Question Paper Code	12164

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023
Sixth Semester
Production Engineering
20ESIC601 - INSTRUMENTATION AND CONTROL SYSTEMS
(Use of Graph sheet, semilog sheet & Polar graph is permitted)
(Regulations 2020)

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

Marks,
K-Level, CO

1. What are the various components of typical measurement system? *2,K1,CO1*
2. How accuracy differs from precision? *2,K2,CO1*
3. Classify temperature sensors based on range of measurement. *2,K2,CO2*
4. What are the various methods of angular velocity measurement? *2,K1,CO2*
5. Mention the materials used in LED and LCD. *2,K1,CO3*
6. List the merits and demerits of UV recorders. *2,K1,CO3*
7. Formulate the force balance equation for ideal dash pot and ideal spring element. *2,K2,CO4*
8. Define transfer function. *2,K1,CO4*
9. Define Gain Cross over frequency. *2,K1,CO5*
10. Explain steady state error. *2,K2,CO5*

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) One hundred temperature readings were taken at small intervals of time and recorded to the nearest 0.5 ºC The frequency of occurrence of the reading is given below *13,K2,CO1*

Temp ºC	98.5	99	99.5	100	100.5	101	101.5
Freq.	4	13	19	35	17	10	2

Find (i) Mean (ii) Mode (iii) Mean deviation (iv) Standard deviation (v) probable error of one reading (vi) Variance.

OR

b) Explain how the measuring instruments are calibrated. *13,K2,CO1*

12. a) Explain the measurement of displacement using potentiometer as sensor. *13,K2,CO2*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12164**

b) Explain the piezoelectric accelerometer with neat sketch. Also list its applications. *13,K2,CO2*

13. a) With the help of a schematic diagram explain the working of CRO. *13,K2,CO3*

OR

b) Explain the importance of data logger in a process industry with an example. *13,K2,CO3*

14. a) Obtain the Electrical Analogous of Force to voltage and Force to Current for the figure shown. *13,K3,CO4*

Fig 1.
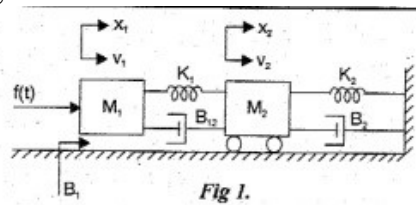
OR

b) Develop the transfer function for the block diagram shown below using Block diagram reduction technique *13,K3,CO4*
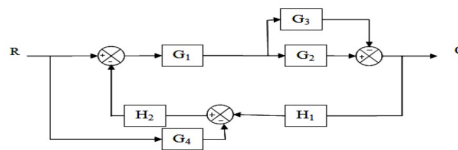
15. a) Draw the polar plot of the unity feedback system whose open loop transfer function is given by $G(s) = \frac{1}{(1+s)(1+2s)}$. *13,K3,CO5*

OR

b) For the unity fed back control systems $G(s) = \frac{20}{s\,(1+3s)(1+4s)}$
Draw the bode plot. *13,K3,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Derive the transfer function of Armature controlled DC servomotor and define transfer function. *15,K4,CO3*

OR

b) Derive the expression for Rise time and peak time for the unit step response of Over damped second order systems. *15,K4,CO5*