Reg. No. :

Question Paper Code : 42448

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Fourth Semester
Electronics and Communication Engineering
EC 2255 – CONTROL SYSTEMS
(Regulations 2008)
(Common to PTEC 2255 – Control Systems for B.E. (Part-Time) Fourth Semester – ECE – Regulations 2009)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

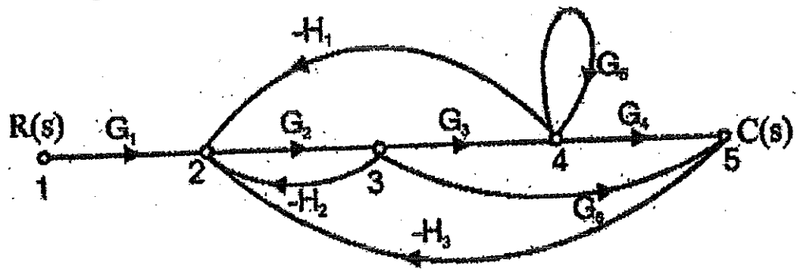
PART – A

(10×2=20 Marks)

1. Define Control System.
2. List out the advantages of closed loop control systems.
3. Name the time domain specifications.
4. Write the transfer function of PID controller.
5. Define Resonant Peak.
6. What is Polar plot ?
7. How to find the centroid in root locus ?
8. What is auxiliary polynomial ?
9. Draw the block diagram representation of the state model.
10. Define Quantization.

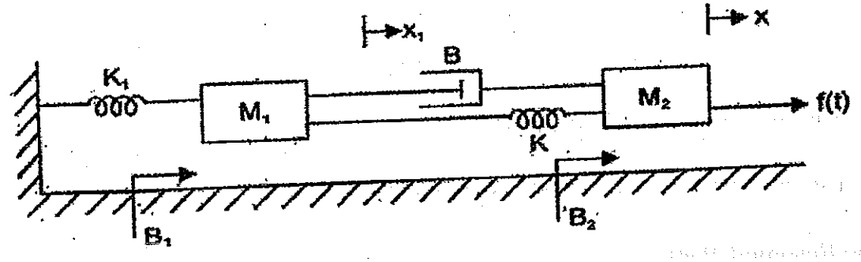
PART – B (5×16=80 Marks)

11. a) Determine the overall gain of the given system whose signal flow graph shown in the figure below



(OR)

b) Obtain the Transfer function X(s)/F(s) for the given Mechanical Translational System.



12. a) Determine the response of critically damped second order system for unit step input.

(OR)

b) The open loop transfer function of a servo system with unity feedback is $G(s) = \frac{10}{s(0.1s+1)}$. Evaluate the static error constants of the system. Obtain the steady state error of the system, when subjected to an input given by the polynomial, $r(t) = a_0 + a_1 t + \frac{a_2}{2} t^2$.

13. a) Consider a unity feedback system having an open loop transfer function $G(s) = \frac{K(1+10s)}{s^2(1+s)(1+2s)}$. Sketch the Nichols plot and determine the value of K so that (i) Gain Margin is 10db, (ii) Phase Margin is 10°.

(OR)

b) Sketch the bode plot for the following transfer function and determine phase margin and gain margin. $G(s) = \frac{75(1+0.2s)}{s(s^2+16s+100)}$.

14. a) Describe the procedure for constructing Root Locus.

(OR)

b) Determine the location of roots on s-plane and hence comment on the stability of a control system whose characteristic equation is given by,

$s^7 + 5s^6 + 9s^5 + 9s^4 + 4s^3 + 20s^2 + 36s + 36 = 0$.

15. a) Describe about the sampled data control systems and the sampling process in detail.

(OR)

b) Convert the following system matrix to canonical form and hence calculate the state transition matrix e^{At} for the same. $A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}$.