# D15

## B. Tech. EXAMINATION, 2020

(Fourth Semester)

(B Scheme)

(Re-appear Only)

EE, EEE

EE210B

CONTROL SYSTEMS ENGINEERING

*Time :* 3 *Hours*]                                    [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

**Note** : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

### Unit I

1. (a) Explain Servomechanism with proper diagram.                  7

   (b) Explain rules for block diagram reduction with an example.    8

2. (a) Define the following :                                        5

   (i)   Transfer function

   (ii)  Linearity

   (iii) LTI system

   (iv)  Mathematical Model

   (v)   Physical Model.

   (b) Explain Masons gain formula with an example.                 10

## Unit II

**3.** A unit feedback system has an open loop transfer function :

$$G(s)\ H(s)\ =\ \frac{K}{s\ (s^2 + 4s + 13)}$$

Draw the root locus diagram as the value of K changes from 0 to infinity. Also find the value of K and the frequency at which the root loci crosses the imaginary axis. **15**

**4.** (a) Derive expression for time response of second order system to setp input. **10**

(b) Write down standard test signals with mathematical expressions. **5**

## Unit III

**5.** Sketch the Bode plot and hence determine the gain cross-over frequency and phase cross-over frequency for the transfer function of the system represented by : **15**

$$G(s)\ =\ \frac{100}{s\ (s + 1)\ (s + 2)}.$$

**6.** (a) Define Stability. What is relative stability explain with proper diagram. **7**

(b) Define Gain margin and Phase margin. **8**

## Unit IV

**7.** (a) Explain working principle of magnetic amplifier. **8**

(b) Explain Integral Controller in detail. **7**

**8.** Write short notes on the following :

(a) Stepper Motor **7**

(b) Synchros. **8**