53 (IE 702) INSC

2018

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 following : 10

   (i) Synchro angular displacement transducer

   (ii) Angular positioning device.

   (b) Derive the transfer function for field controlled DC servomotor. 10

2. Explain the construction and working of *(i)* DC tachogenerator *(ii)* Permanent magnet type stepper motor. 20

3. *(a)* Explain P controller. Draw pneumatic and electronic P controller. 6

(b) Explain the construction and working of an error detector using synchros. 14

4. Design the controllers having the output voltage

(i) $V_{out} = 4V_e + 0 \cdot 2 \int V_e \cdot dt + V_{out}(O)$

(ii) $V_{out} = 9V_e + 0 \cdot 8 \int V_e \cdot dt + 5\frac{dV_e}{dt} + V_{out}(O)$

Assume all capacitance as IMF and $f_{max} = 1kHz$. 20

5. *(a)* Explain the following : 8

(i) Check Valve *(ii)* 4-Way Spool Valve.

(b) Explain flapper valve and derive its expression for pressure ratio. 12

6. *(a)* Explain the following : 12

(i) Hydraulic System

(ii) Pneumatic System.

(b) Draw pneumatic PID and PI controllers. 8

7. *(a)* Explain pneumatic PD controller and derive its transfer function. 14

(b) Explain a multi-stage valve with an example. 6

6. (a) Explain the following: 12

(i) Hydraulic System

(ii) Pneumatic System.

(b) Draw pneumatic PID and PI controllers. 8

7. (a) Explain pneumatic PD controller and derive its transfer function. 14

(b) Explain a multi-stage valve with an example. 6
