ME 226: MECHANICAL MEASUREMENTS-COURSE OUTLINE

Instructor: S.V. Prabhu

Classes: Mon: 9.30 – 10.25; Tues: 10.30 – 11.25; Thur: 11.30 – 12.25;

1. **Introduction: generalized measurement system, static calibration, calibration, random errors, uncertainty analysis, dynamic characteristics. Zero, first and second order measurement systems.**

2. **Temperature measurement: Introduction to temperature measurement. Thermocouples: laws governing their use; Static and Dynamic characteristics. Other measurement techniques.**

3. **Pressure measurement: Manometers, elastic transducers, static and dynamic characteristics. Other devices for measurement.**

4. **Flow measurement: obstruction meters, variable area meters, velocity measurement.**

ME 204: MECHANICAL MEASUREMENTS-COURSE OUTLINE

Instructor: S.V. Prabhu

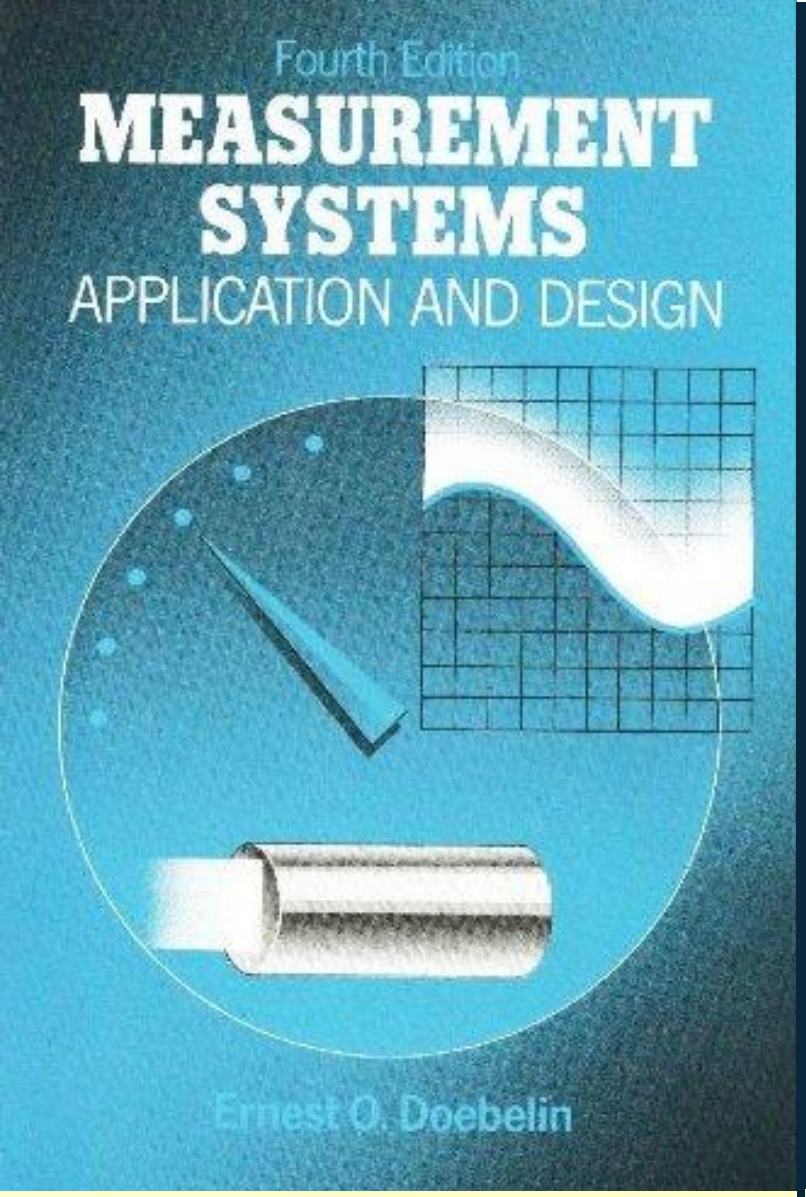
Classes: Mon: 9.30 – 10.25; Tues: 10.30 – 11.25; Thur: 11.30 – 12.25;

5. **Strain measurement**: electrical type strain gauges, metallic resistance strain gauge, selection and installation of strain gages, circuitry for strain measurement, temperature compensation, calibration, semi-conductor strain gauges, stress analysis methods

