

# **VEER NARMAD SOUTH GUJARAT UNIVERSITY**

## **Post Graduate Diploma In Instrumentation**

### **PAPER- I**

#### **Instruments Mechanism and Metrology**

Materials for Instruments, bearings, machine bearing; Use of instruments bearings, different types of bearing and guides. Brief introduction to steps, couplings, clutches, joining and functional mechanisms.

Elements of workshop technology covering fundamentals of simple manufacturing processes machine tools like lathes. drilling machines. milling machines. shapping machines. Measuring systems and precision instruments. Measuring with rules. Mathematical concepts. Limiting means, range, variance. Standard deviation, normal distribution. continece intervals. Principals of sampling.

Standards of measurement, standards of length, end standards, Vernier callipers, fixed gauges, inside, depth and height gauges, Gauge blocks surface plates. micromets. Angular measurement sine bars, angle gauges, levels, clinometers, auto collimations, taper gauge. direct measuring tools and instruments. Optical projectors and microscopes. Horizontal vertical and cabiner profile projector. Toolmakers and workshop microscopes. End standards, end bars, slip gauges.

Comparison measurements: Comparators, pneumatic. electric and electronic comparators. Limits. Fits and Tolerances. Interchangeability. types of fits geometric dimensioning and tolerance. Interference. Surface characteristics, Evaluation and symbology. Surface roughness measurements, profilometers.

Alignment testing. Machine tools alignment, machine beds. Alignment of axis (spindle axis and bed. spindle axis and line of centers), axial slip and calibration of lead screw, alignment telescopes. Interferometers. Elerosonic pulse-Echo and resonance gauging. optical alignment. Equipment and methods.

Surface texture measurements and gauging.

Management of inspection and quality control. Automatic dimensional controls manufacturing processes.

#### **RECOMMENDED BOOKS**

1. Elements of Precision Engineering R. Raman Oxford & IBM Pushlising Co., New Delhi - Bombay - Calcutta.
2. The Design and use of Instrument and Accurate Mechanism, White head, T.N. Dawn Publication Inc.
3. Engineering Metrology. R.K.Jain. Khanna Pub. Delhi 1973.