Roll No. .....

# 3323

## B. Tech. 6th Semester (ECE) Examination – May, 2023

### CONTROL SYSTEMS

**Paper : PCC-ECE-302-G**

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

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

***Note :*** Attempt ***five*** questions in all, selecting ***one*** question from each Unit. Question No. **1** is ***compulsory***. All questions carry equal marks.

**1.** (a) Name two types of electrical analogous for mechanical system. 2.5 × 6

(b) Define the transfer function.

(c) State the uses of lag compensators.

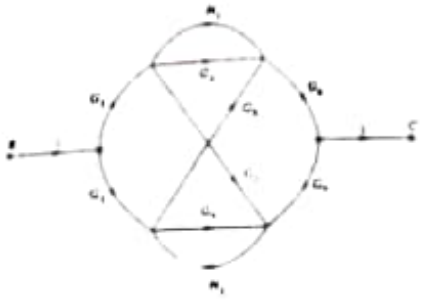
(d) Mention the standard test input signals.

(e) State and explain the Mason's gain formula.

(f) What is servomotor ?

## UNIT – I

2. (a) Develop the transfer function from the given signal flow graph applying Masons gain formula. 7.5

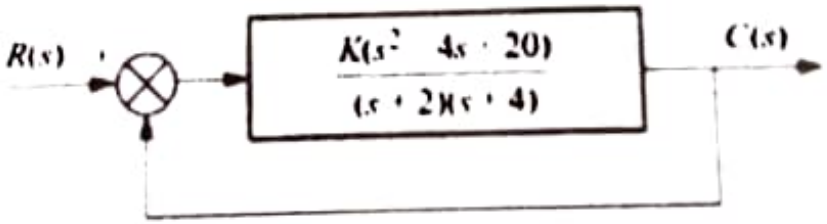


(b) Differentiate between DC servomotor and AC servomotor. 7.5

3. Summarize the block diagram reduction rules with example. 15

## UNIT – II

4. Sketch the root locus of the system. 15




5. (a) Determine the stability of the following system using Routh's criterion. 7.5

$$s^5 + 2s^4 + 24s^3 + 48s^2 - 50 = 0$$

(b) State the guidelines for sketching root locus. 7.5

## UNIT – III

**6.** Draw the Bode Diagram for the transfer function. 15

$$H(s) = -100\frac{s}{s^3 + 12s^2 + 21s + 10}$$

**7.** (a) Derive the transfer function of a lag compensator network. 7.5

(b) Summarize the correlation between time and frequency response. 7.5

## UNIT – IV

**8.** (a) Obtain the solution of non-homogeneous state equation. 7.5

(b) State and explain the properties of State transition matrix. 7.5

**9.** Find X(t), given : 15

$$x'(t) = \begin{bmatrix} 0 & 1 \\ -3 & -4 \end{bmatrix} x(t) \text{ for } x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

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