

Mechanical Measurement & Metrology
(ME-307, Dec-07)

Section-A

- 1). a). Explain primary, secondary and tertiary measurements with sketches.
- b). Explain clearly the following: Range and span, accuracy and precision, calibration and sensitivity.
- c). What do you mean by error in measurement? Discuss the sources of error.
- d). What is the purpose of a comparator? What are different types of comparators?
- e). Explain the working principle of piezoelectric transducers. Also mention their advantages.
- f). Write a brief note on flow visualization techniques.
- g). What are thermistors? Differentiate between metal resistance thermometers and thermistors.
- h). What is the purpose of a proving ring? Draw a neat sketch of the ring.
- i). Suggest some methods for linear measurements with brief working principle.
- j). Draw a neat sketch of hydraulic load cell.

Section-B

- 2). How do you classify measuring instruments? Explain them in brief.
- 3). Explain clearly the following terms: Speed of response, time lag, fidelity and dynamic error, dead time and dead zone.
- 4). Explain clearly with the help of neat sketches methods for measuring straightness and flatness by interferometry.
- 5). Draw a neat sketch of a Bourdon tube pressure gauge. What types of errors are encountered while making measurements and how are they rectified?
- 6). Explain clearly with the help of neat sketches the laws of thermocouples. Mention the commonly used industrial names of thermocouples mentioning the materials and temperature range of each.

Section-C

- 7). (a) What do you mean by calibration? Explain clearly the commonly method of calibrating temperature measuring devices.
(b) Draw neat sketches of a hydraulic and pneumatic load cell.
- 8). What is the purpose of a dynamometer? Draw a neat sketch of a rope brake dynamometer and explain its working. What arrangement is made for the cooling of this type of dynamometer?
- 9). Draw a neat sketch of a disappearing filament type of pyrometer and explain its working. Also mention the application and limitation.