Exam questions “Ship testing and measurement systems”

Operational level			
Ship testing and measurement systems			
Questions M/T – denotes the type of the question (mandatory, requires more time)			
No.	**M/T**	**Question**	**Correct answer**
1	M	The aim of the extension or thermoelectric conductors connecting the thermocouple with the transducer or measurement circuit is: A. Compensation of the impact of the resultant resistance in the measurement circuit, B. The knowledge of the temperature of “cold ends” of the thermocouple becomes the knowledge of the temperature of the extension cables or thermo-electrical cables in the point of connecting the cables to the transducer or the measurement circuit, C. Compensation of the parasitic capacitance in the measurement circuit, D. Measurement of the reference temperature	B
2	O	Information on the defect of connecting wires both on the gap and in the short-circuit in the binary measurement path (ON-OFF) is acquired in the system with: A. Two diodes, B. Without resistors, C. One resistor, D two resistors,	D
3	O	Static thermocouple characteristics, both in the tabular and analytical forms, are cited in standards in reference to the following temperature of cold ends: A. $0^{o}C$, B. $100^{o}C$, C. $0^{o}F$, D. 100K,	A
4	O	An operational measurement circuit for the measurement of temperature using a thermocouple after disconnecting conductors and the short-circuiting of clamps of the circuit in which they were connected shows: A. The temperature of clamps to which the thermoelectric conductors were connected, B. Temperature of the cold ends of the thermocouple, C. The temperature of the measurement junction of the thermocouple, D. Temperature difference between the temperature of the measurement junction and the ambient temperature.	A

5	O	Relevant resistor(s) in the binary measurement path (ON-OFF) with alarm which signals the fault of connecting conductors must be connected: A. To the clamps of the measurement circuit, B. To the clamps of the binary sensor, C. In parallel to the damping capacitor, D. In series with the external inductance.	B
6	O	Information on a defect in connecting conductors in the binary measurement path (ON-OFF) only in the form of the gap is acquired in the circuit with: A. Two diodes, B. Without resistors, C. One resistor, D. Three resistors.	C
7	O	The thermo-resistor of the sensor Pt-100 is made of: A. Gold, B. Silver, C. Platinum, D. Platinum rhodium alloy.	C
8	O	The characteristic curve for the thermal resistance sensor Pt-100 in the temperature range between -200^{o}C and 850^{o}C is: A. Exponential, B. Rectilinear, C. Sinusoidal, D. Non-linear.	D
9	O	Sensor Pt-100 has a resistance of 100 [Ω] (ohms) at the temperature of: A. 100^{o}C, B. 0^{o}C, C. 100^{o}F, D. 0^{o}F,	B
10	M	The measurement signal from the thermocouple has: A. Constant voltage, B. Variable voltage and is periodic, C. Variable voltage and is non-periodic, D. Is a pulse where the width of the pulses depends on the measured temperature.	A

11	O	Thermoelectric wires are used for the connection of: A. Thermal resistance sensor Ni-100, B. Thermistor, C. Strain gauge, D. Thermocouple.	D
12		Connection of the sensor Pt-100 to the measurement system or transducer via three or four wires is necessary because of the following: A. Connection reliability must be increased, B. Redundant wires in the cable should be used effectively, C. The impact of the connecting wires must be eliminated, D. The reference temperature is measured.	C
13	O	Smoke detectors use the following principle of operation A. Ionization and/or optical, B. Microwave, C. Ultrasound, D. Temperature measurement using a thermistor.	A
14	O	Operation of the fire thermal detectors is based on: A. Change in the conductivity of the detector resulting from the impact of smoke particles on ionized air particles, B. Weakening or dissipation of the infrared light, C. Change in the humidity of the detector, D. Change in the resistance of the thermistor.	D
15	O	The signalling system of the general alarm can be not installed: A. In engine rooms, B. In living quarters, C. In processing rooms, D. In the corridors of living quarters.	B
16	O	The signalling system of the general alarm can be powered by its battery pack if the following is provided: A. The battery pack does not supply other internal communication equipment, B. The pack capacity is sufficient for supplying power to the alarm system for 1 hour, C. The alarm power supply system automatically switches to the battery pack, D. The battery is disconnected from the charging rectifier.	C
17	O	General signalling circuits must be protected against: A. Only from overloading, B. Only from short-circuiting, C. From short-circuiting and overloading, D. From the temperature of rooms.	B

