Examination questions on the subject of „High voltage technology"

		Operational level	
		High voltage technology	

Questions
O/T - means Basic/Advanced

Item	O/T	Question	Correct answer

1.	O	The impact ionization under electric field influence occurs in the event of an impact of:
		    A. two ions,
		    B. electron and neutral particle,
		    C. two molecules of matter,
		    D. electron and positive ion.
			B

2.	O	Surface ionisation is a phenomenon occurring mainly in the following areas:
		    A. anode,
		    B. cathode,
		    C. on the surface of the solid material,
		    D. in air gaps.
			B

3.	O	Photoionisation can be classified into:
		    A. indirect and direct,
		    B. homogeneous and heterogeneous,
		    C. internal and external,
		    D. complete and incomplete.
			C

4.	O	The deionisation process consists of:
		    A. neutralisation of the opposite load particles as a result of conveying the load while approaching each other,
		    B. movement of ions and electrons from more concentrated areas to less concentrated areas,
		    C. binding of electrons by gas molecules,
		    D. annihilation of particles involved in the recombination and emission of energy quantum.
			A

5.		What is the measure of polarity of electrical insulating materials?:	

		A. susceptibility to incomplete discharges, B. dielectric loss coefficient, C. resistivity, D. Relative dielectric permittivity.	D

6.		How does conductivity of dielectrics depend on temperature:
		    A. decreases with temperature rise,
		    B. increases linearly with temperature,
		    C. increases exponentially with temperature,
		    D. does not depend on temperature.
			C

7.	O	Due to the spatial distribution, stresses can be distinguished as:
		    A. homogenous, heterogeneous, medium and local,
		    B. constant and alternate,
		    C. impact,
		    D. momentary and maximum.
			A

8.	O	In the case of parallel installation of insulation materials, stress distribution on both sides of the dielectric separation limit is determined as:
		    A. $E_1 > E_2$,
		    B. $E_1 = E_2$,
		    C. not determined,
		    D. $E_1 < E_2$.
			B

9.	O	In a flat system of dielectrics arranged in series, the stresses in materials differing in the relative dielectric permeability are associated with the following equation:
		
		    A. $\dfrac{E_1}{E_2} = \dfrac{\varepsilon_1}{\varepsilon_2}$,
		
		    B. $\varepsilon_2 E_1 = \varepsilon_1 E_2$,
		
		    C. $\dfrac{E_1}{E_2} = \dfrac{\varepsilon_2}{\varepsilon_1}$,
		
		    D. $E_1 = E_2$.
			C

10.	O	What is the approximate number of free loads in ambient air under average conditions?:	

		A. 10^3 particles/mm³, B. 10 particles/cm³, C. 10^3 particles/m³, D. 10^3 particles/cm³.	D

11.	O	Cascade discharge in the gas dielectric is initiated by:
		    A. occurrence of photoemission phenomenon,
		    B. occurrence of deionisation processes,
		    C. free electron,
		    D. stress compensation in the non-homogeneous field.
			C

12.	O	Which of the following mechanisms occur in gases at distances up to 1 cm and atmospheric pressure:
		    A. Townsend
		    B. tunnelling,
		    C. channelling,
		    D. vacuum.
			A

13.	O	Critical stress is the value at which:
		    A. distribution of the electric field is aligned,
		    B. deionisation processes are increasing,
		    C. arched discharge begins,
		    D. electrical discharge is developing.
			D

14.	O	The value of the starting voltages of the gas self-discharge determines:
		    A. Paschen law,
		    B. edge effect,
		    C. streamer mechanism,
		    D. Rogowski profile.
			A

| 15. | O | Which of these types of discharges is not a partial discharge:
    A. pollution creep,
    B. slide,
    C. surface jump,
    D. coronal. | C |

| 16. | O | The dielectric resistance of the air at a pressure of 1 atmosphere at 20°C between flat electrodes at a distance of 1 cm is approximately:
    A. 15 kV/cm,
    B. 30 kV/cm ,
    C. 1 kV/cm,
    D. 5 kV/cm. | B |

| 17. | O | The impact factor for gases is determined by the following equation: | B |

