given duration.

    2+4=6

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