
*Theory test
of the centralised professional qualification
exam*

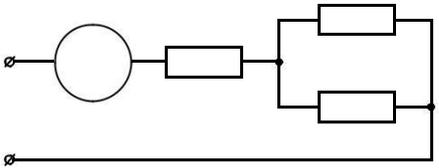
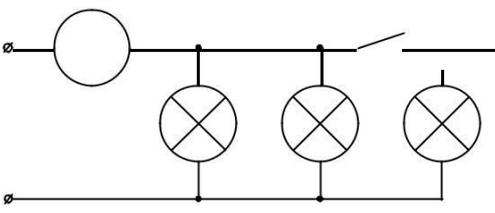
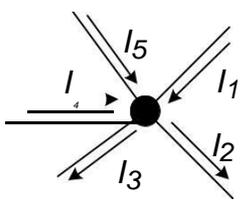
Professional qualification Electrician

June 2018

Instructions on how to complete the theory test of the professional qualification exam

1. The test set consists of tasks and answer sheets.
2. Before starting with the tasks, please write the following on the answer sheet:
 - Name, Surname
 - Educational institution
 - Group
3. Use a blue or black pen to fill in the answers.
4. Do not use a whiteout in the answer sheets.
5. You can complete the tasks in an order of your choice.
6. On the answer sheet, mark only one correct answer by a cross in the corresponding square. The answer should be clearly visible.
7. If you've made a mistake, correct your answer by colouring in the square of your first answer and then crossing another one.
8. Do not make any notes in the exam set.
9. Duration of the test: 100 minutes.
10. After finishing, please give the test set to the exam commission.

PARAUGS	
2.	3.
1 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>
2 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>
3 <input type="checkbox"/>	3 <input type="checkbox"/>
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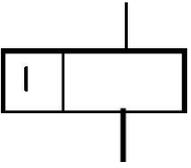
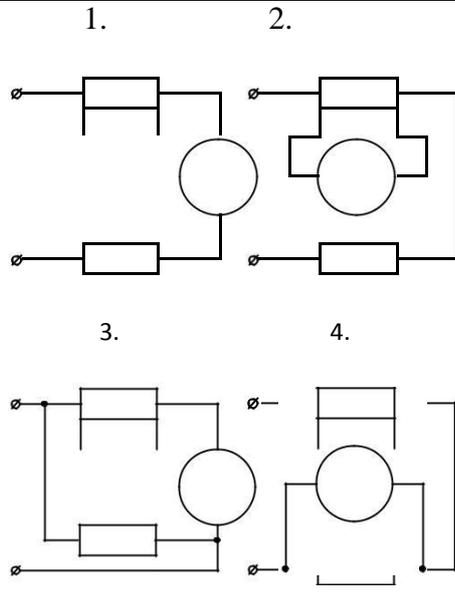
<p>1.</p>	<p>Total resistance of four incandescent light bulbs is 1. Determine the type of incandescent light bulb connection if the resistance of one incandescent light bulb is 4.</p>	<ol style="list-style-type: none"> 1. Series circuit 2. Parallel circuit 3. Combination circuit 4. Star circuit
<p>2.</p>	<p>How high will be the current on the ammeter?</p> 	<ol style="list-style-type: none"> 1. 1A 2. 2A 3. 3A 4. 0.5A
<p>3.</p>	<p>How would the ammeter reading change if the incandescent light bulb EL3 were disconnected?</p> 	<ol style="list-style-type: none"> 1. It will increase 2. It will decrease 3. It will not change 4. It will show 0
<p>4.</p>	<p>How is the relation w_1/w_2 called, where w is the number of coils in a transformer winding?</p>	<ol style="list-style-type: none"> 1. Power factor 2. Load factor 3. Coefficient of performance 4. Efficiency
<p>5.</p>	<p>Why are magnetic circuits of transformers made from separate electrical steel sheets?</p>	<ol style="list-style-type: none"> 1. To reduce the heating of windings 2. To make it possible to change the cross section of a magnetic circuit by changing the number of sheets 3. To reduce eddy current losses 4. To make it possible to put together a transformer by covering one sheet with another
<p>6.</p>	<p>Which formula determines the connection between the number of transformer coils w_1, w_2, voltage U and current I?</p>	<ol style="list-style-type: none"> 1. $W_1/ W_2= U_1/ U_2= I_1/ I_2$ 2. $W_1/ W_2= U_1/ U_2= I_2/ I_1$ 3. $W_1/ W_2= U_2/ U_1= I_2/ I_1$ 4. $W_2/ W_1= U_1/ U_2= I_2/ I_1$
<p>7.</p>	<p>Which formula calculates the strength of current I_5 ?</p> 	<ol style="list-style-type: none"> 1. $I_5 = I_3 + I_4 - I_1 - I_2$. 2. $I_5 = I_3 + I_4 + I_1 + I_2$ 3. $I_5 = I_2 + I_3 - I_1 - I_4$ 4. $I_5 = I_4+I_2+I_3 - I_1$
<p>8.</p>	<p>Primary winding of the transformer is connected to a network. Secondary winding is disconnected from the consumer. What current is in the primary winding?</p>	<ol style="list-style-type: none"> 1. Load current 2. No-load current 3. Nominal current 4. Short circuit-current
<p>9.</p>	<p>In the secondary winding of the transformer there are 46 coils, in the primary one - 920. Determine coefficient of performance!</p>	<ol style="list-style-type: none"> 1. 0.05 2. 0.5 3. 1.5 4. 20

