Government College of Engineering, Amravati
Department of Electronics and Telecommunication
CLASS TEST-II (Summer 2016) B. Tech. Second Year
Course: Control System Engineering **Code:** ETU404 **Time:** 1 hrs. **Marks:** 15 **Dt.** 10/03/2016

Note: 1. Assume the data whenever necessary.

1. Explain in brief components of control system. **3M**

2. For a unity feedback system $G(S) = 20\,(S+2)/\,[S^2\,(S+1)\,(S+5)]$. **4M**
Determine (i) the type of system
(ii) error coefficients and
(iii) steady state error for input $1+3t+t^2/2$

3. For a unity feedback system, system is marginally stable and oscillates with frequency 4 rad/sec. Find K_{mar} and 'q'. $G(s) = 4/\,[(s^2+qs+2K)\,s]$ **4M**

4. Determine time response specifications for a unit step input to a unit feedback system having $G(s) = 144/\,[s\,(s+12)]$. **4M**

Department of Electronics Engineering

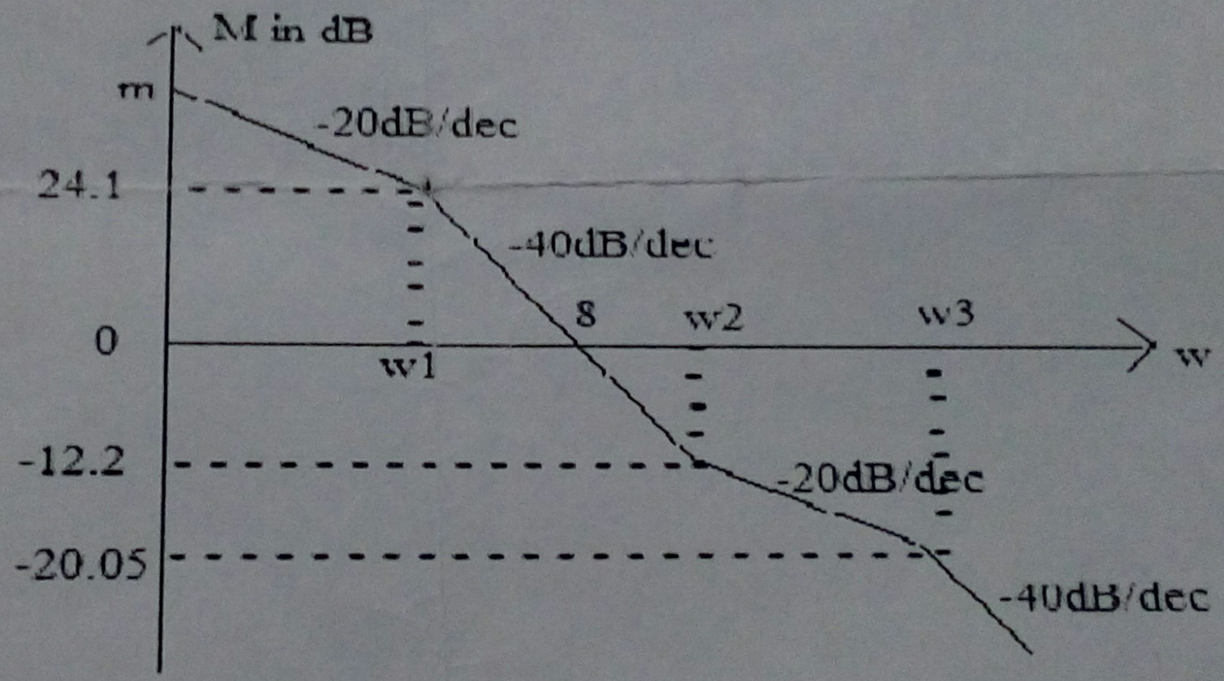
Course Code:ETU 404 **CT-II** **Max. Marks:15**

Course Name:Control System Engg. **Time: 1hr**

Q1.Find the P.M and G.M for $G(s)H(s)=\frac{e^{-s}}{s(s+1)}$. 5M

OR

Q2.Find w1, w2, w3, m and T.F to the given magnitude plot of minimum phase system



5M

Q3.Sketch the Bode Plot of system having the OLTF $G(s)H(s)=\frac{10}{s(s+1)(s+10)}$ 5M

Q4.Sketch the Root locus diagram of a system having $G(s)H(s)=\frac{K(S+1)}{s(s-1)(S^2+4S+16)}$ 5M

Government College of Engineering, Amravati
Department of Electronics and Telecommunication
CLASS TEST-II (Summer 2016) B. Tech. Second Year
Course: Control System Engineering **Code**: ETU404 **Time**: 1 hrs. **Marks**: 15 **Dt. 10/03/2016**

Note: 1. Assume the data whenever necessary.

1. Explain in brief components of control system. 3M

2. For a unity feedback system $G(S) = 20\,(S+2)/\,[S^2\,(S+1)\,(S+5)]$. 4M
   Determine (i) the type of system
   (ii) error coefficients and
   (iii) steady state error for input $1+ 3t+ t^2/2$

3. For a unity feedback system, system is marginally stable and oscillates with frequency 4 rad/sec. 4M
   Find K_{mar} and 'q'. $G(s) = 4/\,[(s^2+qs+2K)\,s]$

4. Determine time response specifications for a unit step input to a unit feedback system having 4M
   $G(s) = 144/\,[s\,(s+12)]$.

ELECTRONICS AND TELECOMMUNICATION ENGINEERING DEPARTMENT

Course Code: ETU 404 CT II Time: 1hr

Course Name: Control System Engineering Marks: 15

All questions are compulsory; each carries equal marks

Q.1 **i.** $G(s)H(s)=\frac{K(1+0.5s)}{s(1+s)(1+2s)}$ is a loop transfer function of a feedback control system, find the type of close loop system. 05

ii. A system with the transfer function $G(s)=\frac{s+6}{s+6+Ks^2}$, what is the value of K for damping ratio will be 0.5?

iii. The natural frequency of an undamped second order system is 40 rad/s. If the system is damped with damping ratio 0.3, what is the damped natural frequency?

iv. What is the characteristic equation of the close loop system if open loop transfer function of an unity feedback open-loop system is $\frac{2s^2+6s+5}{(s+1)^2(s+2)}$

v. A characteristic equation given by $s^4+3s^3+5s^2+6s+K+10=0$, the condition for stability is

Contd.....

Q.2 i. What is steady state error for a unity feedback control system has the open loop transfer function $G(s)=\frac{4(1+2s)}{s^2(s+2)}$ if the input to the system is a unit ramp? 10

ii. The output of a standard second order system for a unit step input is given as $y(t)= 1-\frac{2}{\sqrt{3}} e^{-t}\cos(\sqrt{3}\,t)-\frac{\pi}{6})$ find the transfer function of the system.

iii. An electromechanical close-loop control system has the characteristic equation $s^3+6Ks^2+(K+2)s+8=0$, where K is the forward gain of the system. What is the value of K for closed loop stability

iv. Find the state of system for the characteristic polynomial of a system $q(s) = 2s^5 + s^4 +4s^3 +2s^2 +2s +1$

v. A system having an open loop transfer function $G(s)=\frac{K(s+3)}{s(s^2+2s+2)}$ is used in a control system with unity negative feedback . Using R-H criterion, find the range of values of K for which feedback system is stable.