

ME 561: THERMAL AND FLUID SYSTEM PROPERTIES MEASUREMENT LAB (0-0-2: 1)

List of experiments:

1. To measure fluid flowrates with various flow measuring sensors like venturimeter, orifice, rotameter, flow nozzle, Pitot tube and turbine flowmeter and categorically compare them with respect to operating range, accuracy, characteristics, advantages and limitations.
2. To calibrate the various flow-measurement devices with basic methods and identify the primary causes of error in their measurement.
3. To study various temperature measuring instruments like mercury-in-glass thermometer, different types of thermocouples and RTDs, estimate their response times and compare them with respect to operating range, accuracy, characteristics, advantages and limitations.
4. To calibrate the temperature sensors like mercury-in-glass thermometer, different types of thermocouples and RTDs using different methods and find the major cause of error in their measurement.
5. To measure the global solar radiation with a pyranometer and also the diffuse solar radiation by mounting the pyranometer at the centre of semicircular shading ring arrangement.
6. To carry out statistical analysis, graphical representation of the experimental data recorded by data acquisition system from the various flow/temperature/radiation measurements and estimate the errors/uncertainties using different techniques.
7. To measure and analyse velocity profile with a Pitot tube for flow over a flat plate and demonstrate the boundary layer growth.
8. To study a linear variable differential transformer (LVDT), carry out small displacement measurements using it and also to calibrate the instrument.
9. To determine stress and strain at prescribed conditions of a cantilever and a simply supported beam using electric resistance strain gauge.
10. To measure static/dynamic pressure of fluid in pipe using pressure transducer and to calibrate the device.

References

1. J. P. Holman, "Experimental methods for Engineers", McGraw-Hill, 6th edition 1994.
2. R. S. Sirohi and H. C. Radha Krishna, "Mechanical Measurements", Wiley, 2nd edition 1983.
3. J.W. Dally, "Instrumentation for Engineering Measurements", John Wiley & Sons, 2nd edition 1993.
4. T. Beckwith and L. Buck, "Mechanical Measurements", Narosa Publishing House, 6th edition 2006.