A. $k_{ud} = \dfrac{U_{p100}}{U_{ps}}$,

B. $k_{ud} = \dfrac{U_{p50}}{U_{ps}}$,

C. $k_{ud} = \dfrac{U_{ps}}{U_{p50}}$,

D. $k_{ud} = \dfrac{U_{p0}}{U_{ps}}$.

| 18. | O | At atmospheric pressure, the sulphur hexafluoride (SF6) in relation to air shall have:
    A. 2 times more electrical resistance,
    B. equal electrical resistance,
    C. 3 times more electrical resistance,
    D. 10 times more electrical resistance. | C |

19.	O	The critical stress of sulphur hexafluoride (SF6) as the pressure increases above atmospheric pressure is subject to the following conditions:
		    A. decreases,
		    B. does not change,
		    C. increases,
		    D. increase or decrease depending on the humidity level.
			C

20.	O	In which equipment mineral insulating oil is commonly used:
		    A. low-voltage switchgears,
		    B. transformers,
		    C. high voltage switchgears,
		    D. medium voltage cables.
			B

21.	O	Synthetic silicone oils in relation to mineral oils show:
		    A. lower thermal resistance,
		    B. the same thermal resistance,
		    C. higher thermal resistance,
		    D. higher flammability.
			C

22.	O	Why electrical insulating oils are generally not used in the shipbuilding industry:
		    A. due to low electrical resistance,
		    B. due to fire and environmental risks,
		    C. due to high prices,
		    D. due to low resistance to the maritime environment.
			B

23.	O	Bridge mechanism is associated with the presence in dielectric liquid of:
		    A. bubbles of gas,
		    B. solid impurities,
		    C. water particles,
		    D. inhibitors.
			B

24.	O	What breakthrough mechanism will occur in case of long-term permanent dielectric stressing:
		    A. electric breakthrough (significant),
		    B. cascade mechanism,
		    C. channeling mechanism,
		    D. ionisation and ageing.
			D

25.	O	Full discharge (puncture) in the solid dielectric:
		    A. causes irreparable damage to it,
		    B. causes a change (deterioration) in its resistance parameters,
		    C. causes reparable damage to it,
		    D. causes a momentary arc short circuit.
			A

26.	O	The concept of specific strength refers to:
		    A. dielectric without impurities and admixtures,
		    B. dielectric without impurities with low admixture,
		    C. static-stressed dielectric,
		    D. gas dielectric.
			A

27.	O	The resistance of dielectrics of technical purity is:
		    A. higher than specific strength
		    B. slightly less than specific strength,
		    C. much less than specific strength,
		    D. equal to specific strength.
			C

28.	O	Surface incomplete discharge, in the long term, leads to:
		    A. insulator puncture,
		    B. reduced cross-resistance of the insulator,
		    C. elongation of the leakage path,
		    D. insulator damage.
			D

29.		What kind of electro-isolation system we call non-breakable:
		    A. one of very high electrical strength,
		    B. one where the jump voltage is lower than the breakthrough voltage,
		    C. one protected against sliding discharges,
		    D. one with non-homogeneous stresses.
			B

30.	O	What is the reason for incomplete discharges on the solid insulation surface:
		    A. inadequate cable material,
		    B. impurities and soiling,
		    C. too low surface resistivity,
		    D. low thermal resistance of the material.
			B

31.	O	How is the intensity of partial discharges (PD) measured in insulation systems?:
		    A. by measuring the dielectric loss factor,
		    B. by measuring the leakage current,
		    C. by thermal imaging measurements,
		    D. by measuring acoustic interference.
			D

32.	O	The value of overvoltage is measured by the coefficient of overvoltage determined by the:
		    A. the ratio of amplitude: overvoltage to maximum operating voltage,
		    B. the ratio of the effective values: overvoltage to maximum operating voltage,
		    C. the ratio of effective values: overvoltage to rated voltage,
		    D. the ratio of amplitude: overvoltage to rated voltage.
			A

33.	O	For internal overvoltages, the overvoltage factor is:
		    A. within the range 1 - 1,7,
		    B. rarely greater than 2,
		    C. within the range 1– 2,5,
		    D. greater than 2.
			B

