Title: **Deadband Tank Level Control** Job: 16

Course: Intro to Automation Unit: Manual Motor Control CLO: 2

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade \_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall design a level control circuit for an on/off control valve.
2. Student shall develop an understanding of deadband control.
3. Student shall construct a complex valve control scheme.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Job. Grading shall be based on the Manual Motor Control rubric.

**Devices**

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| Inputs | | |
| *Device* | *Description* | *Symbol* |
| Mushroom Head Pushbutton | Emergency Stop | ESTOP |
| Three-position Selector Switch | Mode, On/Off/Auto | MODE |
| Float Switch (M-GRE-40-W) | High Level Switch | HI\_LVL |
| Float Switch (M-GRE-40-W) | Low Level Switch | LO\_LVL |
| Outputs | | |
| *Device* | *Description* | *Symbol* |
| Green Pilot Light | Pump Running | RUNNING |
| Red Pilot Light | Pump Stopped | STOPPED |
| Blue Pilot Light | Tank Full | FULL |
| Eleven-Pin Relay | Pump Control | VC1 |
| 120VAC Solenoid Valve | On/Off Normally Closed Valve | VLV1 |

**Instructions**

Design an automatic control scheme that shall control the level of water in a municipality’s water tower. Using the inputs from two float switches, control a valve at the top to supply water to the tank. If the tank is full indicated by the high-level flow switch (HI\_LVL), the valve shall shut off ceasing to fill the tank. The valve shall stay closed until the low-level switch (LO\_LVL) indicates that the tank is “empty”. If empty is indicated, the valve shall open filling the tank once again. The circuit can be placed in one of three “modes”. AUTO will function as described above. OFF will close the valve and not allow AUTO function to operate the valve. ON shall open the valve ignoring the signals from the float switches. The entire control circuit shall be protected by an ESTOP. Use the components listed above to design the circuit. Study the associated datasheet for the level switch before embarking on your design. The green light shall indicate the valve is open. The red light shall indicate the valve is closed. The blue light shall indicate when the tank is FULL. The ESTOP should not kill power to any lights. The pump control relay shall be connected to both DC, for control signals, and AC, to start/stop the pump. Ensure that all voltages are separated. Use the space on the opposite side of this page to design the circuit. Once complete, review the design with the instructor. After obtaining approval, wire the circuit. Have the instructor review all wiring before energizing the circuit. Render the schematic using a CAD type software package. Post the schematic to the student share folder using filename MMC Job 16 –name.ext.

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Discussed design \_\_\_\_\_\_\_\_ Checked wiring \_\_\_\_\_\_\_\_ Energized Test \_\_\_\_\_\_\_\_