10.	In which case in a circuit which contains active, inductive and capacitive resistance in series, $\cos\phi = 0$?	<ol style="list-style-type: none"> 1. In case of current resonance 2. In case of active resistance which is equal to zero 3. In case of active and reactive resistance equality 4. In case of voltage resonance
11.	What will be the resistance of an electric stove spiral in work mode, if 5A strong current flows in the spiral of the electric stove and the stove is connected to 220V voltage network?	<ol style="list-style-type: none"> 1. 44 2. 22 3. 110 4. 220
12.	Voltage source is 1.8V and 2.7 resistor resistance is connected to it. Current strength in circuit is 0.5A. What will be the internal voltage drop in current source?	<ol style="list-style-type: none"> 1. 2.0 2. 1.5 3. 0.45V 4. 1.35V
13.	Battery consists of two parallel connected closed accumulator groups with three accumulators in each of them and a 1.65 resistor is connected in series. Electromotive force of the accumulators is 1.2V, internal resistance is 0.1. What is current strength in the external circuit?	<ol style="list-style-type: none"> 1. 4.21A 2. 2.00A 3. 2.14A 4. 2.1A
14.	When is it necessary to carry out maintenance repair for collector and brushes?	<ol style="list-style-type: none"> 1. If the generator starts to vibrate 2. If you can hear a loud sound 3. If you see sparking 4. If the voltage starts to reduce
15.	How are luminescent lamps utilised?	<ol style="list-style-type: none"> 1. They can be thrown away with household waste 2. They are broken into pieces and then utilised as glass fragments 3. They are collected and transferred to licensed recycling companies 4. They can be utilised by burying them into the ground
16.	How can the armature current and voltage of a direct current generator be regulated?	<ol style="list-style-type: none"> 1. By changing the power of primary motor 2. By changing the excitation current 3. By changing the current of additional poles 4. With an excitation winding connection
17.	What is the main advantage of an asynchronous motor compared to a direct current motor with the same power?	<ol style="list-style-type: none"> 1. Low weight 2. Simple construction 3. Lifetime length 4. Big speed range
18.	In which moment does tram motor work as a generator?	<ol style="list-style-type: none"> 1. When the tram maintains constant speed 2. When the tram accelerates 3. When the tram starts moving 4. When the tram slows down
19.	Which one is the correct formula for asynchronous motor from network supplied power!	<ol style="list-style-type: none"> 1. $P_1 = \sqrt{3} U_1 I_1 \cos\phi$ 2. $P = U I \cos\phi$ 3. $P = \sqrt{3} U I$ 4. $P = \sqrt{3} U_f I_f \cos\phi$
20.	Which one is the formula of active power of asynchronous motor in a star circuit?	<ol style="list-style-type: none"> 1. $P = \sqrt{3} U I \cos\phi$ 2. $P = U_f I_f \cos\phi$ 3. $P = \sqrt{3} U_f I_f$ 4. $P = \sqrt{3} U_f I_f \cos\phi$

