

[This question paper contains 4 printed pages.]

3074

Your Roll No.

MEM

J

Paper – ME.504

MEASUREMENT AND CONTROL
TECHNIQUES

Time : 3 Hours

Maximum Marks : 100

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Question 1 is compulsory.

Answer any four from the following.

*All sub-parts of a question must be answered
together. Assume missing data of any.*

1. Explain the following in brief with suitable examples and properly labelled diagrams
 - (a) Strain gauge installation
 - (b) Calibration of a pressure measuring device
 - (c) Measurement errors
 - (d) Frequency response of a first order instrument
 - (e) Ultrasonic flowmeters

(4×5=20)

P.T.O.

2. (a) Define the following terms

- | | |
|--------------------|---------------------|
| (i) Sensitivity | (ii) Accuracy |
| (iii) Precision | (iv) Drift |
| (v) Threshold | (vi) Least count |
| (vii) Hysteresis | (viii) Resolution |
| (ix) Time constant | (x) Range (1×10=10) |

(b) Discuss the applications, working principle and construction of a turbine type flowmeter. (10)

3. (a) What is the principle of working of radiation pyrometer? Explain the working principle, construction and applications of an optical pyrometer. (10)

(b) A seismic vibrometer sensing displacement has undamped natural frequency of 10 Hz and damping ratio of 0.7. Determine the amplitude ratio and phase. (10)

4. (a) What are the difficulties encountered in the measurement of very low pressures? List the methods for low pressure measurement and describe any one with details. (10)

- (b) A pressure measuring device has undamped natural frequency of 377 radians per second and damping ratio of 0.70. Find the phase lag and amplitude of the output for an input pressure varying sinusoidally with an amplitude of 800 KN/mm^2 at a frequency of 50 Hz. (10)
5. (a) Show with the help of block diagram, how open loop and closed loop control systems differ. State the limitations of one over the other. (10)
- (b) Compare the mechanical and electronic/electrical signal conditioning devices. Describe the main characteristics, applications and working of an operational amplifier. (10)
6. (a) What is a transducer? How they can be classified? Describe any one photo-electric transducer in detail. (10)
- (b) Explain the working principle, construction, operation and applications of a LDA. (10)
7. Write short notes any the following any (five) :-
- (i) Rosette gauge
 - (ii) Transfer function

- (iii) AM/FM
- (iv) Acoustic extensometer
- (v) Gauge factor cross sensitivity
- (vi) Stroboscope
- (vii) Pitot static tube
- (viii) Automatic control (4×5=20)