

**B.Tech. (AEROSPACE ENGINEERING)
(BTAE)**

Term-End Examination

00313

June, 2018

BAS-020 : BASIC CONTROL THEORY

Time : 3 hours

Maximum Marks : 70

Note : Attempt any seven questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. (a) Distinguish between the following : 4+4=8
- (i) Open loop and Closed loop control system
 - (ii) Static and Dynamic stability derivatives
- (b) Explain Modern Control theory. 2
2. Determine the stability of the following characteristic equations representing two different control systems : 5+5=10
- (a) $2\lambda^3 + 4\lambda^2 + 4\lambda + 12 = 0$
 - (b) $3\lambda^4 + 10\lambda^3 + 5\lambda^2 + 5\lambda + 2 = 0$

3. Explain the role of the following with respect to signal conversion and processing during system design : 5×2=10

(a) Servo components

(b) Synchros

(c) Transducers

(d) Sensors

(e) Actuators

4. (a) Explain the importance of Fourier transforms in control theory. 4

(b) Explain the usage of proportional controller and proportional integral controller with the help of example. 6

5. Explain the following with respect to Bode Plot : 4+3+3=10

(a) Stability margins

(b) Time delay effects

(c) Phase plot

6. Define and calculate rise time, peak time, peak overshoot and settling time (2%) for a unity feedback control system whose open loop transfer function is given by 4+6=10

$$G(s) = \frac{25}{s(s + 6)}$$

7. Write notes on the following : 5+5=10
- (a) Root Locus method
 - (b) Electronic Design aspects
8. (a) Discuss the effect of zeros and poles on root locus plot. 5
- (b) Explain the factors affecting performance of control system. 5
9. Write notes on following : 5+5=10
- (a) Nyquist stability criterion
 - (b) Modeling of passive electrical components and systems
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