B. Tech - Sem - IV, (2014 Course), E&TC
winter - 2018

**B.Tech. SEM -IV E & TC 2014 Course (CBCS) : WINTER - 2018**

**SUBJECT: CONTROL SYSTEM ENGINEERING**

Day : Thursday
Date : 15/11/2018

**W-2018-2372**

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

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**N. B. :**

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data, if necessary.

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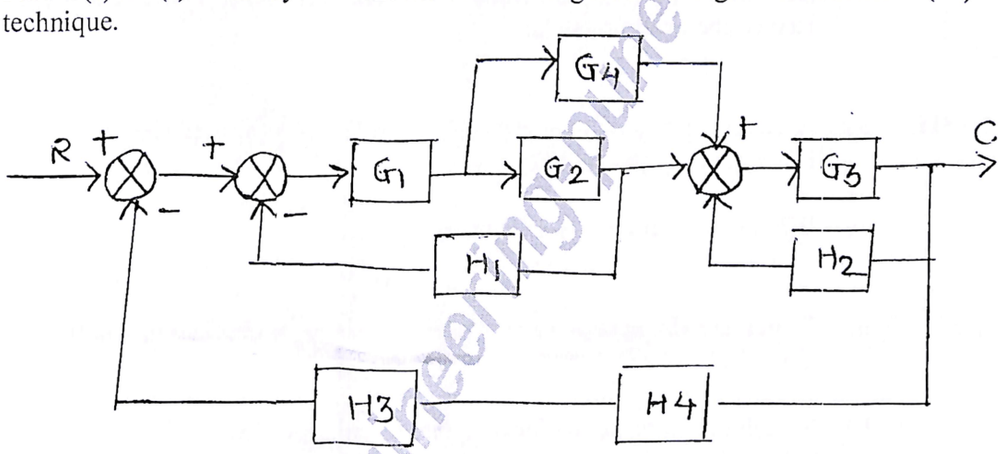
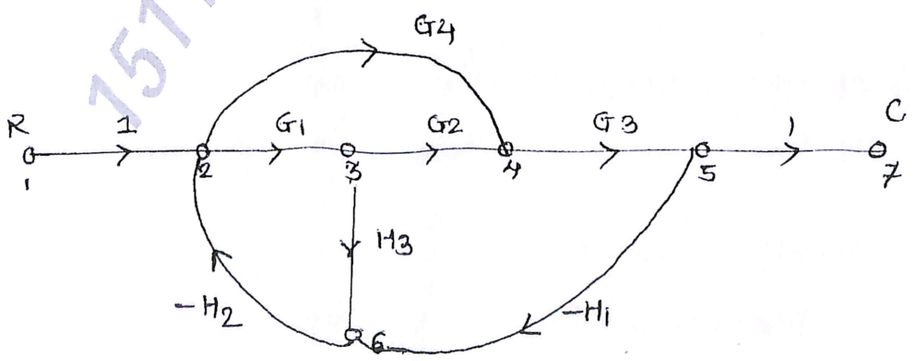
**Q. 1** **a)** Find C(s) / R(s) of the system shown below using Block Diagram Reduction technique. **(06)**




**b)** What is the difference between Feedback control system and Feed-forward control system? **(04)**

**OR**

**a)** What is the Mason's gain formula? Determine T.F. of the following S.F.G. using Mason's gain formula. **(06)**




**b)** How does closed loop control system is advantageous over open loop control system. Give a suitable example. **(04)**

**P. T. O.**

Q2. a) What is the working principle of LVDT? Explain. (06)

b) What are the level measuring instruments? (04)

**OR**

a) What are the types of Transducers? Explain any one in detail (05)

b) Explain working principle of Strain Gauge. (05)

Q3. a) What is the Time domain Specifications? Explain. (05)

b) For Unity F/B system having open loop T.F. (05)
$G(s) = k(s+2) / s^2 (s^2+7s+12)$
Find out Error Constants & Type no. of the system.

**OR**

The open loop T.F. of the system with unity F/B gain is given as (10)
$G(s)= 20 / s^2+5s+6$
Determine the Damping Ratio, Max Overshoot, Rise Time, Peak Time.
Derive the used Formula.

Q4. a) A system is having closed loop T.F. as $T(S)= k / s^3 + 5s^2+5s -2$ (05)
Discuss about the stability.

b) What is the Routh – Hurwitz Criteria (05)

**OR**

a) Which are the necessary conditions needs to be checked to test the stability of the system. (03)

b) Sketch the Root Locus for the system with open loop T.F. (07)
$G(s)= k/ s(s^2+4s+8)$

Q5. a) What is Nyquist Stability Criteria? (05)

b) Draw Frequency Response of following system $G(s)= 1/ 1+2S$ (05)

**OR**

Sketch the Bode plot for unity F/B system with the open loop T.F. (10)
$G(s) = 0.5 / s (s^2+s+1)$ Find Gain Margin & Phase Margin.

Q6. a) Which are the steps to design Lead Compensators? (05)

b) What is ON/OFF controller? Explain it with suitable example. (05)

**OR**

a) What is meant by PLC? Explain Architecture of PLC. (05)

b) What are the types of Compensators? Explain any one in detail. (05)

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