Reg. No.											

Question Paper Code	11478

17 DEC 2022

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Seventh Semester

Production Engineering

PR8003 - INSTRUMENTATION AND CONTROL

(Regulations 2017)

(Use of Polar Graph Permitted)

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? Mention their application.	*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 is piezoelectric effect?	*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,K2,CO3*
7.	What are the major types of control system?	*2,K1,CO4*
8.	Distinguish Type and Order of the system.	*2,K2,CO4*
9.	Define Phase margin.	*2,K1,CO5*
10.	What is the necessary condition for stability?	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Temperature of a metal bath is measured 100 times with variation in apparatus, procedures and persons. The readings are tabulated below *13,K2,CO1*

Temp °C	197	198	199	200	201	202	203	204	205
Freq.	5	2	10	23	35	10	8	5	2

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

OR

b) Explain the desirable and undesirable characteristics of the measurement system and also mention its importance. *13,K2,CO1*

12. a) Explain with neat diagram any two methods to measure acceleration. *13,K2,CO2*

OR

b) Explain in detail the methods used for measuring temperature in industries. *13,K2,CO2*

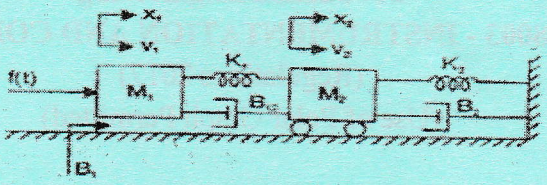
K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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

OR

b) Explain the construction, principle of operation, merits and demerits of magnetic tape recorders. *13,K2,CO3*

14. a) Obtain the Electrical Analogous, Force to voltage and Force to Current for mechanical translational system given below *13,K3,CO4*



OR

b) The transfer function of the system $G(s) = \frac{10}{(s+3)(s^2+2s+2)}$ *13,K3,CO4*

Determine the differential equations governing the system and also develop a state model.

15. a) The open loop transfer function of a system is given by *13,K3,CO5*

$$G(s) = \frac{10}{s\,(1+0.4s)(1+0.1s)}$$

Draw the bode plot of the system.

OR

b) Construct a Nyquist plot for a system whose open loop transfer function is given by $G(s)H(s) = \frac{K(1+s^2)}{s^3}$ *13,K3,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Write the differential equation governing the mechanical rotational systems and determine the transfer function of $\frac{\theta(s)}{T(s)}$. *15,K3,CO4*

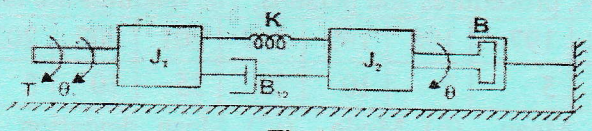


Fig 1.

OR

b) Use Routh stability criterion to determine the location of roots on the s-plane and hence the stability for the system represented by the characteristic equation . *15,K3,CO5*

$$s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$$