ENTRY NUMBER:

DEPARTMENT OF ELECTRICAL ENGINEERING
EEP 201, Lab Quiz # 1

Maximum marks: 5
Duration: 30 Minutes   September 26, 2006
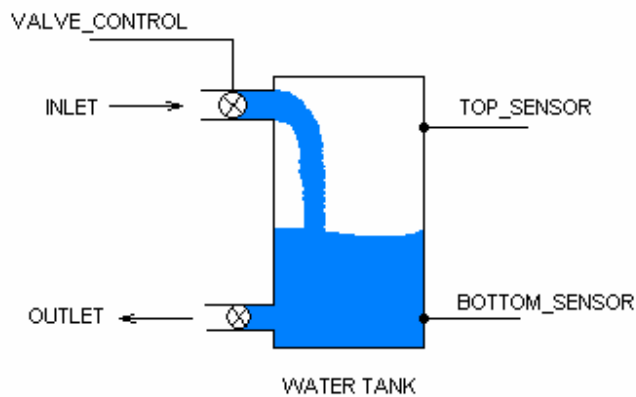
Marks: 5

Design a combinational circuit that implements the following scenario:

There is an overhead water tank, and there are two sensors one is near the top called TOP_SENSOR; and another near the bottom called the BOTTOM_SENSOR. The output of the sensor is HI when the water level is above the sensor level. It is LOW when the water level is below the sensor.

There is an input valve that feeds the tank. The valve is closed when LOW signal is given to VALVE_CONTROL (No water flows into the tank). If a HI signal is given to VALVE_CONTROL the tank starts filling up. There is an outlet in the tank from which the water is taken out when required.

The design has to be such that you control the inlet valve (not the outlet valve), so that it will open if the water level is below the BOTTOM_SENSOR, the valve will then have to be closed when the water level crosses TOP_SENSOR.

As the water is taken out the valve has to be opened only when the water level has gone below the BOTTOM_SENSOR.
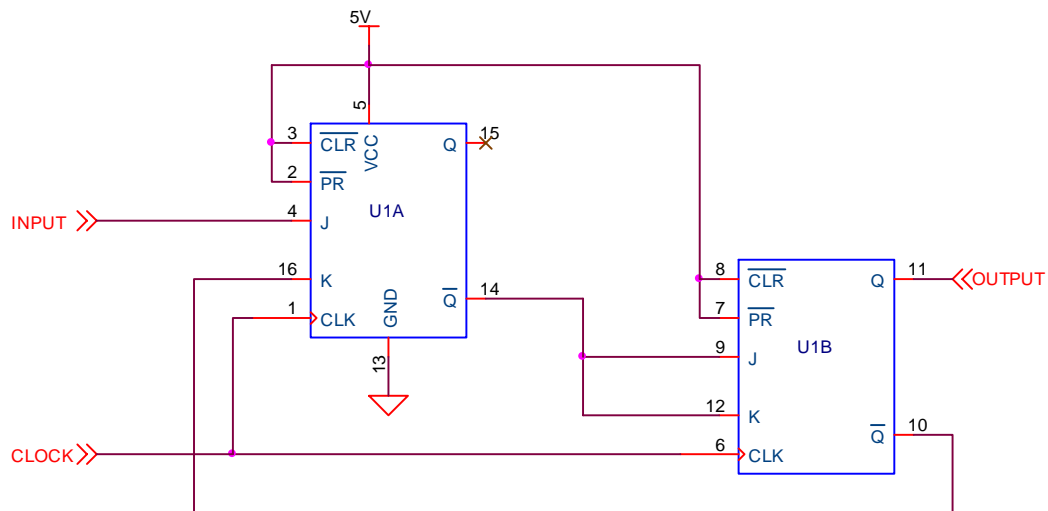
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> Fill up the 'OUTPUT' row of the following table in reference to the above diagram:
>   o   Initial state of the 'Q' outputs of the flip-flops is 1, 0 (Q-U1A = 1, Q-U1B = 0).
>   o   The JK flip flops are positive edge triggered.

CLOCK	0	1	0	1	0	1
INPUT	0	0	1	1	0	0
OUTPUT	0					

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Realize the following using IC 74HC153 and minimum number of additional gate <u>packages</u>. Given the restriction that <u>only one IC 74HC153 package is available</u>.

Give relevant truth table along with the circuit diagram.

$F = \Sigma\ (0, 1, 3, 6, 7, 8, 11, 12, 14)$

IC 74HC153