



Course Title: Control Systems – sec. 1	Date: 1/5/2019
Course No: (610414+640344)	Time Allowed: 50 minutes
Lecturer: Dr. Mohammed Mahdi	No. of Pages: 1

Question 1: (40 Marks)

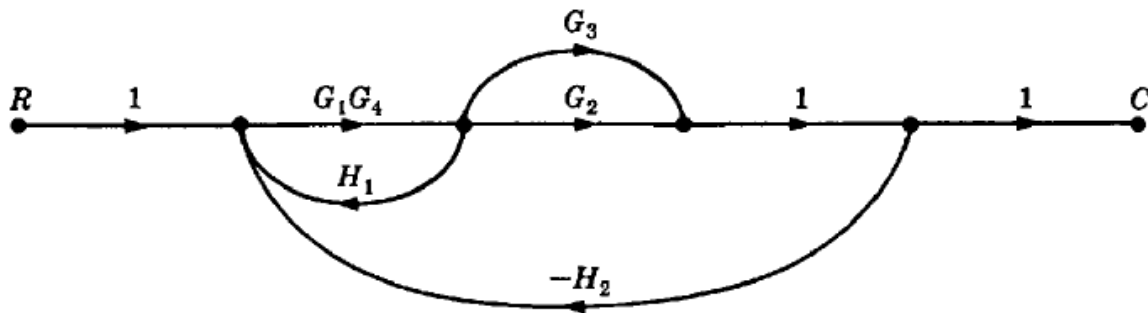
Objectives: This question is about finding time response.

Given the general transfer function of first order control system $\frac{Y(s)}{R(s)} = \frac{k}{\tau s + 1}$. If **R(s)** is unit step input, it is required to find **y(t)**, then calculate **y(0)**, **y(τ)** and **y(∞)**.

Question 2: (60 Marks)

Objectives: This question is about Mason's Gain formula and absolute stability.

A) Given the following signal flow graph: -



It is required to find its closed loop transfer function using Mason's Gain formula. (30 Marks)

B) Given the closed loop transfer function $\frac{Y(s)}{R(s)} = \frac{K}{s(s^2 + s + 1)(s + 2) + K}$, it is required to find the range of gain K for stability using Routh-Herwitz criterion. (30 Marks)