BAS-020

B.Tech. (AEROSPACE ENGINEERING) (BTAE)

00362

Term-End Examination
December, 2017

BAS-020 : BASIC CONTROL THEORY

Time : 3 hours   *Maximum Marks : 70*

Note :   (i)   *Attempt any seven questions.*

(ii)   *All questions carry equal marks.*

(iii)   *Use of scientific calculator is permitted.*

1.   (a)   Explain the requirements of an automatic   3
            control system.

      (b)   Explain the various elements of an   4
            automatic feedback control system.

      (c)   Distinguish between classical and modern   3
            control theory.

2.   (a)   Explain dynamics of a stable and unstable   6
            system with the help of examples.

      (b)   Explain the importance of Laplace   4
            Transforms in control theory.

3.   (a)   Explain the standard test signals with the   3
            help of diagrams.

      (b)   Explain the factors affecting the   7
            performance of control system.

4. Explain the following transient response specifications with the help of a plot. **5x2=10**
   (a) Delay time
   (b) Rise time
   (c) Peak time
   (d) Settling time
   (e) Steady state error

5. How control action is decided in case of a feedback control system ? Explain PI and PID controller with the help of examples. **2+8=10**

6. Write notes on the following : **5+5=10**
   (a) BODE plot
   (b) Modelling of DC motor

7. Determine the stability of the following cases. Which represent characteristic equations of two different control systems : **5+5=10**
   (a) $3s^4 + 10s^3 + 5s^2 + 5s + 2 = 0$
   (b) $\lambda^3 + 6\lambda^2 + 12\lambda + 8 = 0$

8. (a) Explain the rules for graphical construction of the root locus plot. **5**
   (b) Sketch the root locus plot for the following transfer function. **5**

   $$G(s)\,H(s) = \frac{k\,(s+3)}{s\,(s+10)\,\left(s^2 + 8s + 20\right)}$$

9. Explain the following : **5x2=10**
   (a) Gain and phase margin
   (b) Compensator
   (c) Stability margin
   (d) Transport delay
   (e) Actuator