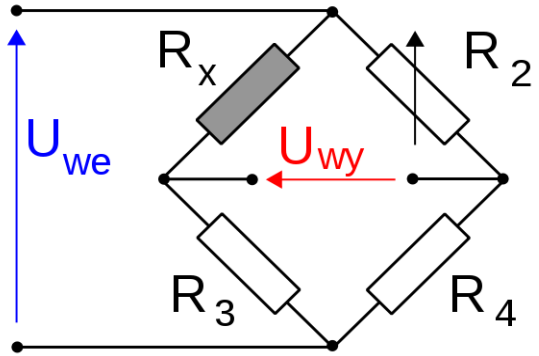
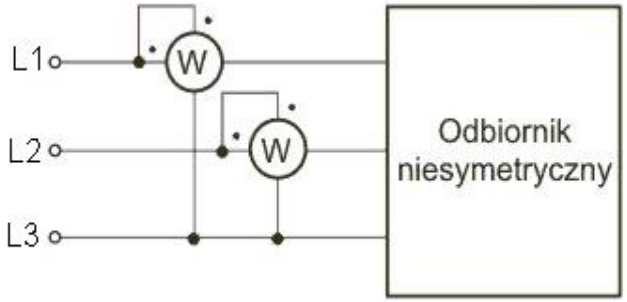
Examination questions for the course in “Metrology”

Operational level			
Metrology			
Questions O/T – specifies the nature of the question (obligatory, time demanding)			
No.	**O/T**	**Question**	**Correct answer**
1.	O	Which of the following answers contains only base units of the SI system: A. kg, s, V, cd, Hz, B. kg, s, A, mol, K, C. kg, s, W, rad, ºC, D. kg, min, A, N, s.	B
2.	O	Which of the unit conversions is correct? A. 2 μF=2·10 $^{-5}$ F, B. 20 mA = 0.002 A, C. 1 kV=1,000 V, D. 25 MHz=2.5 · 10 ^{6} Hz,	C
3.	O	In the SI system, an atomic standard is the standard of: A. time, B. electric current, C. mass, D. luminous intensity.	A
4.	O	In a sentence: “the power supply voltage is 5 V,” A. power supply voltage is a value, B. power supply voltage is a physical quantity, C. the notions of a value and a physical quantity are equivalent, D. there is no sense.	B
5.	O	A technical method of resistance measurement is an example of: A. a non-balanced measurement method, B. a combined measurement method, C. a direct measurement method, D. an indirect measurement method.	D

6.	O	An absolute error in measurement is defined as: A. the difference between the measurement result and the actual value of the measured quantity, B. the absolute value of the difference between the measurement result and the actual value of the measured quantity, C. the difference between the actual value of the measured quantity and the measurement result, D. the quotient of the measurement result and the actual value of the measured quantity.	A
7.	O	A relative error in measurement is defined as: A. the difference between the measurement result and the actual value of the measured quantity, B. the quotient of the measurement result and the actual value of the measured quantity, C. the quotient of the absolute error and the actual value of the measured quantity, D. the quantity of the actual value of the measured quantity and the measurement result.	C
8.	T	Voltage was measured using a class 1 voltage meter of the range of 10 V. A. The maximum measurement error was 1 V, B. The maximum measurement error was 0.1 V, C. The maximum measurement error was 0.01 V, D. The maximum measurement error was 0.001 V.	B
9.	O	A typical reason for systematic errors is: A. simplification of the measurement method, B. charge-up of non-conductive elements of the measuring instrument, C. subjective quality of the operator's sight, D. friction of movable mechanical elements of the measuring instrument.	A
10.	O	A magnetoelectric converter is composed of the following elements: A. a permanent magnet, a movable coil, return springs, B. an electromagnet, a movable core, return springs, C. a fixed coil, a movable coil, rectifier diodes, D. a transformer, a movable coil, return springs.	A
11.	O	An electromagnetic converter is composed of the following elements: A. a permanent magnet, a movable coil, return springs, B. an electromagnet, a movable and a fixed core, return springs, C. a fixed coil, a movable coil, rectifier diodes, D. a transformer, a movable coil, return springs.	B

12.	O	An electrodynamic converter is composed of the following elements: A. a permanent magnet, a movable coil, return springs, B. an electromagnet, a movable and a fixed core, return springs, C. a fixed coil, a movable coil, return springs, D. a transformer, a movable coil, rectifier diodes.	C
13.	O	Extending the DC ammeter range is done using: A. a voltage-range multiplier, B. a current transformer, C. a bypass, D. a DC current amplifier.	C
14.	O	The range of an ammeter of the internal resistance of Ra=1 Ω has been extended 10 times. The resistance of the bypass is: A. 1/11 Ω, B. 1/10 Ω, C. 1/9 Ω, D. 1/8 Ω.	C
15.	O	The range of a voltage meter of the internal resistance of Rv=100 k Ω has been extended ten times. The resistance of the voltage-range multiplier is: A. 900 k Ω, B. 1,000 k Ω, C. 1,100 k Ω, D. 800 k Ω.	A
16.	O	An analogue-to-digital converter is designed to: A. convert resistance to a number, B. convert binary numbers into voltage, C. convert voltage to a number, D. convert utility frequency to a number.	C
17.	O	The dual-slope integration method is: A. a direct method, B. an indirect method, C. a code method, D. combined methods.	B
18.	O	A digital voltage meter is composed of the following sub-assemblies: A. mixer, heterodyne, intermediate frequency amplifier, B. transformer, rectifier, low-pass filter, C. input system, A/C converter, display unit, D. input system, A/D converter, display unit.	D

