



CE1901 HOMEWORK SET 3

INSTRUCTIONS

- **Work** these homework problems by yourself on three-hole punched engineering problems paper. ***Engineering problems paper*** can be purchased at the MSOE bookstore. Some companies call engineering problems paper an “engineering pad.” It is usually green or yellow in color. **Use** the graph paper side **only when drawing graphs**.
- **Do not use calculators** as you work your solutions.
- **Show all work** to receive partial credit.
- **Showing work** means that you illustrate the process you take to complete a problem.
- **Print and three-hole punch** this coversheet. **Staple** to your solution packet.
- **Submit** your paper solution packet at the start of the **second lecture of week 4**.

ASSIGNED PROBLEMS

1. **Design** a standard form solution (canonical) of a four-bit multiple-of-5 detector. The output $F(ABCD)$ is true if and only if binary input $ABCD$ is a multiple of 5. **Draw** the schematic as a new Quartus project and **simulate** to verify operation.
2. **Design** a canonical solution of a four-bit greater-than-10 detector. The output $F(ABCD)$ is true if and only if $ABCD$ is greater than 10. **Draw** the schematic as a new Quartus project and **simulate** to verify operation.
3. **Design** a canonical solution of a balanced-energy detector. The output $F(ABCD)$ is true if and only if there are equal number of signals with energy as signals without energy. **Draw** the schematic as a new Quartus project and **simulate** to verify operation.