(142)

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATION-MARCH-2026

B.Tech- IVth Semester (CSE/IT)

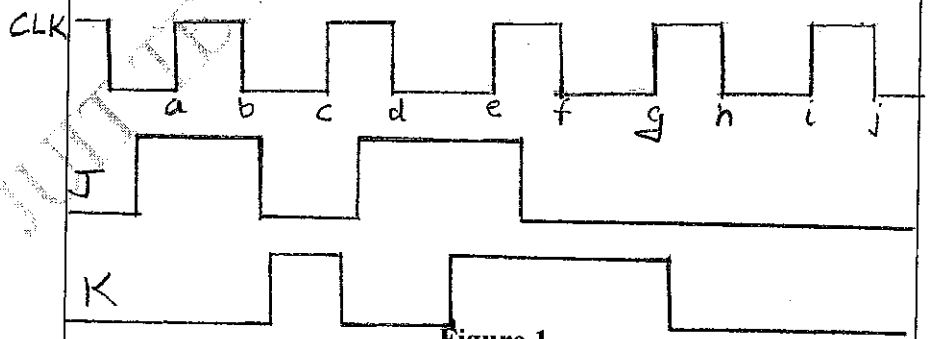
COURSE CODE (CREDITS): 25B11CI411 (3) MAX. MARKS: 25

COURSE NAME: Digital Systems and Computer Organization

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

MAX. TIME: 1.5 Hours

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

Q. No	Question	CO	Marks
Q1	A combinational circuit has to be designed in such a way that it provides the 2's complement as output for 4-bit binary number as input. Show the following: i) Truth-Table ii) Boolean expression for the output variables	CO-2	2+2=4
Q2	A 2-bit magnitude comparator for 2 inputs (A and B having bits A_0, A_1, and B_0, B_1 respectively) has to be designed. Obtain the following: i) Boolean expression for the output variables ii) Show the logic circuit	CO-2	1.5+1.5=3
Q3	**a)** Implement the 24:1 MUX using 8:1 MUXs only. Clearly mention on the diagram which selects line is the MSB and which select line is the LSB. **b)** Design a 2-input Ex-OR gate using one 2:1 MUX.	CO-2 CO-2	2 1
Q4	The waveform as shown in figure 1 is applied to (a) a positive-edge triggered J-K flip-flop, (b) a negative edge-triggered J-K flip-flop. Draw the output waveform in each case.  **Figure 1**	CO-3	1.5+1.5=3
Q5	Convert J-K flip flop to S-R flip flop using conversion table, excitation table and Karnaugh Map.	CO-2	4
Q6	Design a 4-bit asynchronous decade counter (MOD-10 counter)	CO-3	3+2=5

	(a) Draw the complete logic circuit diagram showing all flip-flop connections and the asynchronous reset logic. **(b)** Draw the timing diagram for one complete counting cycle (from 0000 to 1001 and back to 0000), clearly showing the clock input and the four output waveforms Q_3 Q_2 Q_1 Q_0. Label all transitions and indicate the reset pulse.		
Q7	Write short note on the following: a) The significance of asynchronous inputs (Preset and Clear) with truth-table. b) Differentiate between combinational and sequential circuits. c) Compare and contrast between latch and flip-flop.	CO-3	3*1=3