

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2160104

Date:18/05/2019

Subject Name:Basic Control Theory

Time:10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q-1 (a)** Cruise missile control is the example of closed loop system or open loop system. Justify the statement. 03
- (b)** Explain the difference between open loop and closed loop system. 04
- (c)** Explain the rules for block diagram reduction technique. 07

- Q-2 (a)** Explain standard test input signals. 03
- (b)** Explain the difference between manmade and natural control system. 04
- (c)** Explain Mason's gain formulae in detail. 07

OR

- Q-2 (c)** Explain steady state error for type-0,1, and 2 system for step, ramp and parabolic. 07
- Q-3 (a)** Define transfer function and derive transfer function for RC series ckt. 03
- (b)** Explain the steps for plotting the Nyquist plot. 04
- (c)** Draw the root locus of the system given as $G(s)=K/s(s+5)$. Also determine the range of K. 07

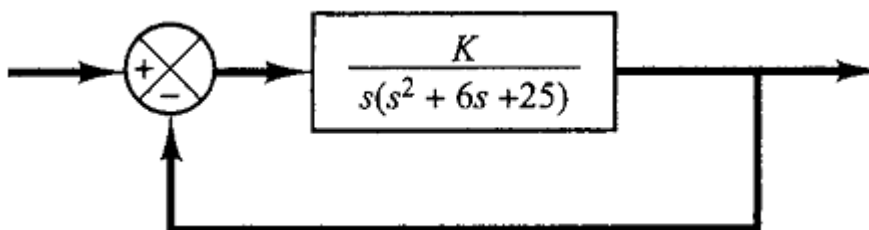
OR

- Q-3 (a)** Explain difference between signal flow graph and block diagram reduction method. 03
- (b)** Explain different terms of time domain analysis with example. 04
- (c)** The characteristic equation of the feedback system is 07

$$F(s)=s^4+6s^3+2s^2+5s+10$$

Using Routh's Hurwitz criteria determine the stability of the system.

- Q-4 (a)** Explain proportional controller in detail. 03
- (b)** Explain the steps to plot the bode plot. 04
- (c)** Sketch the root locus of the following system 07



OR

- Q-4 (a)** Explain State space analysis. **03**
- (b)** Explain relative stability of closed loop system. **04**
- (c)** A unity feedback system has **07**
- $G(s) = \frac{K}{s(s+2)(s+3)}$
- Using Routh's Hurwitz criteria find the range of K for closed loop system to be stable.
- Q-5 (a)** Explain Integral controller. **03**
- (b)** Explain PI controller in detail. **04**
- (c)** Explain the difference between modern control theory and conventional control theory. **07**

OR

- Q-5 (a)** Explain derivative controller **03**
- (b)** Explain the following terms: proportional band, rate gain and direct action. **04**
- (c)** Explain PID controller in detail. **07**

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