



# GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

(An Autonomous Institute of Government of Maharashtra)

National Highway No.6, JALGAON – 425 002

Phone No.: 0257-2281522

Website : www.gcoej.ac.in

Fax No.: 0257-2281319

E-mail : princoe@rediffmail.com



Name of Examination : **Winter 2020** - (Preview)

Course Code & Course Name : **ET302 - Control System Engineering**

Generated At : **19-04-2022 10:37:39**

Maximum Marks : **60**

Duration : **3 Hrs**

**Edit** **Print** **View Answer Key** **Close** **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

## 1) Solve any two question

- a) Find out transfer function of system whose signal flow graph is given in figure 1. [6]

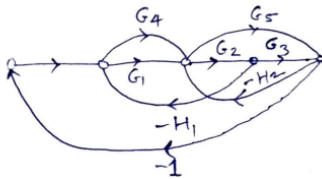


Figure 1

- b) For a system having  $C(s)/R(s) = 20/s^2 + 7s + 25$ . Find its time response specification and expression for output. [6]  
 c) i. What is an actuator? Write short note on pneumatic actuator. [4]  
 ii. What is sensor? Classify sensors with example. [2]

## 2) Solve any two question.

- a) i. Explain the nature of Bode plot for a poles at origin, simple poles and simple zeros. [3]  
 ii. Write merits of state variable method over classical method (transfer function based). [3]  
 b) Find out state equation and output equation of electric network shown in Figure 2 [6]

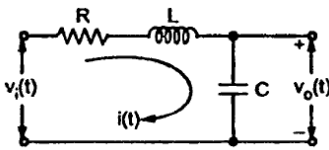


Figure 2

- c) The characteristics equation of a feedback control is given by  $s^4 + 20Ks^3 + 5s^2 + 10s + 15 = 0$ , Find the range of 'K' for which system is stable. [6]

## 3) Solve any two question.

- a) open loop transfer function of unity feedback control system is given by  $G(s) = K(s+1)/s^2$ . Sketch the root locus plot for the system. [6]  
 b) Find the steady state error for the various types of standard test input for a unity feedback system with  $G(s) = K/S(S+5)(S+10)$  for.  
 i.  $K=20$  [3]  
 ii.  $K=100$  [3]  
 c) Write short note on .  
 i. PI controller. [3]  
 ii. Adaptive control system. [3]

## 4) Solve Each question.

- a) Write short note on 'Irrigation canal management system'. [6]  
 b) For the plot shown in figure find out transfer function. [6]

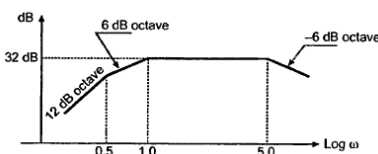


Figure 3

## 5) Solve Each question.

- a) Explain raw mill automation system in detail. [6]  
 b) Construct the complete Nyquist plot for a unity feedback control system whose open-loop transfer function is  $G(s)H(s) = K/s(s^2 + 2s + 2)$ . [6]