Total number of printed pages–3

53 (IE 702) INSC

2021

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 *any two* types of directional valve. 10

   (b) Explain a two-stage valve using 4-way spool valves. 10

2. *(a)* Explain hydraulic system. 6

   (b) With a neat diagram, explain the working of a pneumatic P controller. Derive its transfer function. 14

Contd.

3. *(a)* Explain the construction and modes of operation of a 2-phase permanent magnet stepper motor. 14

(b) With a neat circuit diagram, explain the driver circuit of the stepper motor. 6

4. *(a)* Design the controller having the output voltage :

$$V_{out} = 10V_i + 0 \cdot 4 \int V_i \cdot dt + 2\frac{dV_i}{dt} + V_{out}(0)$$

Assume all capacitance as $1\mu F$ and f_{maxi} : $1kHz$. 14

(b) Explain synchro transmitter. 6

5. *(a)* Design the controller having the output voltage.

$$V_{out} = 6V_i + 12\frac{dV_i}{dt} + V_o$$

Assume all capacitance as $1\mu F$. 12

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

6. *(a)* Explain the construction and working of a DC tachogenerator. 12

(b) Explain an angular positioning device having a feedback in it. 8

7. Specify the components required to control the angular position of the load in a system. Explain in detail, the controlling process and the working of each component. 20