

Code No: R22026

R10

SET - 1

II B. Tech II Semester Supplementary Examinations, November - 2017

CONTROL SYSTEMS

(Com. to EEE, ECE, EIE, ECC, AE)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

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1. a) Define Control system, explain about the different types of control systems with suitable examples (8M)  
b) Describe the effect of feedback on system stability and sensitively (7M)
2. a) Illustrate the procedure for converting Block diagram into Signal flow graph (8M)  
b) Describe the AC servo motor and list out its merits and demerits. (7M)
3. a) Define time response, Explain the different types of standard test signals with examples (8M)  
b) A unity feedback system is characterized by a openloop transfer function  $G(s)=K/S(S+10)$ ; Determine the gain K, so that the system will have a damping ratio of 0.5; for this value of K, determine settling time ,maximum peak overshoot, peak time for a unit step input (7M)
4. a) Define stability, explain about the BIBO stability (8M)  
b) Construct Routh array and determine the stability of system, whose characteristic equation  $S^6+2S^5+8S^4+12S^3+20S^2+16S+16 = 0$ ; Also determine the number of roots lying on right half of S-plane, left half of S-plane and on imaginary axis (7M)
5. a) Define the frequency domain specifications (8M)  
b) Draw the bode plot for the transfer function,  $h(S)=\frac{20(S+2)}{S(S^2+10S+100)}$  Determine the gain margin and phase margin. (7M)
6. a) Sketch the polar plot of the transfer, (8M)  
 $G(S)=\frac{10}{S(S+1)}$   
b) State and describe the Nyquist stability criterion (7M)
7. a) Explain the need for compensators in control systems (8M)  
b) Enumerate the design steps involved in phase lead compensation (7M)
8. a) By partial fraction expansion method ,obtain the state variable representation of the system described by the differential equation  $dy^3/dt^3+ 6dy^2/dt^2+11 dy/dt+6y=6u$  (8M)  
b) Explain the concepts of controllability and observability (7M)