

Total No. of Questions : 9]

SEAT No. :

P4478

[4860] -96

[Total No. of Pages : 2

**M.E. (Mechanical Engineering-Design Engineering)
a-INSTRUMENTATION AND AUTOMATIC CONTROL
(2008 Course) (Semester-I) (Elective- I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answer to the each section should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if required.*

SECTION - I

- Q1)** a) Give step by step procedure for measurement of any quantity with appropriate example. **[6]**
- b) List down the static and dynamic characteristics of measuring instruments and explain at least two characteristics in detail. **[10]**

- Q2)** a) Growth of bacteria (N) in a culture after t hrs. is given in following table:

T	0	1	2	3	4	5	6
N	32	47	65	92	132	190	275

- Fit a curve of the form $N=ab^T$ and estimate N when $t=4.5$ **[6]**
- b) What is meant by Least Square Regression Method, Derive the relation for linear equation fit using least square approach? **[6]**
- c) List down the errors involved in measurement and explain these errors in detail. **[6]**

- Q3)** a) Explain method to measurement the field quantities (i) Heat Flux measurement (ii) Flow Measurement. **[10]**
- b) Explain working principle of measurement of temperature using Resistance Temperature Detector. **[6]**

P.T.O.

Q4) Write a short note on following (Attempt any three). **[16]**

- a) Accelerometer and Vibration Measurement.
- b) Noise Measurement
- c) Anemometer.
- d) Load Cell.

SECTION - II

Q5) a) Explain working principle of Torque Dynamometer (Rope wire type). **[6]**
b) List down methods used for radiation measurements and explain one of them in detail. **[10]**

Q6) a) What is pollution and explain its significance in terms of industrial development. **[8]**
b) List down the pollution measurement techniques and explain oxygen measurement sensor. **[8]**

Q7) a) What is meant by Mass Spectrometry and explain working of spectrometer. **[8]**
b) List down methods used for pollution control explain one of them in detail. **[8]**

Q8) a) What is close loop and open loop control? Give appropriate examples for open loop and close loop control systems. **[8]**
b) Explain working of PID PD and PI control system and its importance for industrial process control. **[8]**

Q9) Write note on following attempts any three. **[18]**

- a) Pneumatic controls in industry.
- b) Electronic controls used in process industries.
- c) List down different control systems used in material handling systems.
- d) Chromatography.

