



VIT
Vellore Institute of Technology

Final Assessment Test - April 2025

Course: ISWE201L - Digital Logic and Microprocessor

Class NBR(s): 3325/3329/3332/3335/3337

Time: Three Hours

Slot: C1+TC1

Max. Marks: 100

- 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) Convert the following octal $(1267.23)_8$ into [6]
 - i) binary
 - ii) decimal and
 - iii) hex
- b) Convert the following binary number $(1001100101)_2$ into gray code and [4]
excess-3 code.

- 2.(a) Simplify the following Boolean function F , together with the don't-care conditions d , and then express the simplified function in sum-of-product form and product of sum. Draw the logical diagram of the function using minimum number of basic gates.

$$F(A, B, C, D) = \sum m(0, 6, 8, 13, 14) + d(2, 4, 10)$$

OR

- 2.(b) To simplify the following Boolean function using Mc-cluskey tabulation method and draw the circuit diagram ,

$$F(A, B, C, D) = \prod (0, 5, 8, 9, 10, 11, 14, 15)$$

3. A farmer employs a servant to look after his farm-house. He instructs the servant to keep a watch on his goat. So that she does not harm the kitchen-garden, when the entrance-door is open. He is also required to see that no 'wild-animal' may pounce upon the grazing goat. For this, the farmer gives the servant a switch-board, with three switches marked as Door open, Wild-Animal Near-By and Goat near Door and instructs the servant to press the appropriate switch, depending upon what he sees. The switch-board has an alarm bell that rings when the condition demands farmer's attention. Suggest a suitable switching-circuit design for the 'switch-boards' using 4:1 Multiplexer.

- 4.(a) Design a gating circuit using NOR only gates, which lights up a bulb, when the input is a prime between 0 and 9 (Input is a 4-bit binary number).

OR

- 4.(b) A combinational circuit has three inputs, x, y and z and three outputs, A, B and C. When the binary input is 0, 1, 2 or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6 or 7, the output is the two's complement of input. Design the combinational circuit by finding the circuit's truth table, Boolean expression and the logic diagram.
5. A synchronous sequential network has three T-Flip flops A, B, C and an input x. when $x=0$ the state of the circuit remains the same. When $x=1$ the circuit goes through the transitions from 000 to 001 to 010 to 011 back to 100 to 101 101 to 110 110 to 111 and repeats.
6. Design a counter using JK flip-flops that goes through the following binary repeated sequence: 0, 1, 3, 7, 6, 4.
7. Explain briefly about the internal hardware architecture of 8086 microprocessor with a neat diagram.
8. Draw the block diagram of programmable Interrupt controller (8259) and explain its operations.
9. Write an ALP to find the total number of odd numbers from an array of 10 elements.
10. Suppose that $DS=2000H$, $BX=3000H$, $SP=2010H$, $SI=1200H$ and $DI=1400H$. Determine the memory address accessed by each of the following instructions, assuming real mode operation.
- i. `MOV AL,[1234h]`
 - ii. `MOV AX,[BX]`
 - iii. `MOV [DI],AL`
 - iv. `MOV CL,[SI]`
 - v. `MOV AL,[DI-0100H]`

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