

**UNIT V****Chapter 5 : Temperature Measurement 5-1 to 5-31**

**Syllabus :** Temperature and its units : Temperature scales and conversions. Classification of temperature measuring transducers : Filled system thermometer- vapour pressure thermometer. Expansion thermometer-Bimetallic thermometer. Electrical methods : Thermistors. RTD - (PT-100, 2/3 wire). Thermocouple – Law of intermediate temperature and intermediate metals Seebeck and Peltier effect, Types J, K, R, S, T. Pyrometer – Optical method, Radiation method. Typical specifications of thermistor, RTD and thermocouple. Calibration of temperature measuring transducers.

5.1	Temperature and its units.....	5-1	5.4.1	Thermistors.....	5-10
5.2	Temperature Scales and Conversion .....	5-2	5.4.1.1	Comparison between NTC and PTC .....	5-12
5.2.1	Fahrenheit Temperature Scale (°F).....	5-3	5.4.2	Resistance Thermometer (PT100) or Resistance Temperature Detector (RTD).....	5-12
5.2.2	Celsius Temperature Scale (°C).....	5-4	5.4.2.1	Two Wire System.....	5-13
5.2.3	Kelvin Temperature Scale (°K).....	5-4	5.4.2.2	Three Wire System .....	5-14
5.2.4	Rankine Temperature Scale (°R).....	5-4	5.4.2.3	Metal used for Resistance Thermometers.....	5-14
5.2.5	Reaumur Temperature Scale (°R').....	5-4	5.4.2.4	Comparison between RTD and Thermistor .....	5-15
5.2.6	International Practical Temperature Scales.....	5-4	5.4.3	Thermocouples .....	5-15
5.3	Classification of Temperature Measuring Transducers .....	5-5	5.4.3.1	Types of Thermocouples (J, K, R, S, and T) Based on Materials and Temperature .....	5-17
5.3.1	Filled system thermometer- vapour pressure thermometer.....	5-5	5.4.3.2	Compensation Circuit.....	5-18
5.3.1.1	Gas Filled Thermometers.....	5-6	5.4.3.3	Comparison between thermocouple and Thermistor.....	5-19
5.3.1.2	Vapour Pressure Thermometers .....	5-6	5.5	Pyrometers.....	5-19
5.3.2	Expansion thermometer .....	5-7	5.5.1	Radiation Pyrometers.....	5-20
5.3.2.1	Bimetallic Thermometers .....	5-7	5.5.2	Infra-Red Pyrometers.....	5-20
5.3.2.2	Bimetal Helix Thermometer.....	5-8	5.5.3	Optical Pyrometers.....	5-21
5.3.2.3	Spiral Bimetallic Thermometer .....	5-9	5.6	Typical Specification of Thermistor, RTD and Thermocouple .....	5-23
5.4	Electrical methods.....	5-10	5.7	Calibration of Temperature Measuring Transducers .....	5-24
			5.7.1	Thermistor.....	5-24
			5.7.2	Thermocouple .....	5-24
			5.7.3	Pyrometer .....	5-24
			5.7.4	Bimetallic Thermometer .....	5-24
			5.8	Problems.....	5-25
			5.9	MSBTE Questions and Answers .....	5-27
			•	<b>Appendix A : Solved MSBTE Question paper of Winter 19.....</b>	<b>A-1</b>

