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 construction and working of a Permanent magnet type stepper motor. 15

   (b) A single stack 3 phase variable reluctance type stepper motor has a step angle of 25°. Find the number of its rotor and stator poles. 5

2. *(a)* Explain the modes of operation of variable reluctance stepper motor. 12

(b) Explain Synchro Receiver. 8

3. (a) Design a controller having the output voltage ;

$$V_{out}(t) = 7V_e(t) + 30\frac{d}{dt}V_e(t) + 1{\cdot}5\int V_e(t)\,dt + V_{out}(0).$$

Assume all capacitance as $1\mu F$ and $f_{max} = 10kHz$. 14

(b) Draw an electronic P Controller. 6

4. (a) Design a controller with minimum number of components and the controller parameters are $G_P = 8$ and $G_I = 0{\cdot}8$. Assume all capacitance as $1\mu F$. 12

(b) Design a controller using the controller parameters :

$G_P = 12$ and $G_D = 6$. Assume all capacitance as $1\mu F$ and $f_{max} = 1kHz$. 8

5. (a) With a neat diagram, explain the working of a two-stage 3-way spool valve. 10

(b) With a neat diagram, explain the following : 10

(i) 4-way spool valve

(ii) Check valve.

6. (a) With a neat diagram, explain the following : 10

(i) Hydraulic system

(ii) Pneumatic system.

(b) With a neat diagram, explain the working of a pneumatic P controller. 6

(c) Draw a pneumatic PD controller. 4

7. Write short notes on : 4×5=20

(a) Angular positioning device

(b) Angular displacement transducer

(c) DC Tachogenerator

(d) Negative feedback.
