

Faculty of Engineering, KFS University

Subject computerized control exam

23/ 06 / 2021, 2nd term final exam

4th year, computer and control systems dep.



examiner: prof. Ali Sakr

Full marks 90 M

Solve the next problems,

The exam fulfill NARS metrics: a.3, a.8. a13 , a19 , b.2, b.6, b.7 , b.17, and C17

1- Q1: T or F (15M)

- 1- we have to configure sensors for all points of a SCADA system?
- 2 alarms respond in millisecond with high precision?
- 3- alarm is acknowledged at all workstations without having to programs?
- 4-Can we disable alarms?
- 5- number of alarms can we attach to control system depend on number of measureable points.
- 6- sensors are indicators used for displaying output
- 7- alarms can be prioritized regarding risk of measures
- 8- A DC motor is required to have a high torque at low speeds ,
- 9- linear sensors used to estimate the value of input signal.
- 10- all planes contain microcontrollers to collect suitable signal conditioning, and provide output signals via drives actuators.

2- (15M)

a-Define sensitivity of electric resistance regarding current $\delta R / \delta i$, cross section area

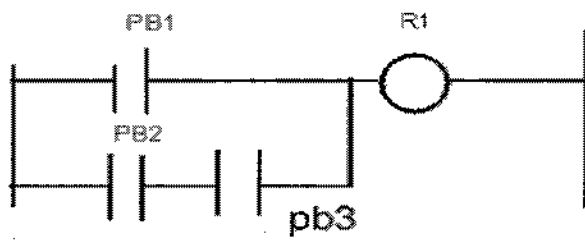
$\delta R / \delta A$ using relations $\rho l/A$, P/i^2

b-A stepper motor has a step angle = 1.8°. How many pulses are required for the motor to rotate a complete revolution? What pulse frequency is required for the motor to rotate at a speed of 200 rev/min?

c=Encode Analogue signal 8 volts., using 6 bit register. Consider max analogue signal= 10v, find absolute error & relative error for the relative digital value.

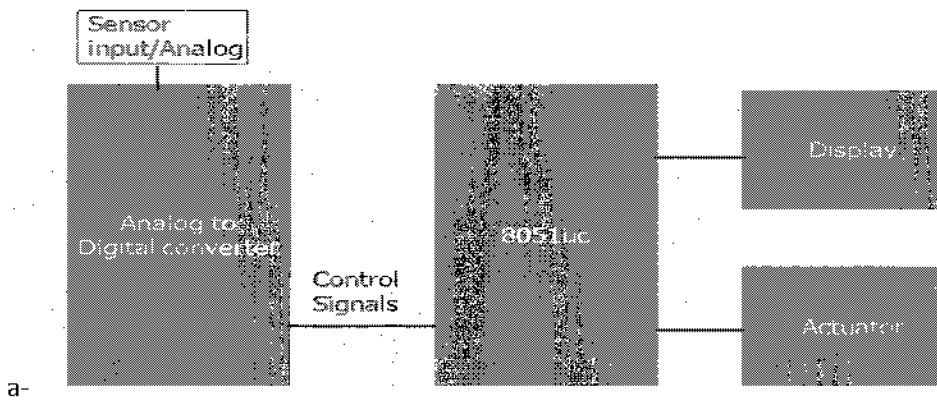
3-(15M)

- a- write the function for next rugs
- b- Write a PIC - C program to toggle all the bits of Port1 continuously.



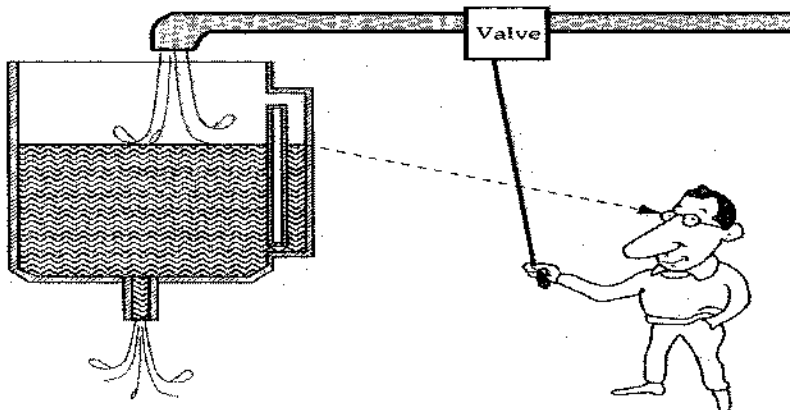
4= (15M)