34.	O	For external overvoltages, the overvoltage factor is included in the range of:
		    A. 1 – 2,
		    B. 2 – 4,
		    C. 1,1 – 1,7,
		    D. > 5.
			D

35.	O	What circumstances can cause the greatest internal overvoltages:
		    A. shutdown of idle transformers or capacitor batteries,
		    B. shutdown of transformer or motor under rated lo,
		    C. earth short-circuit for one phase,
		    D. 3 phase short circuit.
			A

36.	O	Under what conditions can waveforms be generated in electrical power components:
		    A. with permanent earth contact,
		    B. at very high frequency of the voltage or current,
		    C. in the event of lightning striking the hull of the vessel,
		    D. on starting the engine or activating the generator.
			B

37.	O	As the overvoltage wave moves along the power line, it is suppressed:
		    A. in inductive, dielectric, sliding ways,
		    B. in resistance, leakage and transient leakage ways,
		    C. in capacity, surface ways,
		    D. in resistance, amplitude and internal ways.
			B

38.	O	The following vessel components are particularly vulnerable to lightning strikes:
		    A. bridge under the radar tower,
		    B. continuous decks,
		    C. masts and antennas,
		    D. tanks and cargo holds.
			C

39.	O	Lightning discharge can be a source of overvoltage:
		    A. of internal and external type,
		    B. of direct and induced type,
		    C. only interphase with significant values type,
		    D. only earthly type.
			B

40.	O	When no additional lightning protector installation is required:
		    A. where an effective electrical connection from the highest point of the ship to the steel hull is ensured,
		    B. where all parts exposed to lightning strikes (anthens, masts) are isolated from the hull,
		    C. where all components exposed to lightning strikes are made of electrical insulating materials,
		    D. where no electrical appliances are present at the highest point of the mast (on top).
			A

41.	O	Lightning discharges on a steel hull ship are particularly dangerous for the following installations:
		    A. computer networks,
		    B. power grids,
		    C. main engine automation,
		    D. firefighting.
			A

42.		The following are used as surge protection in the HV power grid:
		    A. capacitor batteries,
		    B. thyristor switches,
		    C. valve deflectors,
		    D. melt fuses.
			C

43.		At the cable terminals in the ship's HV power grid, the following are used: A. cable terminals, B. cable boxes, C. Cu/Al washers, D. special arch shielding systems.	A
44.		The most commonly used switches in the ship's HV network are: A. low-oil circuit breakers, B. vacuum or SF $_6$ switches, C. switches with deionisation plates, D. non-contact switches.	B
45.		In ship's HV switchgears the following is applied: A. tightly closed structures, B. partitioning into attenuator chambers, C. only switch-disconnectors with safety catch, D. only non-contact switches.	B
46.	O	Durability of cables designed for high-voltage, alternating current installations: A. can only be tested with DC test systems, B. can only be tested with AC test systems, C. can be tested with DC and AC test systems, D. can only be tested with the Schering's high voltage bridge.	C
47.	O	The minimum insulation distance in the air between non-insulated rails and metal parts in the rated operating voltage range of electrical equipment from 6 kV to 10 kV shall be as follows: A. 1,1 cm, B. 10 cm, C. 100 cm, D. 0,10 cm.	B
48.	O	Before measuring with the high voltage indicator, there is no need for: A. checking the degree of humidity and soiling and, if necessary, thorough cleaning of the indicator, B. checking the technical condition for cracks, mechanical damage, C. checking the measuring range on the rating plate, D. checking the originality of the packaging in which the indicator is stored.	D

| 49. | O | The limiting sign on the insulating rod is a point:
    A. below which no live parts may be touched by the insulating rod,
    B. below which live parts can be touched with the insulating rod.,
    C. that indicates restrictions on use in humid rooms.,
    D. that indicates restrictions of use in potentially explosive atmospheres.. | A |
| 50. | O | Which of the following average stress levels is not currently used on seagoing vessels:
    A. 3,3 kV,
    B. 6,6 kV,
    C. 11 kV,
    D. 40 kV. | D |