National University of Computer and Emerging Sciences

CLO #:1 Understand and Analyze Boolean expressions, the inputs, and outputs of a circuit, implement the circuits using logic gates and verify them via truth tables. *10 Marks*

Q1:

As part of an aircraft's functional monitoring system, a circuit is required to indicate the status of the landing gears prior to landing. A green LED display turns on if all three gears are properly extended when the "gear down" switch has been activated in preparation for landing. A red LED display turns on if any of the gears fail to extend properly prior to landing. When a landing gear is extended, its sensor produces a LOW voltage. When a landing gear is retracted, its sensor produces a HIGH voltage. Implement a circuit to meet this requirement.

Draw the logic circuit on Logic Works and truth table to show all the possible situations.

CLO #:1 Understand and Analyze Boolean expressions, the inputs, and outputs of a circuit, implement the circuits using logic gates and verify them via truth tables. *10 Marks*

Q2: Draw the Half adder circuit diagram on Logic Works using NOR gates only.

CLO #: 1 Understand and Analyze Boolean expressions, the inputs, and outputs of a circuit, implement the circuits using logic gates and verify them via truth tables. *5 Marks*

Q3: Problem Statement: A device is needed to indicate when two LOW levels occur simultaneously on its inputs and to produce a HIGH output as an indication. Specify the device. Draw the logic circuit on Logic Works and truth table to show all the possible situations.

CLO #: 1 Understand and Analyze Boolean expressions, the inputs, and outputs of a circuit, implement the circuits using logic gates and verify them via truth tables. *5 Marks*

Q4: Draw the circuit of the following expression.

$$X = \overline{ABC} + B(EF + \overline{G})$$

CLO #: 2 Gain hands on experience creating reduced forms of circuit using K-maps and Boolean algebra laws. *10 Marks*

Q5:

a) Use K-MAP to minimize the given SOP expression. Implement the minimized SOP on Logic Works and draw Complete Truth Table.

$$\overline{A}\,\overline{B}\,\overline{C}\,\overline{D} + \overline{A}\,\overline{B}\,\overline{C}D + ABCD + ABC\overline{D}$$

b) Use K-MAP to minimize the given POS expression. Implement the minimized POS on Logic Works and draw Complete Truth Table.

$$(X+\overline{Y})(\overline{X}+Z)(X+\overline{Y}+\overline{Z})(\overline{X}+\overline{Y}+Z)$$