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BIEL-020

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00655

Term-End Examination

June, 2019

BIEL-020 : CONTROL ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permissible. Use of graph paper and semi-log sheet is allowed.*

1. (a) What is the use of feedback in control systems to parameter variations ? *5*

(b) Consider the following transfer function :

$$G(s) = \frac{(s+2)(s+1)}{s(s+5)(s+3)(s+7)}.$$

Draw pole-zero plot, s plane is considered upto infinity. *5*

2. For the block diagram shown in Figure 1, determine the overall transfer function. *10*

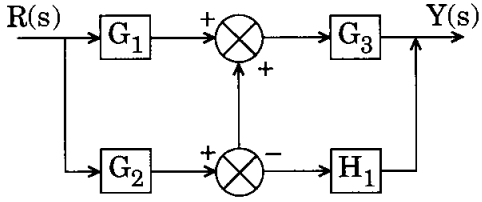

Figure 1

3. Draw the signal flow graph and determine C/R for the block diagram shown below. *10*

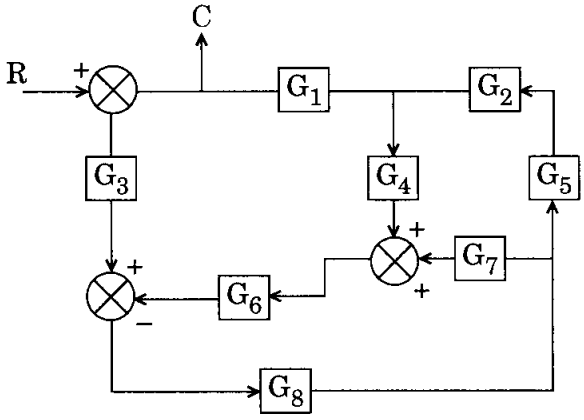

Figure 2

4. Define position, velocity and acceleration error constant. Explain how these error constants are useful in finding steady state error with an example. *10*

5. Open loop transfer function of a certain unity feedback system is

$$G(s) = \frac{k(s+1)}{s(s-1)(s+6)}.$$

Determine : *10*

(a) The range of value of k for which the system is stable.

(b) The value of k that will result in the system being marginally stable.

6. Plot the root locus pattern of a system whose forward path transfer function is

$$G(s) = \frac{k}{s(s+2)(s+3)}.$$ *10*

7. Explain how to determine gain margin and phase margin of a closed loop control system for its root loci. Illustrate with the help of an example. *10*

8. (a) What is closed loop transfer function of a system with positive feedback ? Explain the effect of positive feedback on stability. *5*

(b) Discuss the advantages and limitations of frequency response method of analysis for control systems. *5*

9. (a) Explain frequency response analysis in control systems. *5*

(b) Explain polar and inverse polar plot. What is the role of these plots in control systems ? *5*

10. Apply Nyquist stability criterion to the system with loop transfer function

$$G(s)\,H(s) = \frac{(4s + 1)}{s^2(s + 1)\,(2s + 1)}$$

and ascertain its stability. *10*