**Registration No :** | | | | | | | | | | |

**Total Number of Pages : 02** **B.Tech.**

**PEI6I102**

**6th Semester Regular Examination 2017-18**
**INDUSTRIAL AUTOMATION**
**BRANCH : AEIE, EIE, IEE**
**Time : 3 Hours**
**Max Marks : 100**
**Q.CODE : C218**

**Answer Part-A which is compulsory and any four from Part-B.**
**The figures in the right hand margin indicate marks.**

## Part – A (Answer all the questions)

**Q1.** **Answer the following questions : *multiple type or dash fill up type :*** **(2 x 10)**

**a)** _____type of controller is used to measure the disturbances of the process.

**b)** _____, _____ and _____ are the main factors of adaptive controller.

**c)** Fluid flashes if the application ratio is more than _____.

**d)** _____ Controller is guarantee for minimization of error.

**e)** _____is the typical value of proportional band.

**f)** What is process time lag?

**g)** Proportional plus derivative control action provides
a) High maximum deviation b) zero maximum deviation c) smallest maximum deviation d) none of these.

**h)** A ladder diagram of PLC is an example of _____.

**i)** The most popular medium for the data highway for DCS communication is _____.

**j)** _____, _____ are the performance criteria.

**Q2.** **Answer the following questions : *Short answer type :*** **(2 x 10)**

**a)** What is industrial automation? What are the different costs included in industry in designing the particular product?

**b)** Explain IEC 61131 international standards for PLC.

**c)** What is proportional band? How is related to control action?

**d)** What is control element? State the different types of actuators.

**e)** What are programmable logic controller designs?

**f)** What is the need of latching in a ladder diagram?

**g)** State the non difference of centralized and distributed control system.

**h)** Define ultimate gain and ultimate period of process control.

**i)** Differentiate the continuous and discontinuous state in the sequential process.

**j)** State the difference between analog and digital controller.

## Part – B (Answer any four questions)

**Q3.** **a)** Narrate the characteristics of proportional control, integral control and derivative control. Write suitably and limitation of their application in process control. **(10)**

**b)** Discuss the effects of i) Lower value of PB ii) Shorter value of Integration time. **(5)**

**Q4.** **a)** Lists the advantages and disadvantages of feedback and feed forward control configuration. Give one example with explanation of each configuration. **(10)**

**b)** Draw the block diagram of a cascade control system and describe the functions of a unit. Write the characteristics of a cascade control. **(5)**

**Q5.** **a)** What is actuator? State the different types of actuator. Explain any two actuators with examples. **(10)**

**b)** A velocity control system has a range of 220-460 mm/sec. If the set point is at 320mm/sec and the measured value is 315mm/sec. Calculate the error percentage of span? **(5)**

**Q6.** **a)** What is adaptive controller? State the different types of adaptive controllers. Explain any two controllers with neat block diagram. **(10)**

**b)** With neat sketches explain the architecture and functional requirements of DCS. **(5)**

**Q7.** **a)** Give examples of multitasking process. Describe the functions of mailboxes, semaphores and regions related to intertask communication. **(10)**

**b)** Explain the cavitations and flashing phenomena with diagram. **(5)**

**Q8.** **a)** Using Z-N method of tuning find tuned parameters of PID controllers for a process having its transfer function as $\frac{e^{-0.5S}}{(S+1)(2S+1)}$. All other elements in the control loop have unity transfer function. **(10)**

**b)** Explain the digital PID controllers with usual meanings. **(5)**

**Q9.** **a)** Design a PLC program and prepare a typical I/O connection diagram and ladder logic program for the following counter specifications. **(10)**

**i)** Counts the number of times a push button is closed.

**ii)** Decrements the accumulated value of the counter each time a second push button is closed.

**iii)** Turns on a light any time the accumulated value of the counter is less than 20.

**iv)** Turns on a second light when the accumulated value of the counter is equal to or greater than 20.

v) Resets the counter to 0 when a selector switch is closed.

**b)** Explain the various steps involved in developing PLC based automation projects. **(5)**