a-discuss action of next micro-controllers

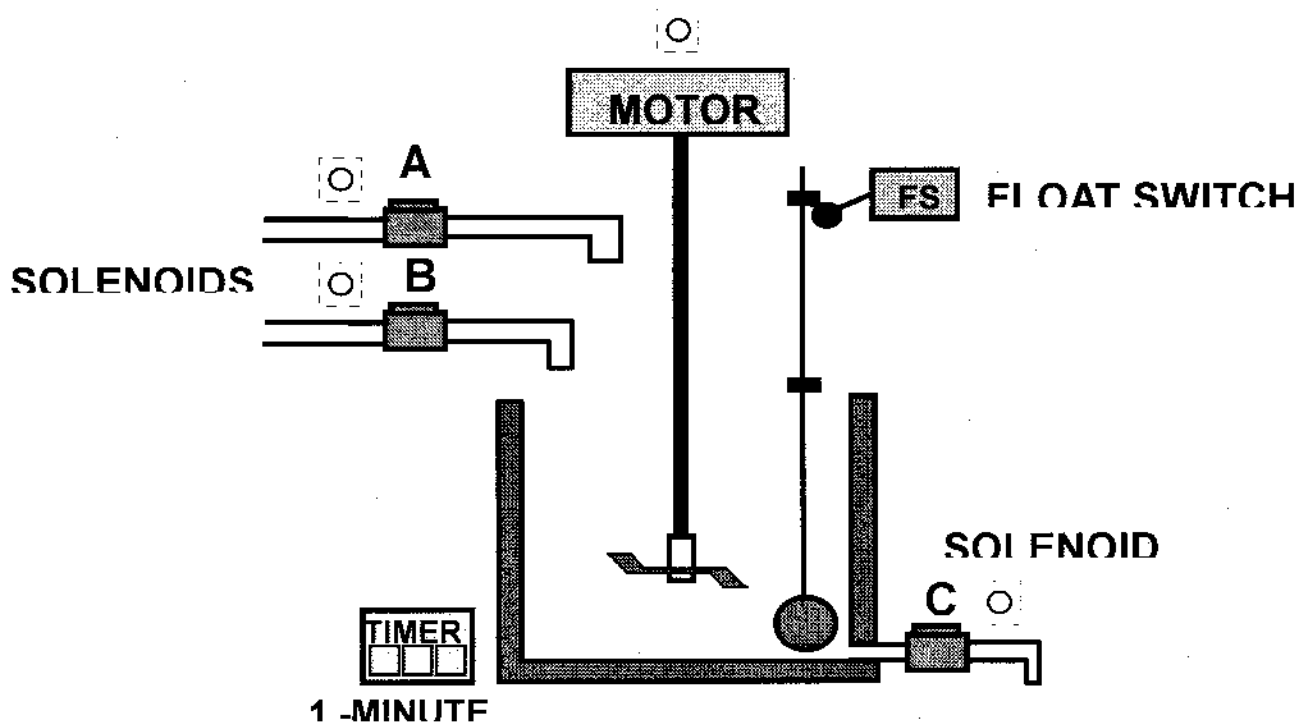


a-

b- design a block diagram for controlling next siphon



5- (15M)- Implement PLC ladder diagram for next system



6- (15M)

- a- Discuss the structure of Arduino, write a program that test temperature and write HI if $T > 60C$.
- b- Design a traffic light control System, using PLC, green light =90 sec, yellow 10 sec, and red 90 sec, yellow 2 sec, plot ladder diagram,
- c- discuss interactive process control with SCADA , discuss Elements of a SCADA (Sensors , actuators, RTUs, Communication system, MTU. what are advantages of merging SCADA elements.