18	O	The alarm circuit should trigger the alarm signalling system on the failure of the monitored circuit by: A. Interrupting the alarm trigger circuit by an electrical contact, B. Closing the alarm trigger circuit by an electrical contact, C. Interrupting or closing alarm trigger circuit depending on the design of the alarm trigger circuit, D. Applying voltage to the alarm circuit.	A
19	O	Information on momentary alarm conditions (disappearing without any intervention): A. Is not transmitted by the alarm signalling circuit, B. Is transmitted by the alarm circuit and disappears after the alarm condition vanishes, C. Is transmitted by the alarm circuit and it is maintained until it is acknowledged by the crew, D. Is only recorded by the alarm printer,	C
20	O	A momentary disruption in the power supply to the alarm circuit: A. Results in the loss of information on alarm conditions occurring before the disruption, B. Causes restoring information on the last alarm condition, C. Does not result in the loss of information on alarm conditions occurring before the disruption, D. Causes restoring information on alarm conditions occurring in the marine power plant.	C
21	O	The safety circuit of the mechanism should be independent from the following: A. Alarm system, B. Control system, C. Control and alarm systems. D. Failure of the monitored signal detector.	C
22	O	If the safety circuit stops the device, restarting the device is possible: A. Automatically, without additional operations, B. Manually, C. Automatically or manually, after the manual unlocking of the control system, D. Manually after the defect is repaired.	C
23	O	Intrinsically safe (spark-proof) accompanying devices are installed in the following: A. The safe zone, in the output of external circuits entering the explosive zone, B. In the explosive zone in the input of the measurement circuits, C. The explosive zone, in parallel to the external measurement circuit, D. The safe zone, in parallel to external circuits.	A

24	O	The Zenner barrier is based on: A. The stabilisation of the temperature of circuits in the explosive zone, B. Protection against the voltage surge in the circuit in the explosive zone. C. Connection of the external circuits of the safe zone to the internal circuits of the explosive zone in the case of a failure, D. Extinguishing of the electric arc in the hazardous zone.	B
25	O	There are two intrinsically safe (spark-proof) electrical devices with the safety levels “a” and “b” Which device provides a higher safety level? A. “b”, B. ”a”, C. Both devices are equally safe. D. It cannot be stated, the data is insufficient.	B
26	O	What kind of devices can be made intrinsically safe (spark-proof): A. Slip-ring motors, reactive power compensators, contactors, B. Electrical devices operating at high power intensity, e.g. 100A, C. Low power testing and measurement equipment, D. High power testing and measurement equipment, e.g. 200W.	C
27	O	Labelling of the electrical device in explosion proof design Ex ia IIC T6 consists of the series of symbols which indicate the following: A. Symbol denoting explosion-proof design, intrinsically safe (spark-proof) device with a very high safety level which can be operated in an explosive atmosphere consisting of hydrogen and air, in the temperature group which guarantees that the surface temperature will not exceed 85^{o}C, B. Intended use, the year of manufacture, accuracy class, ignition group, the number of the relevant standard specification, C. Type of device, spark-proof protection level, ignition group, temperature class which guarantees that the surface temperature will exceed 85^{o}C	A
28	O	Application of three identical Zener diodes configured in parallel in the intrinsically safe (spark-proof) protective barrier: A. Improves matching of the barrier to the measurement circuit located in the hazardous zone, B. Does not affect the essential parameters of the barrier, but increases costs, C. Increases the safety level. D. Decreases the safety level.	C

29	O	The permitted working plane of the two-wire 4-20mA measurement path describes application properties for the following: A. Transducer, B. Measurement path, C. The source of the supply voltage, D. The loading of the measurement path.	B
30	M	The serial diode configured in series between the transducer and the measurement circuit: A. Protects the measurement path against overvoltage, B. Enables measurement of the output current of the transducer without disconnecting conductors, C. Introduces the reference temperature compensation, D. Stabilizes the supply voltage.	B
31	M	The working point of two-conductor current measurement path in 4-20 mA standard is determined by the following coordinates: A. The minimum and maximum permitted supply voltages of the transducer, B. The value of the supply voltage of the measurement path and resultant termination resistance, C. Minimum loading value and maximum voltage value, D. The voltage value of the measurement path and resistance of the thermal resistance sensor.	B
32	O	A high resistance of the two-conductor measurement path in 4-20mA standard results, among others, from the following: A. The measurement range, B. Supply voltage, C. The application of the current as an information carrier, D. Termination resistance.	C
33	O	When the transducer is programmed in accordance with Hart Protocol, the programmer must be connected in the transducer circuit compliant with 4-20mA standard so that the minimum resistance of the voltage side is: A. 1 [kΩ](kilohms), B. 0 [Ω](ohms), C. Any value, D. 250 [Ω](ohms).	D
34	O	When the programmer communicates with the Hart transducer, there is a reciprocal transmission of the following signals: A. TTL with the frequency of 10 kHz, B. TTL with the variable frequency dependent on the flowing current, C. Sinusoidal signals with the frequencies of 1200Hz and 2200Hz, D. Voltage signals in the range 0-10V DC.	C

35	O	When the intelligent transducer is programmed using the HART programmer, the transducer: A. Should be disconnected from the measurement circuit and energized from a separate power supply, B. Does not require a power supply, C. Must be energized with the pulse voltage using the specially selected capacity of the serial capacitor, D. Can operate in accordance with its application provided that the resultant termination resistance is minimally 250 [Ω](ohms)	D
36	O	The following is measured based on the measurement of the hydrostatic pressure in liquid level measurement systems in open tanks: A. The absolute pressure of the liquid column, B. The absolute pressure, C. Pressure difference in regard to the atmospheric pressure, D. Negative pressure in regard to the atmospheric pressure.	C