

INFR2810 – Tutorial

May 22, 2025

Q.No.	Question																									
1	Binary→Decimal with Fractional Part: 1101.1011 ₂																									
2	Convert the 12-bit binary number 101101101011 ₂ into Octal, Hexadecimal and Decimal																									
3	You must transmit the 8-bit data word 10101100. a. What parity bit would you append for even parity? For odd parity? b. If a single-bit error flips bit 3, show how each scheme detects it (or not).																									
4	Compute the Hamming distance between 1101001 ₂ and 1011100 ₂																									
5	The minimum Hamming distance between any two codewords in a code is 5. a. How many errors can that code detect? b. How many can it correct?																									
6	Symbols {A,B,C,D,E} have probabilities {0.40, 0.25, 0.20, 0.10, 0.05}. If you used a fixed-length code, how many bits/symbol? What’s the average length?																									
7	For a 4-bit binary input WXYZ (W = MSB), output 1 iff the decimal value > 6. a. List the minterms for all values 7–15. b. Simplify via Boolean algebra or a 4-variable K-map. c. Draw the final comparator circuit with logic gates.																									
8	Given the Huffman table A → 0, B → 10, C → 110, D → 111 a. Decode the bit-string 011011110. b. Using the same table, encode the message “DABAC”.																									
9	Draw a 4-input OR gate using only 2-input OR gates. b. Provide its truth-table for the input combinations (all 0 → output; all 1 → output). In general, an n-input OR built from 2-input ORs requires n–1 gates, so for n=4 you can’t do it with fewer than 3.																									
10	Simplify the expression $A \cdot (B + A' \cdot C) + A \cdot B + A \cdot C$ to its minimal form, showing each algebraic step.																									
11	For the 4-variable function given by the following map, derive both: A minimal Sum-of-Products expression A minimal Product-of-Sums expression <table><tr><th>AB\CD</th><th>00</th><th>01</th><th>11</th><th>10</th></tr><tr><th>00</th><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><th>01</th><td>1</td><td>1</td><td>1</td><td>0</td></tr><tr><th>11</th><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><th>10</th><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	AB\CD	00	01	11	10	00	1	0	1	1	01	1	1	1	0	11	1	0	0	1	10	1	1	1	1
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