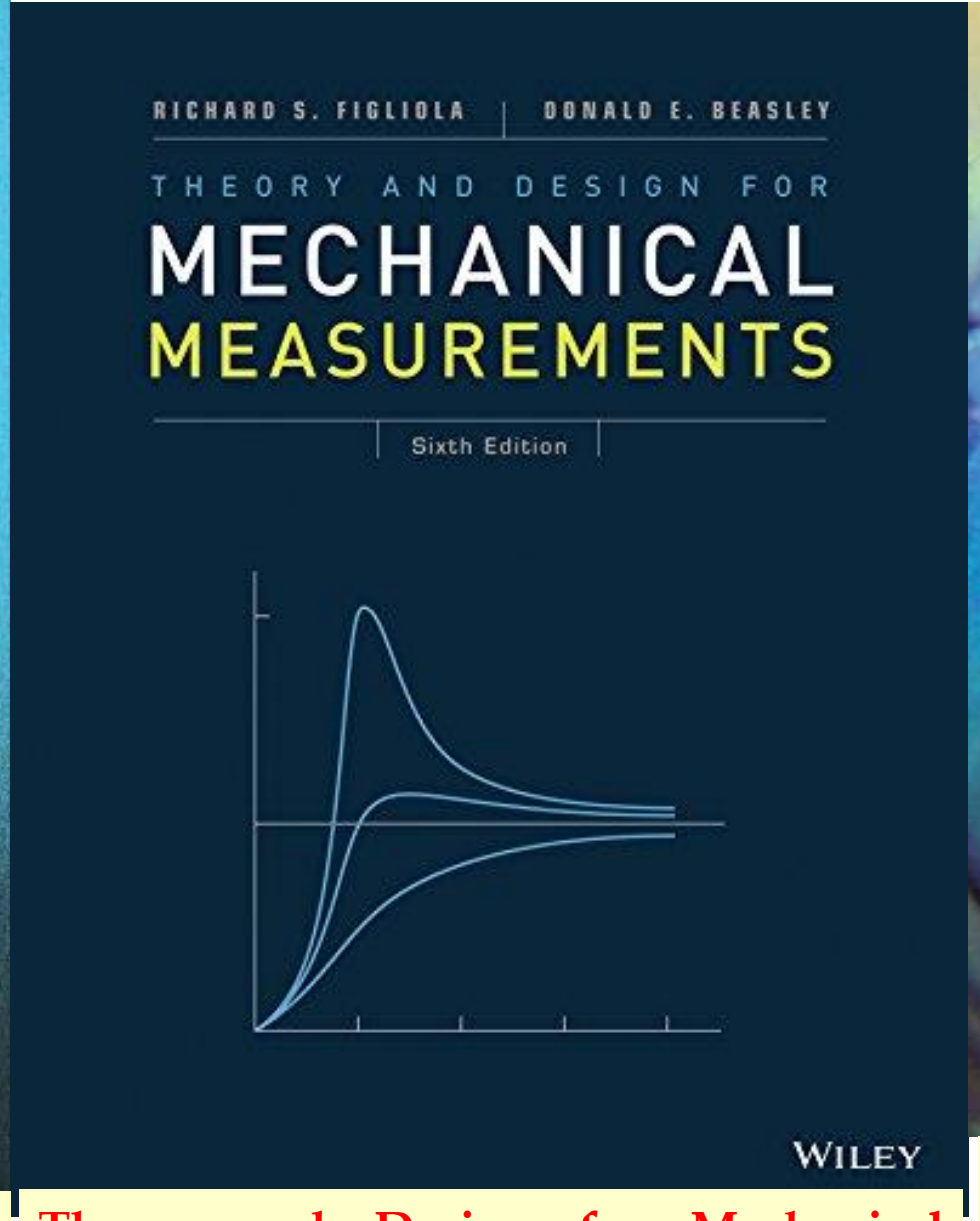
6. **Force and torque measurement**: standards, elastic transducers, strain gage load cells, hydraulic and pneumatic systems, torque measurement, combined force and moment measurement.

7. **Measurement of motion**: LVDT, general theory of seismic instruments, vibrometers and accelerometers, piezoelectric accelerometers and vibrometers-circuitry and calibration, exciter systems, vibration test methods.

