(7 pages) **Reg. No. :**.....

**Code No. : 20041 E** **Sub. Code : CMPH 62**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2025.

Sixth Semester

Physics — Core

DIGITAL ELECTRONICS

(For those who joined in July 2021 and 2022 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The decimal number system is also known as _____.

   (a) base-2 system
   (b) base-10 system
   (c) base-8 system
   (d) base 16 system

2. Whenever a binary number has all 1's (consisting of only 1's), its decimal equivalent is found by using the formula _____.

   (a) $2^n - 1$ (b) $2n - 1$
   (c) $2^n$ (d) $2n$

3. The NOT gate is commonly known as _____.

   (a) Complementary circuit
   (b) An inverter
   (c) Buffer
   (d) Both (a) and (b)

4. $A + AB =$ _____.

   (a) B (b) A
   (c) AB (d) 0

5. The frequency of clock pulse determines the _____ of the computer.

   (a) Size (b) Input
   (c) Output (d) Speed

6. _____ Circuit is one in which the whole electronic system as produced on one small piece of silicon.

(a) An amplifier (b) An integrated

(c) A logic (d) A binary

7. The demultiplexer is also known as _____.

(a) Data selector (b) Encoder

(c) Decoder (d) Data Distributor

8. The process of converting the results from binary code into alphanumeric character is known as _____.

(a) encoding (b) selecting

(c) decoding (d) designing

9. The process of entering data into the register is known as _____ into the register.

(a) reading (b) writing

(c) scripting (d) converting

10. _____ as an example of an interfacing circuit as it converts a sine wave into a pulse wave form.

(a) Resistive network

(b) Capacitative network

(c) Schmidt trigger

(d) Binary ladder



PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain BCD code.

Or

(b) (i) Add $1110001_2$ and $1010101_2$.

(ii) Subtract $1010_2$ from $111_2$.

12. (a) Using Boolean Algebra, Show that

(i) $(A+B)(A+C) = A+BC$

(ii) $(A+B+C)(A+B+C)(A+B+C) = A+BC$.

Or

(b) Draw the logic circuit for following Boolean expressions.

(i) $Y = AB+CD$

(ii) $Y = A(B+C)$

(iii) $Y = A+BC$

(iv) $Y = AC+BD$.

13. (a) Describe the construction of Full Adder using NAND gates only.

Or

(b) Draw and explain half subtractor with logic diagram and truth table.

14. (a) Using K-Map, Simplify the following Boolean expression.

$Y = ABCD + ABCD + ABCD + ABCD + ABCD + ABCD + ABCD + ABCD.$

Or

(b) Convert the following into minterms.

(i) $Y = A + B$

(ii) $Y = A + BC$

(iii) $Y = AB + ACD.$

15. (a) Explain, giving block diagram, the working of Parallel-in, Serial-out register.

Or

(b) Calculate maximum count, modulus and division factor for a 3-bit asynchronous binary counter.



PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain with illustration, the method of conversion from decimal to binary number (Integer and fraction).

Or

(b) Add the binary numbers corresponding to the given decimal numbers in 1's complement system.

(i) +7 and +4

(ii) +7 and –4

(iii) –7 and +4

(iv) –7 and –4.

17. (a) State and explain DeMorgan's Laws.

Or

(b) Write down the logic expression, symbol and truth table of exclusive OR gate (XOR). Construct XOR gate using (i) NAND gates only and (ii) NOR gates only.

18. (a) Explain the operation of JK flip flop giving truth table.

Or

(b) With a neat circuit diagram, explain the working of a monostable multivibrator using 555 timer.

19. (a) Explain the working of a 4 to 1 line multiplexer. Draw the logic circuit and truth table.

Or

(b) Draw and explain Decimal to BCD encoder.

20. (a) Explain with a neat circuit diagram, the function of Mod-5 binary counter.

Or

(b) Explain the function of simultaneous conversion type A/D converter, defining its resolution and accuracy.

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