



Izmir University of Economics
Digital Design (EEE242)
Midterm Exam II (Date: 5/6/2021, Duration: 90 min)
Instructor: Asst.Prof.Dr. Faezeh Yeganli

Name:
Student's Number:.....

| Questions | Mark |
|-----------|------|
| Q1(%40) | |
| Q2(%20) | |
| Q3(%20) | |
| Q4(%20) | |
| Total | |

Q1) Simplify the following Boolean function F, together with the don't care conditions d, and implement it with

$$F(A,B,C,D) = \sum m(3, 6, 7, 8, 10, 14, 15) + \sum d(1, 4, 5, 13)$$

- Determine the sum of products (SOP).
- Implement F with two level NAND gates.
- Determine the product of sums (POS).
- Implement F with two level NOR gates.

Q2) Implement the truth table given below using

| Inputs | | | Output |
|--------|---|---|------------|
| a | b | C | f |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | Don't care |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | Don't care |
| 1 | 1 | 1 | 1 |

A single 3-to-8 Decoder and any simple logic gate (e.g. AND/OR/...)

Q3) You are given 6 gates to implement the following Boolean function. Each gate has 2 inputs only.

| Type | Quantity |
|------|----------|
| AND | 3 |
| OR | 1 |
| NAND | 1 |
| NOR | 1 |

$$F(w, x, y, z) = \left((xyz)' + w'xz + y \right)'$$

Q4) Analyze the following circuit and determine the output F as sum of minterms.

