

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B.Tech. Summer 2018 - 19 Examination**

**Semester: 4**  
**Subject Code: 03106251**  
**Subject Name: Control System Engineering**

**Date: 29/04/2014**  
**Time: 02:00pm To 04:30pm**  
**Total Marks: 60**

**Instructions:**

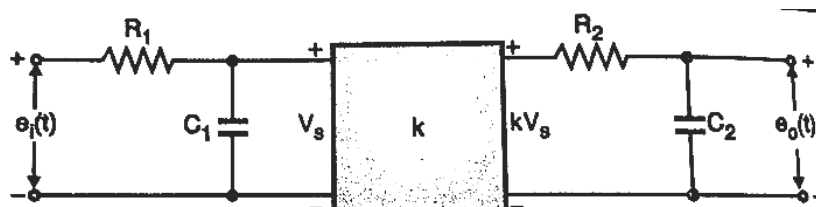
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1 Objective Type Questions****(15)**

1. Which unit is adopted for magnitude measurement in Bode plots?  
 A. Degree                      B. Decimal                      C. Decibel                      D. Deviation
2. If damping factor is 0, then the system is \_\_\_\_\_  
 A. Under Damper              B. Over Damped              C. Critically Damped              D. Un Damped
3. If a system is subjected to step input, which type of static error coefficient performs the function of controlling steady state error.  
 A. Position                      B. Velocity                      C Acceleration                      D. Retardation
4. Which among the following represents an illustration of closed loop system?  
 A. Automatic washing machine                      B. Automatic electric iron  
 C. Bread toaster                      D. Electric hand drier
5. For Nyquist contour, the size of radius is \_\_\_\_\_  
 A. 25                      B. 0                      C. 1                      D.  $\infty$
6. A 3<sup>rd</sup> Order System to be stable, if \_\_\_\_\_ number of poles are on LHS of S-plane.
7. A root locus start at \_\_\_\_\_ (Open Loop poles/Close loop Poles)
8. For a 2<sup>nd</sup> order under damped system, the time taken for the response to raise from 0 to 50 % for very first time is called \_\_\_\_\_
9. Phase Margin measure at \_\_\_\_\_ dB value of Magnitude graph in bode plot.
10. In F-V analogy, velocity is analogous to \_\_\_\_\_
11. When Close Loop Pole move Left of S-Plane, the transient Response time \_\_\_\_\_.  
 ( Reduce/ Increase)
12. R-H stability criteria give \_\_\_\_\_ stability. (Absolute/Relative)
13. When the number of poles is equal to the number of zeroes, how many branches of root locus tends towards infinity? \_\_\_\_\_
14. For Stable system GM and PM both are \_\_\_\_\_ in Bode Plot. (Positive/Negative)
15. Self-loop having \_\_\_\_\_ no of Node.

**Q.2 Answer the following questions. (Attempt any three)****(15)**

- A) Differentiate between Open loop and Closed loop system with suitable examples.
- B) Determine the Transfer Function  $V_o(S)/V_i(S)$  of Electrical System Shown in Fig,



- C) Find Range of K with the help of RH Criterion.

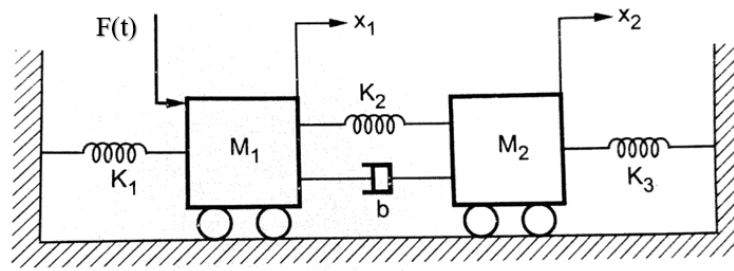
$$s^3 + 3s^2 + 21s + ks + 13k = 0$$

- D) Define Following terms.

1. Source Node    2. Chain Node    3. Forward Path    4. Dummy Node    5. Self-Loop.

**Q.3** A) Find F-I Analogy for Following Mechanical Network.

(07)



B) Write-down 4 different case of **ZETA** ( $\zeta$ ) for unit step response  $c(t)$  for 2<sup>nd</sup> order unity feedback system.

(08)

**OR**

B) Draw root locus for the system having

(08)

$$G(s) = \frac{k}{s(s+1)(s+3)(s+4)}, H(s) = 1$$

**Q.4** A) Draw Nyquist plot and comment on the stability of the system.

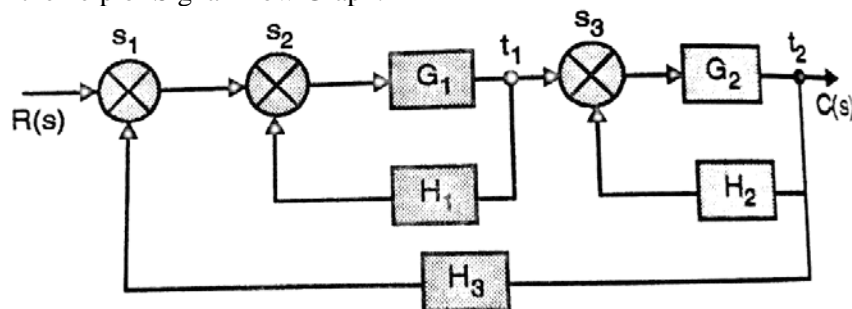
(07)

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

**OR**

A) Find TF with the help of Signal Flow Graph.

(07)



B) Draw Bode plot and determine GM, PH,  $\omega_{gc}$  &  $\omega_{pc}$ .

(08)

$$G(s) = \frac{100}{s(s+0.5)(s+10)}, H(s) = 1$$