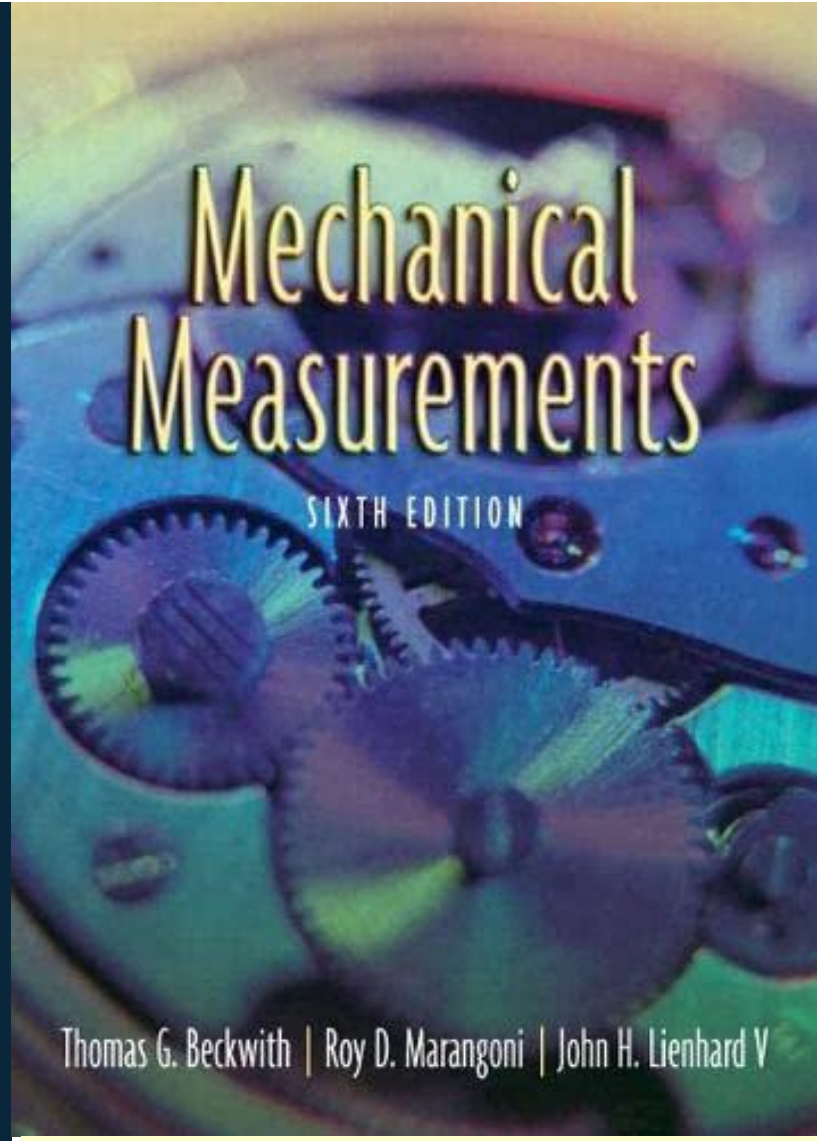
8. **Signal conditioning**: Operational amplifiers, filters.



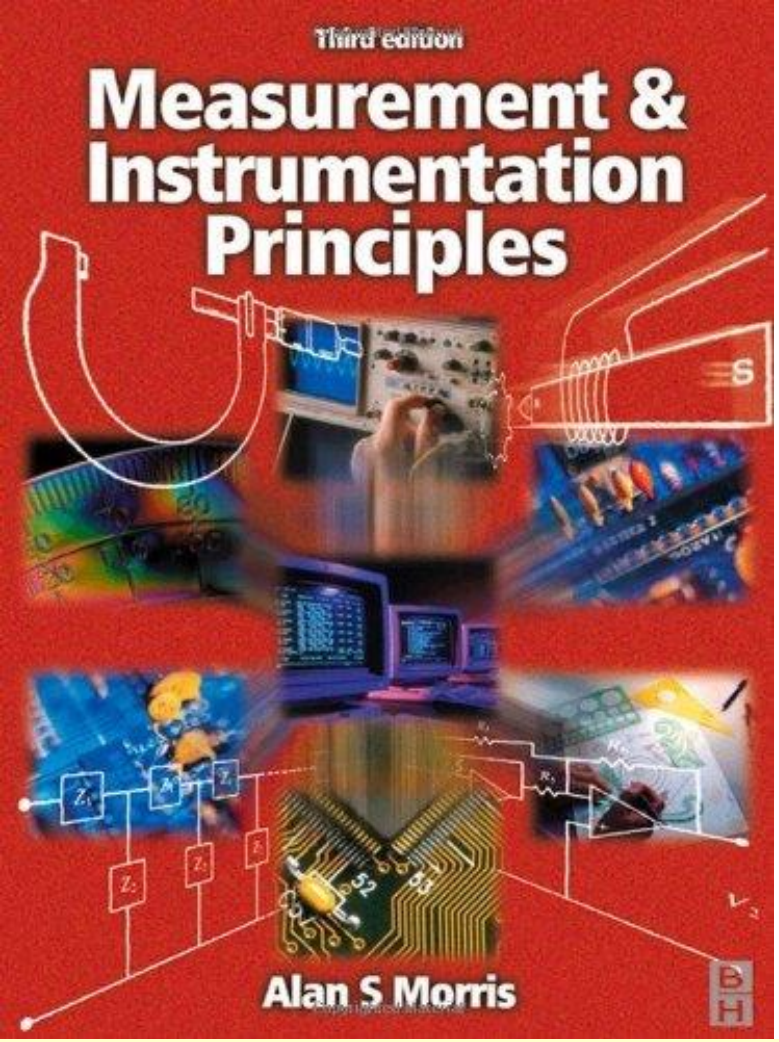
Measurement Systems: Application and Design, E.O. Doebelin, Fourth Ed., 1990, McGraw Hill.



