Total No. of Questions :5] *[Total No. of Printed Pages :2*

Roll No .....

MMIP - 104

M.E./M.Tech., I Semester

Examination, December 2015

Mechatronics

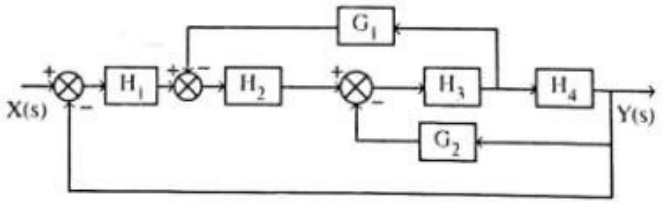
Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any two parts from each question.
ii) All questions carry equal marks.
iii) Assume missing data if any and indicate the same clealy.

1. a) Explain the static performance characteristics of a sensors.
   b) Explain the principle of operation of Hall-Effect sensors.
   c) What are the basic processes of MEMS? Discuss them in detail.

2. a) For the system shown in the figure find the overall transfer function of system using block diagram reduction.



   b) What are gain margin and phase margin? How do they enable to analyse the stability of a control system?

   c) Determine the range of K for a stable system when equation are
      i) $2s^3 + 6s^2 + 6s + (1+K) = 0$
      ii) $s^3 + 10s^2 + 24s + K = 0$

3. a) Discuss the principle and operation of PID controller.
   b) Discuss in detail about integrator and differentiator. Also draw its output waveform for square wave input.
   c) Define filtering? Mention the four different types of filters.

4. a) Discuss the following actuation systems :
      i) Self - excited wound field shunt configuration d.c. motor
      ii) Self - excited wound field series configuration d.c. motor
   b) Compare the performance of various types of actuators.
   c) List the solid state switches and explain state its uses.

5. a) With neat diagram explain programmable logic controller. With an example explain ladder logic used in PLC.
   b) Explain the architecture of 8051 controller.
   c) Using two - input NAND gates only, realise the binary logic function $\overline{A} + \overline{B}C$.

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