

Code: 9A19401

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B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2015/2016

## CONTROL SYSTEMS

(Electronics & Computer Engineering)

Time: 3 hours

Max. Marks: 70

## Answer any FIVE questions All questions carry equal marks

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- 1 (a) Explain the term frequency response analysis.
  - (b) Show that in bode magnitude plot the slope corresponding to a quadratic factor is -40 dB/dec.
  - (c) Explain the following with the help of an example:(i) Minimum phase function. (ii) Non minimum phase function. (iii) All phase function.
- 2 (a) What is compensation? What are the different types of compensators?
  - (b) What is a lag compensator? Obtain the transfer function of lag compensator and draw pole-zero plot.
  - (c) Explain the different steps to be followed for the design of compensator using Bode plot.
- 3 (a) A unity feedback controlled system is characterized by open loop transfer function  $G(s) = \frac{K(S+13)}{S(S+3)(S+7)}$ using Routh criterion, calculate the value of K for the system to be stable.
  - (b) Write the root locus of the system whose open loop transfer function is  $G(s)H(s) = \frac{K}{S(S+5)}$ .
- 4 (a) Derive the time response specifications for unit step response of a second order system for under damped case.
  - (b) With the help of a neat sketch, explain about PI type controller.
- 5 (a) Obtain the state transition matrix for the system



- (b) Define controllability and observability.
- 6 (a) Differentiate between polar plot and Nyquist plot.
  - (b) Explain the Nyquist stability criterion. Write its advantages.
- 7 (a) Find the transfer function  $\theta(s)/T(s)$  for the following system.



- (b) Explain feedback characteristics of closed loop system.
- 8 Draw and explain block diagram reduction rules for calculating transfer function of a system.