

TE/Insem/APR-109
T.E. (Mechanical)
Mechatronics
(2015 Pattern) (Semester - II)

Time :1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer any 3 questions : (Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6).
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.

- Q1)** a) Draw a suitable diagram and explain the construction and working of a servo motor. Also, in comparison to stepper motor, list two advantages offered by a servo motor. [6]
- b) Draw a suitable block diagram and explain the working of open loop control system. Also, list two advantages of open loop control system. [4]

OR

- Q2)** a) Define as well as discuss the importance of Sampling Theorem as well as Aliasing with respect to signal conversion. [6]
- b) A thermocouple has an output emf as shown in the following table when its hot junction is at the temperatures shown. Determine the measurement sensitivity of the thermocouple. [4]

Output emf in volts	4.37	8.74	13.11	17.48
Temperature in °C	250	500	750	1000

- Q3)** a) Reduce the block diagram shown in Figure 3a below and determine the transfer function, C/R. [6]

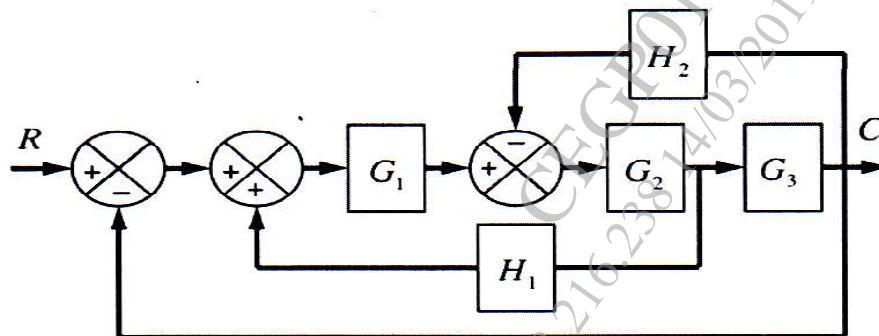


Figure 3a

P.T.O.

- b) A capacitive type proximity sensor is used for displacement measurement. Discuss any four criterion for assessing the measurement performance of the capacitive sensor. [4]

OR

- Q4) a)** Draw a suitable block diagram and discuss the application of Mechatronics in any one of the below: [6]

- Anti-lock braking in four wheel automobiles
- Industrial Conveyor system

- b) Draw a suitable circuit diagram and explain the working of two stage voltage amplifier. [4]

- Q5) a)** A 4-bit R-2R type DAC is supplied with 2.56 volts dc reference potential. Determine the full scale analog output potential and the Least Significant Bit (LSB). [6]

- b) Discuss, in brief, the role played by following four elements in a Mechatronic system : [4]

- i) Actuator
- ii) Sensor
- iii) Signal Conditioner
- iv) Digital Architecture

OR

- Q6) a)** Angular position of a dc motor is to be measured using an optical encoder. For this, draw the setup and explain the principle of working of the encoder. [6]

- b) Draw the flowchart and explain the working of the 4 bit SAR type Analog to Digital converter. [4]

