JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-1 EXAMINATION-FEBRUARY-2026

B.Tech- IVth Semester (CSE/IT)

COURSE CODE (CREDITS): 25B11CI411 (3) MAX. MARKS: 15

COURSE NAME: Digital Systems and Computer Organization MAX. TIME: 1 Hour

COURSE INSTRUCTORs: EMP(Coordinator), SWT, NTJ, PDG, ALK, MSD

Note: *(a) All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.(c) Use of calculator is not allowed.*

Q. No	Question	CO	Marks
Q1	a) If $(121)_b = (25)_{10}$, then find the value of base b. b) Convert $(F8D)_{16}$ into 2's complement format, octal equivalent, and gray code.	CO-1	1 2
Q2	Simplify the following Boolean expressions: (a) $\overline{A + B + \overline{C}} + \overline{A}\overline{B}C + \overline{A}\overline{B}\overline{C}D$ (b) $\overline{A + \overline{B\overline{C}} + CD} + \overline{\overline{BC}}$	CO-1	4
Q3	Design a digital security system that uses a 4-variable Boolean function F(W,X,Y,Z) to control an alarm. The alarm should activate only when specific conditions are met, represented by the minterms as $\sum m(2,3,6,7,10,11,14,15)$. Develop the Karnaugh map (K-map) for this function, then simplify it to derive the minimal Boolean expression. Using this simplified expression, design a logic circuit suitable for implementation in a real-time security system.	CO-1	4
Q4	Analyze the truth table of a full adder and derive the Boolean expressions for Sum and Carry using K-map. Further, design a full adder using logic gates based on the derived expressions and draw the corresponding logic diagram.	CO-2	4

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