53 (IE 702) INSC

2017

INSTRUMENTATION SYSTEM COMPONENTS

Paper : IE 702

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions out of* ***seven.***

1. *(a)* Explain the construction and working of synchro error detector. 12

   (b) Explain the construction and working of DC tachogenerator. 8

2. *(a)* Explain the following : 7×2=14

   (i) Angular positioning device

   (ii) Angular displacement transducer.

   (b) Explain multistage valve. 6

3. *(a)* Explain the construction and working of permanent magnet stepper motor. 12

(b) Explain the full-step and half-step operations of variable reluctance stepper motor. 8

4. *(a)* Design an electronic PID controller using the controller parameters; $G_P = 10$, $G_D = 15$, $G_I = 0{\cdot}2$. Assume all capacitance as $1\mu F$ and $f_{maxi:} = 2kHz$. 14

(b) Design an electronic P controller using the controller parameter; $G_P = 7$. 6

5. *(a)* Design an electronic PD controller using the controller parameters; $G_P = 5$ and $G_D = 8$. Assume all capacitance as $1\mu F$. 12

(b) Draw an electronic PI controller using two operational amplifiers. Explain the design procedure of the controller. 8

6. *(a)* Explain the construction and working of a flapper valve. Derive an expression for its pressure ratio. 14

(b) Explain the construction and working of a 4 way spool valve. 6

7. *(a)* Explain pneumatic system. 5

(b) With a neat diagram, explain the working of a pneumatic PD controller. Derive its transfer function. 15