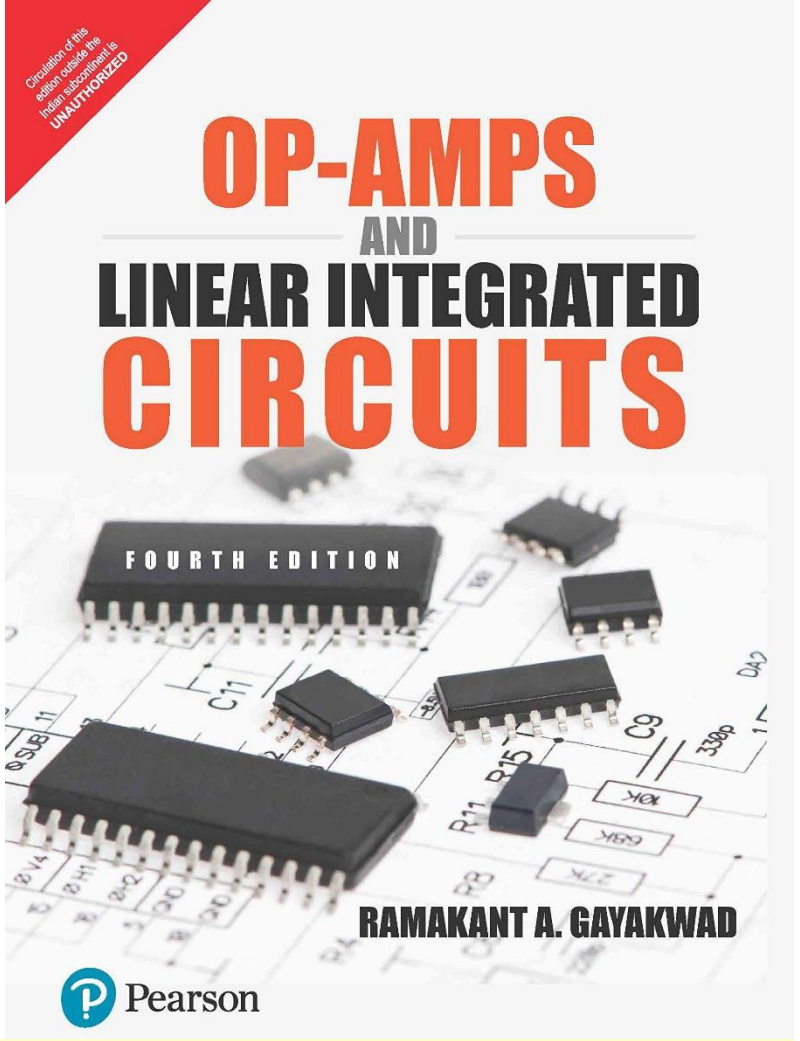
Theory and Design for Mechanical Measurements, R.S.Figiola and D.E.Beasley, Fifth Edition, 2008, John Wiley and Sons



