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**

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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 $G(s) = \dfrac{40(s+2)}{s(s+1)(s+4)}$. 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 $G(s) = \dfrac{1}{s(s+3)(s+3)}$ (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)