Tecnologie elettriche/elettroniche TEE classe 5B Prof. De Luca Fortunato (Temperature Transducers n1)

COGNOME _____ Nome _____ Data_____

1) An inverse transducer is a device which converts ?

- a) Electrical quantity into a non electrical quantity
- b) Electrical quantity into mechanical quantity
- c) Electrical energy into thermal energy
- d) Electrical energy into light energy

2) Self generating type transducers are _____ transducers?

- a) Active
- b) Passive
- c) Secondary
- d) Inverse

3) The transducer that converts the input signal into the output signal, which is a discrete function of time, is known as _____ transducer?

- a) Active
- b) Analog
- c) Digital
- d) Pulse

4) Resolution of a transducer depends on ?

- a) Material of wire
- b) Length of wire
- c) Diameter of wire
- d) Excitation voltage

5) Resistance thermometers, also called resistance temperature detectors or resistive thermal devices (RTDs), are temperature sensors that exploit the predictable change in _____ of some materials with changing temperature?

- a) Electric current
- b) Electrical resistance
- c) Electrical impedance
- d) Electrical conduction

6) Sensors work up to 961.78 °C and are used in the SPRT's that define _____?

- a) ISO 2000
- b) International Temperature Scale of 1990
- c) Both a & b
- d) None of these

7) They are slowly replacing the use of _____ in many industrial applications below 600 °C, due to higher accuracy and repeatability ?

- a) Thermistor
- b) Two wire RTD
- c) Three wire RTD
- d) Thermocouple

8) The application of the tendency of electrical conductors to increase their electrical resistance with rising temperature was first described by_____ ?

- a) James Fourier
- b) Sir William Siemens
- c) Sir Issac Newton
- d) Sir David Richards

9) _____ have a range of −150 to 2,320 °C (-292 to 4,208 °F), so for extremely high temperatures they are the only contact temperature measurement choice?

- a) Thermocouple
- b) Thermistor
- c) RTD
- d) None of these

10) As they are almost invariably made of _____, they are often called platinum resistance thermometers (PRTs)?

- a) Rhodium
- b) Gold
- c) Platinum
- d) Palladium

Solution to Quiz N1

Question 1=a
Question 2=a
Question 3=c
Question 4=c
Question 5=b
Question 6=b
Question 7=d
Question 8=b
Question 9=a
Question 10=c

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Tecnologie elettriche/elettroniche TEE classe 5B Prof. De Luca Fortunato (Temperature Transducers n2)

COGNOME _____ Nome _____ Data_____

1) Thermocouples are widely used in science and industry; applications include temperature measurement for kilns, _____ exhaust, diesel engines, and other industrial processes ?

- a) Internal combustion engine
- b) Gas turbine
- c) power-to-weight ratio
- d) Turbocharger

2) Type J (_____–constantan) has a more restricted range than type K (–40 to +750 °C), but higher sensitivity of about 55 µV/°C ?

- a) Oxygen
- b) Iron
- c) Chromium
- d) Zinc

3) Type M thermocouples use a _____ alloy for each wire?

- a) Iron
- b) Nickel
- c) Palladium
- d) Zinc

4) In particular, type S is used as the standard of calibration for the melting point of _____ (1064.43 °C)?

- a) Silver
- b) Gold
- c) Copper
- d) Platinum

5) Type T (_____–constantan) thermocouples are suited for measurements in the −200 to 350 °C range?

- a) Silver
- b) Copper
- c) Palladium
- d) Gold

6) A thermocouple is a junction between two different metals that produces a voltage related to a _____ difference?

- a) Thermodynamic temperature
- b) Temperature
- c) Lightning
- d) Water vapor

7) Type B, S, R and K thermocouples are used extensively in the steel and _____ industries to monitor temperatures and chemistry throughout the steel making process ?

