

Code No: RT22026

**R13**
**SET - 1**

**II B. Tech II Semester Supplementary Examinations, November-2017**  
**CONTROL SYSTEMS**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**

**PART-A**

1. a) Discuss about a closed loop system with an example. (3M)
- b) What do you mean by characteristic equation? Why that name is given to it. (3M)
- c) How damping ratio affects the time response of a second order system. (3M)
- d) What is impulse response of a system? How it is different from unit step response (2M)
- e) What is the effect of adding a pole to the forward path transfer function? (3M)
- f) State the Nyquist stability criterion. (2M)
- g) Write the properties of lag compensator (3M)
- h) How can you determine the order of a system from its state model? (3M)

**PART-B**

2. Derive an expression for the transfer function of an AC Servo motor. (16M)
3. a) Explain the effect of adding poles and zeros to transfer function (6M)
- b) A unity feedback system has  $G(s) = \frac{40(s+2)}{s(s+1)(s+4)}$ . Determine (10M)
  - i) Type of the system
  - ii) All error coefficients and
  - iii) Error for ramp input with magnitude 4
4. Sketch the complete root locus for the system having (16M)
 
$$G(s)H(s) = \frac{K(s+11)}{s^2 + 4s + 20}$$
5. a) Explain about gain crossover frequency and phase cross over frequency (8M)
- b) Sketch the direct polar plot for a unity feedback system with open loop transfer function  $G(s) = \frac{1}{s(s+3)(s+3)}$  (8M)
6. a) Explain the procedure for the design of Lag – lead compensator. (8M)
- b) List the effects and limitations of Phase – lag control. (8M)
7. a) List the properties of State transition matrix (6M)
- b) Explain the controllability and observability with an example. (10M)