


VIT

Vellore Institute of Technology
(Established in the year 1984 under sanction of the Government of Tamil Nadu)
Final Assessment Test – April 2025

Course: BITE202L - Digital Logic and Microprocessors

Class NBR(s): 2959 / 2968 / 2972 / 2974

Slot: B2+TB2

Max. Marks: 100

Time: Three Hours

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

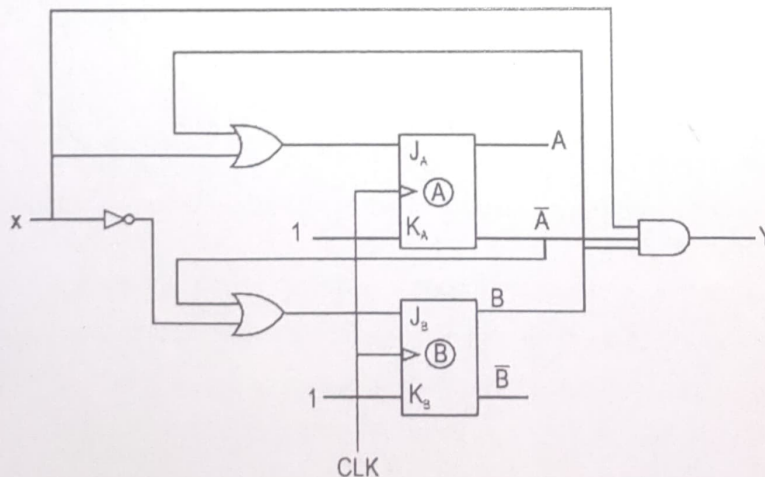
Answer ALL Questions

(10 X 10 = 100 Marks)

- 1.a) i) Convert the decimal number $(3250)_{10}$ in to binary and find the 2's complement for the binary number obtained from it.
- ii) Convert $(BABA.DAD)_{16}$ to Octal.
- iii) Convert $(53.521)_8$ to $()_5$
- iv) Convert the $(11010.11)_2$ to $()_{10}$

OR

- 1.b) Simplify the following Boolean functions, using five-variable K-map:
 $F(A, B, C, D, E) = \sum (0, 2, 4, 6, 9, 11, 13, 15, 17, 21, 25, 27, 29, 31)$
 And show the final result in NAND implementation.
2. In computer computations it is often necessary to compare numbers. Two 2-bit signed numbers, $X = x_1x_0$ and $Y = y_1y_0$, can be compared by using the subtractor, which performs the operation $X - Y$. The two outputs denote the following:
 • $Z = 1$ if the result is 0; • $N = 1$ if the result is negative; • otherwise $N = 0$ if the result is positive. Design a logic circuit for the same.
3. a) Using a decoder constructed with NAND gates and external gates, design the combinational circuit defined by the following three Boolean functions: [5]
 $F1 = xy + xz^1 + yz^1$
 $F2 = xz + xy + yz$
 $F3 = y^1z + x^1y^1z^1 + xy$
- b) Construct a 16 X 1 multiplexer with two 8 X 1 and one 2 X 1 multiplexers with neat sketch. [5]
- 4.a) Analyse the given sequential circuit and present the state equations, state table and state diagram.



OR

- 4.b) A sequential circuit has two JK flip-flops A and B, two inputs x and y and one output z. The flip-flop input equations and circuit output equation are

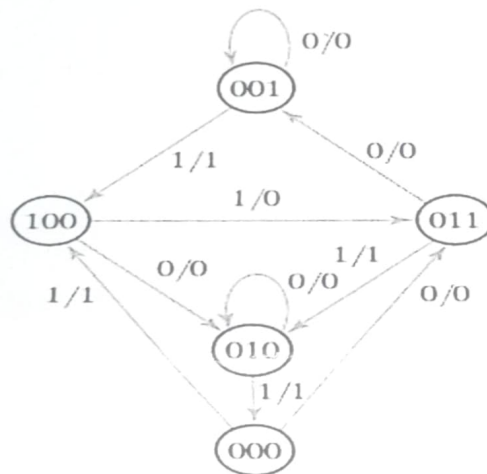
$$J_A = Bx + B'y' \quad K_A = B'x + y$$

$$J_B = A'x \quad K_B = A + xy'$$

$$z = (A + B) x'y'$$

- Draw the logic diagram of the circuit. [3]
- Tabulate the state table. [3]
- Derive the state diagram. [4]

5. A sequential circuit has three flip-flops A, B, C; one input x in and one output y out. The state diagram is shown in figure. The circuit is to be designed by treating the unused states as don't-care conditions. Analyze the circuit obtained from the design to determine the effect of the unused states. Use D flip-flops in the design.



- Design a Synchronous counter with the following repeated binary sequence 0, 1, 3, 7, 6, 4, 0, 1, 3, 7, 6, 4.... Use T_FF. [5]
- The contents of a four-bit register is initially 1100. The register is shifted six times to the right with the serial input being 110010. What is the content of the register after each shift? Draw the timing diagram of each register. [5]
 - Write the Sequence for the following shift registers up to 7 Clock pulses and draw the timing diagram for the same. [5]



- Compare and Contrast the pros and cons of Minimum mode and Maximum mode operations of 8086. [5]
- Develop an ALP code to find Fibonacci Series for a given number. [5]
 - Write an ALP to count the odd numbers from a given list of ten 8-bit numbers. [5]
- Demonstrate in detail about Direct Memory Access controller 8257.

⇔⇔⇔ X/D/TY ⇔⇔⇔