

Course Number and Name													
BME404 – ENGINEERING METROLOGY AND INSTRUMENTATION													
Credits and Contact Hours													
3&45													
Course Coordinator's Name													
Mr.Hariharan													
Text Books and References													
TEXT BOOKS:													
1. R.K.Jain Engineering Metrology , Khanna Publishers, 2005													
2. Kumar D.S Mechanical Measurement and Control – Metropolitan Book company Pvt. Ltd. – 1989													
REFERENCES:													
1. T.G.Beckwith and N.Lewis Buck, Mechanical Measurements, Addison Wesley, 2001													
2. Sirohi, R.S. and Radhakrishnan, H.C.Mechanical Measurements, New Age, 1994.													
Course Description													
To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.													
Prerequisites							Co-requisites						
Manufacturing Technology I							Nil						
required, elective, or selected elective (as per Table 5-1)													
Required													
Course Outcomes (COs)													
CO1	Upon completion of this course, the Students can demonstrate different measurement techniques												
CO2	Learn form measurement												
CO3	Use of different measuring methods in Industrial environment.												
CO4	Understand the application of sensors & transducers												
CO5	Student will know the advance measuring systems												
CO6	Understand principles of Laser												
Student Outcomes (SOs) from Criterion 3 covered by this Course													
COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l	
CO1						L							
CO2		H							L				L
CO3				H									
CO4						H			M		M		
CO5									H		M		
CO6									M		H		

List of Topics Covered

UNIT I INTRODUCTION TO MEASUREMENTS – LINEAR, ANGULAR 9

Basic concepts of measurement–need of measurement–precision and accuracy –Reliability–Errors in measurement–causes–types, Engineering component measurements – comparators – mechanical & pneumatic–Limit gauges – slip gauges – Sine bar – dial gauge – Rollers – Design – Applications – Angle dekkor – Auto collimator – Alignment telescope.

UNIT II FORM MEASUREMENT AND LASER IN METROLOGY 9

Form measurement – Measurement of tooth thickness – gear tooth vernier – Surface finish measurement – radius measurement – flatness and roundness measurement – Screw thread and gear Measurement.

Laser Metrology: Precision instrument based on laser – Principle – Application of laser –Laser interferometer – Applications in linear measurement and angular measurement – Application in testing of machine tools by Laser interferometer.

UNIT III RECENT ADVANCEMENT AND DEVELOPMENT METROLOGY 9

Coordinate Measuring Machine – constructional features – types – Applications of CMM – CNC. CMM applications – Inspection by computer aided – machine vision – Applications in Metrology.

UNIT IV MECHANICAL INSTRUMENTATION AND INSTRUMENTS 9

Generalized measurement system and its functional elements, primary, secondary and working standards. Instrument characteristics, static and dynamic characteristics classification – zero, first and second order instruments and responses, problems. Sensors and transducers – mechanical detector – transducer elements, electrical transducers – Thermoelectric transducer – variable inductance transducers – capacitor transducers – preamplifiers – charge amplifiers – Piezo electric transducers – strain gauges – bridge circuits (quarter, half and full activated), sensitivity – filters – attenuators – D'arsonval – CRO – Oscillographs – recorders – microprocessor based data logging.

UNIT V MEASUREMENT SYSTEMS 9

Force measurement – Torque measurement – Pressure measurement – Flow measurement – Temperature measurement – Vibration Measurement.