Total No. of Questions : 6]

SEAT No. :

P523

[Total No. of Pages : 2

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]**

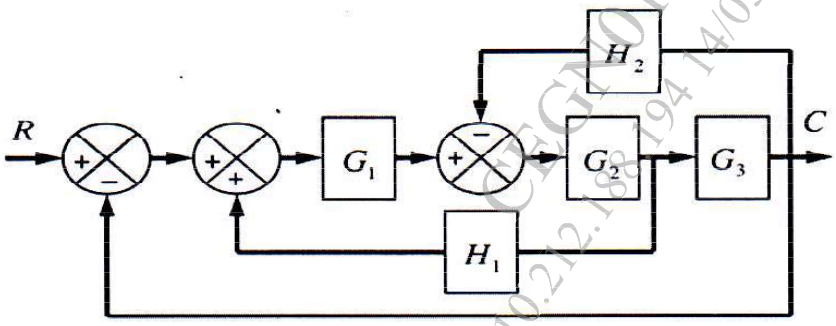

Figure 3a

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]**