- a) Oxygen
- b) Iron
- c) Zinc
- d) Chromium

8) Type C (tungsten 5% _____ – tungsten 26% rhenium) thermocouples are suited for measurements in the 0 °C to 2320 °C range?

- a) Iridium
- b) Rhenium
- c) Rhodium
- d) Niobium

9)Disposable, immiscible, type S thermocouples are regularly used in the _____ process to accurately measure the temperature of steel before tapping?

- a) Aluminum
- b) Electric arc furnace
- c) Carbon
- d) Iron

10) A thermistor is a type of _____ whose resistance varies with temperature?

- a) Resistor
- b) Electrical impedance
- c) Electronic component
- d) Multimeter

Solution to Quiz N2

Question 1=b
Question 2=b
Question 3=b
Question 4=b
Question 5=b
Question 6=b
Question 7=b
Question 8=b
Question 9=b
Question 10=a

Tecnologie elettriche/elettroniche TEE classe 5B Prof. De Luca Fortunato (Temperature Transducers n3)

COGNOME _____ Nome _____ Data_____

1) There are many different semiconducting thermistors with a range from about 0.01 _____ to 2,000 kelvins (−273.14 °C to 1,700 °C)?

- a) Celsius
- b) Thermodynamic temperature
- c) Temperature
- d) Kelvin

2) Thermistors differ from _____ (RTD) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals?

- a) Thermostat
- b) Temperature coefficient
- c) Resistance thermometer
- d) Thermocouple

3) Many NTC thermistors are made from a pressed disc or cast chip of a semiconductor such as a sintered metal _____?

- a) Iron
- b) Hydrogen
- c) Oxygen
- d) Oxide

4) Thermistors are widely used as inrush current limiters, temperature _____, self-resetting over current protectors, and self-regulating heating elements?

- a) Protein
- b) Sensor
- c) Sense
- d) Transducer

5) T is the temperature in _____ and R is the resistance in ohms?

- a) Kelvin
- b) Rankine scale
- c) Celsius
- d) Both a & b

6) For higher temperature variation applications thermistors and _____ are more suitable?

- a) Resistance thermometer
- b) Thermocouple
- c) Thermostat
- d) Temperature coefficient

7) A device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument ?

- a) Sensor
- b) Actuator
- c) Both a & b
- d) None of these

8) Self generating type transducers are _____ transducers?

- a) Active
- b) Passive
- c) Secondary
- d) Inverse

9)A sensor with two dissimilar metals joining together?

- a) Thermistor
- b) Thermocouple
- c) Both a & b
- d) None of these

10) Thermocouples are?

- a) Passive transducer
- b) Active transducer
- c) Both active and passive transducer
- d) None of the above

Solution to Quiz N3

Question 1=d
Question 2=c
Question 3=d
Question 4=b
Question 5=d
Question 6=a
Question 7=a
Question 8=a
Question 9=b
Question 10=a

Tecnologie elettriche/elettroniche TEE classe 5B Prof. De Luca Fortunato (Temperature Transducers n4)

COGNOME _____ Nome _____ Data_____

1) A transducer that converts measurand into the form of pulse is called?

- a) Active transducer
- b) Analog transducer
- c) Digital transducer
- d) Pulse transducer

2) Resolution of a transducer depends on?

- a) Material of wire
- b) Length of wire
- c) Diameter of wire
- d) Excitation voltage

3) The transducers which requires an external power and their output is a measure of some variation such as resistance, inductance, capacitance etc., are called as?

- a) Active transducer
- b) Primary sensor
- c) Passive transducer
- d) Self generating transducer

4) Thermocouple works?

- a) Seebeck effect
- b) Peltier effect
- c) Thomson effect
- d) Thremoresistance effect

5) The transducer can be considered as _____ ?

- a) Sensor
- b) Sensor + signal conditioning
- c) Feedback information
- d) Thermodynamic temperature

6) Three wires RTD is used for _____ ?

