No. of Printed Pages : 3

BAS-020

B.Tech. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

00240

June, 2015

BAS-020 : BASIC CONTROL THEORY

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt* ***five*** *questions in all. Use of scientific calculator is permitted. All questions carry equal marks.*

1. (a) What do you mean by feedback control system ? Distinguish between open loop system and closed loop system. *6*

(b) Define the following : *8*

(i) Rise time

(ii) Peak overshoot

(iii) Steady state error

(iv) Delay time

2. Establish correlation between frequency domain response and time domain response. *14*

3. Sketch the root locus plot for the system when open loop transfer function is given by $G(s)\,H(s) = \dfrac{k}{s\,(s+4)\,(s^2+4s+13)}$. *14*

4. Sketch the Nyquist plot for the system having $G(s)\,H(s) = \dfrac{1+4s}{s^2(1+s)\,(1+2s)}$. *14*

5. (a) Explain the meaning and significance of phase margin and gain margin of a control system. How will you obtain the values of these margins from Bode plots ? *8*

   (b) What is meant by relative stability ? Can you find out relative stability by Routh stability criterion ? *6*

6. (a) Comment upon the application area of Lag Compensator. Give a simple RC circuit to implement it. Derive its transfer function. *8*

   (b) Determine the value of k such that the roots of the characteristic equation given below lie on the left of line $s = -1$.

   $$s^3 + 10\,s^2 + 18\,s + k = 0$$ *6*

7. Draw the Bode plot for the transfer function given below : *14*

$$G(s)\,H(s) = \frac{48\,(s+10)}{s\,(s+20)\,(s^2+2{\cdot}4s+16)}$$

8. (a) Explain the function and working of an a.c. servo motor. *7*

   (b) Discuss the effect of feedback on stability, noise and overall gain of the system. *7*

9. Write short notes on any ***two*** of the following : *7+7=14*

   (a) Transducer and Transport Delay

   (b) Proportional Integral Controller

   (c) Computers Electronic Design Aspects