

2026

ELECTRONICS — MINOR**Paper : MN-2****(Operational Amplifier and Digital System)****Full Marks : 75***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words
as far as practicable.***Group - A****1. Answer *any ten* questions :**

2×10

- (a) What is meant by input offset voltage of an OP-AMP?
- (b) What is meant by PSRR?
- (c) What is Schmitt Trigger?
- (d) What is Gray code?
- (e) What is the difference between weighted and non-weighted codes?
- (f) Convert $(101101)_2$ to decimal.
- (g) State De Morgans theorems.
- (h) What is FAN-IN of a gate?
- (i) Define decoder.
- (j) Why is an EXOR gate called a controlled inverter?
- (k) What is the function of a latch?
- (l) Define resolution of A/D converter.

Group - B**2. Answer *any three* questions :**

- (a) Find expression for the output voltage of a non-inverting amplifier using OP-AMP with necessary diagram. Why is it preferred to an inverting amplifier? 4+1
- (b) Write the truth table of NAND gate. Show how NAND gates can be used to realize OR gate and NOT gate. 2+3
- (c) Explain the operation of SR flip-flop using NOR gates. Write its truth table. 3+2
- (d) Prove using laws of Boolean Algebra,—

$$AB + (AC)' + AB'C \cdot (AB + C) = 1.$$
 5
- (e) Explain the principle and operation of successive approximation ADC. 5

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Group - CAnswer *any four* questions.

3. (a) Simplify the boolean function using K-Map, $F(A, B, C, D) = \sum(0, 2, 5, 7, 8, 10, 13, 15)$.
(b) Subtract using 1's complement method, $(10011)_2$ from $(111011)_2$.
(c) Implement XOR gate using NAND gate only. 4+4+2
4. (a) Draw and explain the circuit of a 4 bit SIPO shift register.
(b) Draw and explain the operation of a MOD10 ripple counter with suitable timing diagram. 5+5
5. Write short notes on (*any two*) : 5×2
(a) Comparator
(b) Multiplexer
(c) Master-slave J-K flip-flop
(d) TTL and CMOS logic family.
6. Convert the following as instructed : 2×5
(a) $(45.625)_{10}$ to Binary
(b) $(110101.101)_2$ to Octal
(c) $(7D.8)_{16}$ to binary
(d) $(259)_{10}$ to BCD
(e) $(111011)_2$ to Hexadecimal.
7. (a) Draw the circuit diagram of an inverting three input adder circuit using OP-AMP. Derive its output voltage.
(b) Derive an expression for the voltage gain of a differential amplifier using OP-AMP. 5+5
8. (a) What are the ideal characteristics and practical limitations of an OP-AMP?
(b) Explain the working of differential amplifier with circuit diagram using OP-AMP. 5+5
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