JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

SUPPLEMENTARY EXAMINATION-2026

B.Tech-III[rd] Semester (ECE/ECS/EE, Minor Degree)

COURSE CODE (CREDITS): 25B11EC312/18B11EC312 (4) MAX. MARKS: 75

COURSE NAME: Digital Circuit Design/Digital Electronics & Logic Design

COURSE INSTRUCTOR: Dr. Pardeep Garg MAX. TIME: 2 Hours

Note: (a) All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

Q. No	Question	CO	Marks
Q1	Each of the following arithmetic operations is correct in at least one number system. Determine the possible base in each case: i) $\frac{33}{3} = 11$ ii) $(121)_r = (144)_8$	CO-1	2.5+2.5=5
Q2	Convert $(AF7)_{16}$ into gray code, 2's complement, and octal equivalent formats.	CO-1	2*3=6
Q3	The message **(1110110)** coded in the 7-bit Hamming code is transmitted through a noisy channel. Decode the message assuming that at most a single error occurred in the code-word. Compute the error location and find the corrected code-word.	CO-1	6
Q4	Reduce the following expression using Boolean algebra: $f = (B + BC)\,(B + \bar{B}C)\,(B + D)$	CO-1	5
Q5	Reduce the following expression using K-map and implement the minimized expression using basic gates and universal gates: $f = \sum m(2, 3, 6, 7, 8, 10, 11, 13, 14)$	CO-3	4+2+2=8
Q6	Implement the following logic function using a multiplexer: $f = A \oplus B \oplus C$	CO-3	5
Q7	Draw the logic diagram of 4-bit SISO, SIPO, PISO, and PIPO Shift Registers (using D flip-flops).	CO-2	2.5*4=10
Q8	Design a 2-bit Ripple Up-counter using negative-edge triggered flip-flops and explain its working along with the timing diagram.		10
Q9	Draw the logic diagram of a 4-bit Ring counter (using D flip-flops), construct its sequence table corresponding to the clock pulses and represent the state diagram.	CO-2	3+4+3=10
Q10	Design a sequence detector to detect the binary sequence **1110** using Moore type finite state machine (FSM) with the help of D flip-flops.	CO-2	10