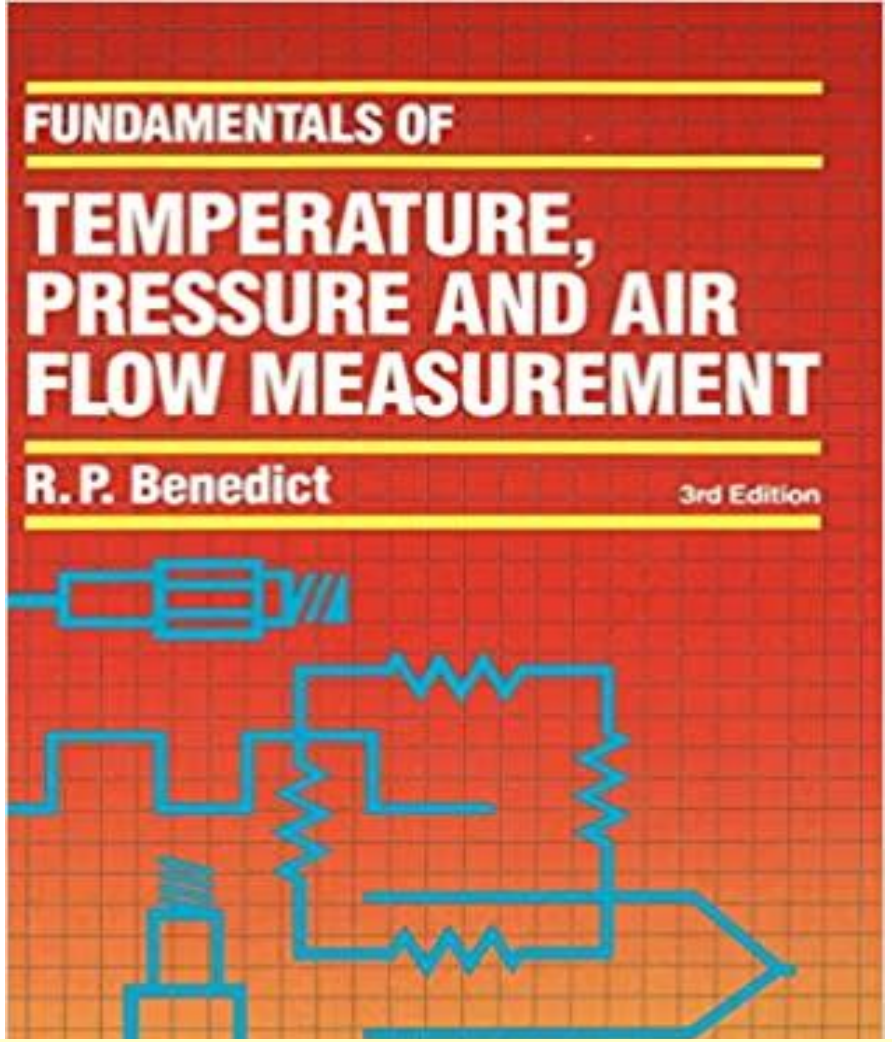
Mechanical Measurements, T.J.Beckwith, R.D.Marangoni, J.H.Lienhard, 2007, Prentice Hall



Measurement and Instrumentation Principles, Alan S Morris, Third Edition, 2001, Butterworth-Heinemann.



Op-amps and Linear Integrated Circuits, R.A.Gayakwad, 2000, Prentice Hall.



Fundamentals of Temperature, Pressure, and Flow Measurements , Robert P. Benedict , Third Edition, Omega Press

Attendance

Students are advised to attend all classes. As per Institute rules, 80% attendance will be required to clear the course. This rule will be enforced. Otherwise, DX grade would be awarded.

Quiz	25 %
Midsem	25 %
Endsem	50 %

There will be no make-up exams. Those who miss one quiz/mid-sem due to medical reasons will be given a proportionate weight from the average of other exams, including the end-sem. Any one missing more than one test will be handled on case to case basis. Here the instructor's decision shall be final. If there is any extraordinary reason due to which a student will miss a test, the student is expected to take prior permission for being absent.

Anyone unauthorised absence during a test other than medical reasons, will attract zero marks for that test.

Exams: Quizzes will be held on prescribed days. It can have multiple choice questions, short answer questions, analytical and numerical problems. The exact dates for mid semester and end semester examinations would be announced as and when the information is released by the department Time-Table coordinator. The end semester test will be a comprehensive one covering the entire course. Please note that no make-up exams will be conducted. All quizzes, midsem and endsem papers shall be evaluated by the instructor.

All exams are closed book exams with formula sheet allowed. The formula sheet would be given by the instructor

If a student is found to possess the prohibited material any time during the exam, it will be considered cheating and the student will be handed FR (Fail and repeat the course).

Honesty Policy: Exams must be taken without the assistance of others. However, incidents of copying in the exam will lead to a minimum penalty of FR. The matter may be referred to DAC for final quantum of punishment, if required.

Tools used for teaching and evaluation

- Will share class notes to all. This is essentially the presentation used for the classes.
- Everything essential will be written on the green board.
- Students are strongly urged to write along with the teacher so that
  - They are with the teacher and following the content on transient basis
  - One time writing is equivalent to multiple times reading
  - Student will know exactly what was taught in the class and relate to the class notes supplied by the teacher later.
- All the class notes would be provided in the Moodle
- Students are strongly encouraged to ask doubts in the class and also in the moodle.

THIS IS THE PLAN AS OF NOW, WE SHALL EVOLVE AS WE MOVE ON