

7. (a) Derive the transfer function of AC tachogenerator. **10**
- (b) Explain the constructional features of a stepper motor and its applications in the control system. **10**
8. A unity feedback system has open-loop transfer function :

$$G_p(s) = \frac{K}{s(1 + 0.5s)(1 + 0.1s)}$$

Compensate the system to meet the following specifications  $K_v \geq 25 \text{ s}^{-1}$ ,  $\phi_m \geq 60^\circ$  and bandwidth = 10 rad/s. **20**

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**4**

**100**

**No. of Printed Pages : 4**

**Roll No. ....**

**611**

**B. Tech. EXAMINATION, May 2019**

(Sixth Semester)

(Old Scheme) (Re-appear Only)

EE, EEE, ECE Common with BME VII

EE304

**CONTROL SYSTEMS ENGINEERING**

*Time : 3 Hours]*

*[Maximum Marks : 100*

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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.

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**Note :** Attempt any *Five* questions. Each question carries equal marks.

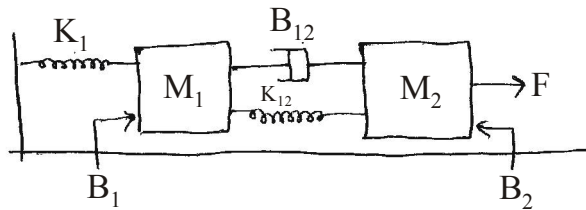
1. (a) With a neat diagram explain the working of an ac position control system. **10**

(4-09/18) **M-611**

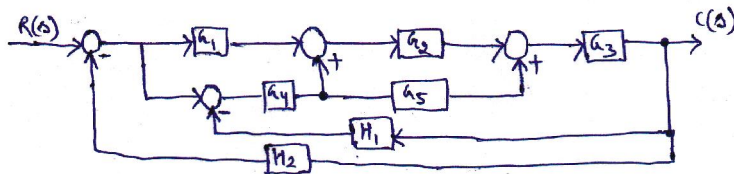
**P.T.O.**

- (b) Discuss the effect of feedback on sensitivity, stability and external disturbance (noise). **10**

2. (a) Write differential equations of mechanical system shown in Fig. (1) in time domain and obtain the analogous electrical circuit based on force voltage analogy. **10**



- (b) Find C/R of the system shown in Fig. (2) using block reduction technique. **10**



3. (a) Find the response of a first order system to the unit step input. Describe time response specifications of second order system. **8**

- (b) Explain Routh's Hurwitz stability criterion. Also determine the stability of the system having the following characteristic equation  $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$ . **12**

4. Sketch root locus for open loop transfer function : **20**

$$G(s)H(s) = \frac{k(s+3)}{s(s+2)}$$

5. Investigate the stability of a control system with OLTF  $G(s)H(s) = \frac{k(s+1)}{s(s-1)(s+10)}$  using Nyquist stability criterion. Also, if  $k = 15$ , find the gain margin. **20**

6. The control system has :

$$G(s)H(s) = \frac{2(s+5)}{s(s+1)(s+10)}$$

- Sketch bode Plots. Determine (i) Gain margin (ii) Phase margin. **20**