JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

ACCELERATED SEMESTER

MID-TERM EXAMINATION-2026

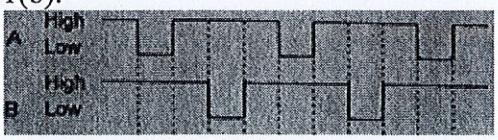
B.Tech-VII Semester (CSE/IT/BT/BI/CE)

COURSE CODE (CREDITS): 20B1WEC734 (3) MAX. MARKS: 50

COURSE NAME: Digital Systems

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. (c) A non-programmable calculator is allowed.

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) $\frac{41}{3} = 13$ ii) $\sqrt{41} = 5$	CO-1	2.5+2.5=5
Q2	Convert $(987)_{10}$ into gray code, hexadecimal equivalent, and 2's complement formats.	CO-1	2*3=6
Q3	The message **(0011011)** 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	5
Q4	For the two-input NAND gate operating as a negative OR gate (Fig. 1(a)), sketch the output waveform when the input waveforms A and B are as depicted in Fig. 1(b).  Fig. 1(a)  Fig. 1(b)	CO-1	4
Q5	Write down the minimized expression by solving the following expression using K-map and implement the minimized expression using AOI logic and universal gates: $f=\sum m\,(0, 1, 4, 5, 6, 7, 9, 11, 15) + d(10,14)$	CO-1	7
Q6	Design a Full Adder using 3:8 decoder.	CO-3	5
Q7	Design a 32:1 multiplexer using two 16:1 multiplexer and one 2:1 multiplexer (in one circuit); discuss its working along with the truth-table.	CO-3	8
Q8	Draw the logic diagram of 4-bit SISO, SIPO, PISO, and PIPO Shift Registers (using D flip-flops).	CO-2	2.5*4=10