19.	O	In order to use a magnetoelectric voltage meter to measure the RMS of voltage, it is necessary to: A. attach the voltage meter to the secondary winding reducing the voltage, B. apply a bypass attached simultaneously to the voltage meter, C. apply a half-wave or a full-wave rectifier as the input stage, D. apply a low-pass filter as the input stage.	C
20.	O	The scale of an electromagnetic meter used to measure the AC amperage is scaled in: A. units of the RMS current value, B. units of the average current value, C. units of the maximum current value, D. units of the instantaneous current value.	A
21.	O	A technical method of resistance measurement requires using the following instruments: A. an ammeter and an ohmmeter, B. two voltage meters, C. two ammeters, D. a voltage meter and an ammeter.	D
22.	O	A digital method of resistance measurement requires using: A. a current source and a digital ammeter, B. a current source and a digital voltage meter, C. a voltage source and a digital voltage meter, D. a generator of standard frequency and a pulse counter.	B
23.	O	In order to measure resistance, it is necessary to use: A. a Schering bridge, B. a Graetz bridge, C. a Wheatstone bridge, D. a Wien bridge.	C
24.	O	In a single-phase AC circuit, active power can be measured using: A. a wattage meter, B. a varmeter, C. a voltage meter and an ammeter. D. a variometer.	A

25.	O	The condition of balance for a bridge shown in the figure below  is as follows: A. Rx+R2=R3+R4, B. Rx ·R4=R2· R3, C. Rx· R2=R3 ·R4, D. Rx +R4=R2 +R3.	B
26.	O	2. The Aron circuit shown in the figure below is used to:  A. measure the active power, B. measure the apparent power, C. measure the distortion power, D. measure the power factor.	A

27.	O	Analogue frequency meters are manufactured using: A. electromechanical ratiometric converters, B. current transformers, C. low-frequency differential amplifiers, D. uncontrolled bridge rectifiers.	A
28.	O	An indispensable element of a digital frequency meter is: A. a rectifier bridge, B. a pulse counter, C. a constant voltage amplifier, D. a voltage divider.	B
29.	O	The output signal from a thermocouple is: A. resistance, B. capacitance, C. inductance, D. voltage.	D
30.	O	A compensating box in a system of temperature monitoring is used to compensate for: A. the passive power, B. radio-electrical interference, C. changes in the temperature of the thermocouple cold junction, D. changes in the voltage of the measurement system’s power supply.	C
31.	O	A three-wire system of connection of a thermoresistor with an unbalanced bridge makes it possible to: A. move the sensor away from the measurement system to a significant distance (>2 m), B. compensate for the radio-electrical interference induced in the wires, C. resign from stabilisation of the power supply voltage, D. increase the system’s reliability.	A

32.	O	A piezoresistive pressure transmitter functions on the basis of: A. a change in the capacitance of the silicon membrane relative to the sensor's housing, B. a change of the semiconductor resistivity under the impact of mechanical stress, C. induction of electrical charge under the impact of pressure, D. deformation of the membrane under the impact of external pressure.	B
33.	O	A potentiometer transducer can be used to measure: A. angular displacement, B. angular velocity, C. amplitude of mechanical vibration, D. frequency of mechanical vibration.	A
34.	O	A tensometric bridge may be power supplied by: A. a constant voltage of stabilized value, B. an alternating voltage of stabilized frequency, C. an alternating voltage of a purely sinusoidal waveform and of any amplitude, D. an alternating voltage of a saw waveform and of any frequency.	A
35.	O	A digital oscilloscope may not offer a direct measurement of: A. signal amplitude, B. signal frequency, C. signal source internal impedance, D. signal amplitude spectrum.	C
36.	O	The best analogue signal for transmission at significant distances (>2 m) is: A. a 4..20 mA current signal, B. a 0..10 V voltage signal, C. a 0..20 mA current signal, D. a -5 V .. + 5 V voltage signal.	A
37.	O	An element linking an analogue measurement channel with a computer is: A. a D/A converter, B. an AC/DC converter, C. a high-pass filter, D. an A/D converter.	D
38.	O	The sampling theorem concerns: A. the maximum frequency of the sampled signal, B. the minimum frequency of the sampled signal, C. the minimum length of a binary word, D. the resolving power of a converter.	A

39.	O	Non-used terminals of “single-ended” voltage inputs of a measurement card should: A. be left open, B. be shorted with the analogue ground, C. be shorted using a capacitor, D. be shorted using a resistor.	B
40.	O	A two-wire twisted pair is used to transmit digital signals because: A. it makes it possible to eliminate radio-electrical interference, B. it offers a low self-capacitance, C. it offers a low self-inductance, D. it is cheaper than a three-wire solution.	A