- a) Remote applications
- b) High temperature measurements
- c) Low temperature measurements
- d) Temperature coefficient

7) Thermocouples are temperature measuring devices that consist of _____ connected to an electronic circuit ?

- a) Two polarized metal wires
- b) Two wires of the same alloy
- c) Two wires composed of different metals
- d) None of these

8) RTD refers to _____?

- a) Reaction Timing Device
- b) Resistance Thermal Detector
- c) Resistance Thermometer Device
- d) None of these

9)The temperature sensor that has a fastest speed of response is _____?

- a) RTD
- b) Thermocouple
- c) Thermistors
- d) None of these

10) _____ is used to measure high temperature ranges ?

- a) Thermistor
- b) RTD
- c) Thermocouples
- d) None of these

Solution to Quiz N4

Question 1=d
Question 2=c
Question 3=c
Question 4=a
Question 5=b
Question 6=a
Question 7=c
Question 8=b
Question 9=a
Question 10=c

Tecnologie elettriche/elettroniche TEE classe 5B Prof. De Luca Fortunato (Temperature Transducers n5)

COGNOME _____ Nome _____ Data_____

1) RTD use the principle of change in resistance with temperature. The properties of a conductor material to be used as an element of an RTD should possess the following properties?

- a) The change in resistance per unit change in temperature should be as small as possible
- b) The change of resistance with temperature should not be linear function
- c) The resistance of the materials should not have a continuous and stable relationship with temperature.
- d) None of the above

2)The resistance of a thermometer is 5Ω at 30 ^{0}C and 6.5 Ω at 60 ^{0}C. Using linear approximation, the value of resistance temperature co-efficient at 450C?

- a) 0.0081/^{0}C
- b) 0.0087/^{0}C
- c) 0.009/^{0}C
- d) 0.01/^{0}C

3)The sensitivity of thermistors as compared with sensitivity of platinum resistance temperature detector over a temperature range of 100 ^{0}C to 400 ^{0}C to changes in temperature is?

- a) 10^6 times
- b) 100 times
- c) 10^7 times
- d) 10^3 times

4) A thermistor exhibits?

- a) Only a negative change of resistance with increase in temperature
- b) Can exhibit either a negative or positive change of resistance with increase of temperature depending upon the type of material used
- c) Only a positive change of resistance with increase in temperature
- d) None of the above

5)The temperature transducers exhibit non-linear behavior. The order in which they exhibit nonlinearity (highest to lowest) is?

- a) Thermocouples, RTD, Thermistors
- b) Thermistors, Thermocouples, RTD
- c) Thermocouples, Thermistors, RTD
- d) RTD, Thermistors, Thermocouple

6) Three types of temperature transducers are compared as regards their sensitivity. The order in which they exhibit their sensitivities (highest to lowest) is?

- a) Thermistors, RTD, thermocouples
- b) Thermocouples, RTD, Thermistors

- c) RTD, Thermocouples, Thermistors
- d) RTD, Thermistors, Thermocouples

7) Thermocouples are temperature measuring devices that consist of _____ connected to an electronic circuit ?

- a) Two polarized metal wires
- b) Two wires of the same alloy
- c) Two wires composed of different metals
- d) None

8) A thermocouple produces a voltage of 50 mV. Its internal resistance is 50Ω. The resistance of its leads is 10Ω. Its output is real by a PMMC meter having an internal resistance of 120Ω. The output voltage indicated is?

- a) 33.3 mV
- b) 40 mV
- c) 25.5mV
- d) None

9)To avoid the self heating effect in temperature sensors, we can use_____ currents ?

- a) High
- b) Medium
- c) Small
- d) None

10) For measuring very cold temperatures, thermometers are filled with _____ ?

- a) Mercury
- b) Ether
- c) Alcohol
- d) None of the above

Solution to Quiz N5

Question 1=d
Question 2=b
Question 3=a
Question 4=b
Question 5=b
Question 6=a
Question 7=c
Question 8=a
Question 9=c
Question 10=c