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21.	Why, sometimes, when starting an electric motor the switch Y/ Δ is used?	<ol style="list-style-type: none"> 1. To change motor speed 2. To reduce inrush current 3. To increase motor torque at the moment of launch 4. To reduce motor slip
22.	For which capacitors should the electrical polarity be strictly respected when connecting them in a circuit?	<ol style="list-style-type: none"> 1. Ceramic 2. Electrolytic 3. Mica 4. Variable capacitors
23.	What will be the total voltage and capacity of series circuit of two accumulators 12V/55Ah?	<ol style="list-style-type: none"> 1. 12V and 110Ah 2. 12V and 55Ah 3. 24V and 55Ah 4. 24V and 110Ah
24.	What is marked with this graphic symbol?	<ol style="list-style-type: none"> 1. Inductance coil with a magnetic dielectric core 2. Resistor 3. Inductance coil with a ferromagnetic core. 4. Electric stove spiral
25.	What is marked with this graphic symbol?	<ol style="list-style-type: none"> 1. Two-sided zener diode 2. Tenzo diode 3. One-sided zener diode 4. Tunnel diode
26.	What is marked with this graphic symbol?	<ol style="list-style-type: none"> 1. Overhead power line on poles 2. Overground power line 3. Underground power line 4. Underwater power line
27.	What is marked with this graphic symbol in deployment plans?	<ol style="list-style-type: none"> 1. Overhead power line corner pole with a guy wire 2. Overhead power line corner pole with a subpole 3. Overhead power line pole 4. Underwater power line
28.	Which element in electric schemes is marked with the letters XT?	<ol style="list-style-type: none"> 1. Releasable connection 2. Resistor 3. Outlet 4. Fuse
29.	What is marked with this graphic symbol? 	<ol style="list-style-type: none"> 1. Disconnecting contact of a contractor 2. Connecting contact of a contractor 3. Connecting contact of a switch 4. Disconnecting contact of a disconnecter

<p>30.</p>	<p>What is marked with this graphic symbol?</p> 	<ol style="list-style-type: none"> 1. Breakdown fuse 2. Fuse cutout 3. Arrester 4. Switch-arrester
<p>31.</p>	<p>What is marked with this graphic symbol?</p> 	<ol style="list-style-type: none"> 1. Alternating current relay 2. Direct current relay 3. Voltage relay 4. Current relay
<p>32.</p>	<p>In which scheme the shunt is turned on correctly in a ammeter circuit?</p>	
<p>33.</p>	<p>On the scale of which measuring device there is the symbol W?</p>	<ol style="list-style-type: none"> 1. Voltmeter 2. Ammeter 3. Electricity meter 4. Wattmeter
<p>34.</p>	<p>What is used to measure voltage?</p>	<ol style="list-style-type: none"> 1. With an indicator 2. With a hand lamp 3. With a frequency meter 4. With a voltmeter
<p>35.</p>	<p>How should a wattmeter be connected to an electronic circuit so that it measures active power?</p>	<ol style="list-style-type: none"> 1. Current winding - parallel to load, voltage winding - in series 2. Both windings in series behind each other 3. Both windings parallel to each other and parallel to the load 4. Current winding in series with load and parallel to load - voltage winding

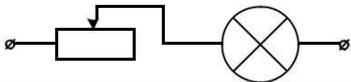
36.	How should single-phase electricity meter windings be connected in a circuit?	<ol style="list-style-type: none"> 1. Current winding - parallel to load, voltage winding - in series 2. Both windings in series behind each other 3. Both windings parallel to each other and parallel to the load 4. Current winding in series with load and parallel to load - voltage winding
37.	How is the active energy measurement device called?	<ol style="list-style-type: none"> 1. Wattmeter 2. Voltammeter 3. Multimeter 4. Electricity meter
38.	Why are ohmmeter test leads connected before measuring?	<ol style="list-style-type: none"> 1. To warm up the battery of the meter 2. To check the ohmmeter 3. To charge the battery of the meter 4. To remove static electricity
39.	What do fuse cutouts protect from in an electric network?	<ol style="list-style-type: none"> 1. They protect from network short circuit current and a lasting overload 2. They protect from overvoltage regime 3. They protect the device from overheating 4. They protect from static electricity
40.	What do arresters protect from in an electric network?	<ol style="list-style-type: none"> 1. From short circuit current 2. From overvoltage in network 3. From lasting overload 4. From static electricity
41.	Why are fuse cutouts filled with quartz sand?	<ol style="list-style-type: none"> 1. For a better heat output in the air 2. To extinguish electric arc during overheating 3. For fuse sealing 4. So that the fuse can bear higher current
42.	What would happen if direct current contactors were replaced with similar alternating current devices?	<ol style="list-style-type: none"> 1. Alternating current contactor will not sufficiently pull armature 2. Alternating current contactor will increasingly heat 3. Alternating current contactor will work slower 4. Alternating current contactor will extinguish electric arc lighter
43.	How can homes, equipment and pets be protected from lightning?	<ol style="list-style-type: none"> 1. By turning off electricity during thunderstorm 2. By closing windows and doors during thunderstorm 3. By installing lightning conductors 4. There is no protection from lightning
44.	Which workers are allowed to carry out live working?	<ol style="list-style-type: none"> 1. Workers with 10 year experience in electrical installations 2. Workers with C electrical safety group 3. Workers who are given the right to carry out such work 4. Workers with a bachelor's degree in electrical sciences
45.	In which case differential protection relay is called a leakage relay?	<ol style="list-style-type: none"> 1. If actuation happens when the current difference is 10 mA 2. If actuation happens when the current difference is 30 mA 3. If actuation happens when the current difference is 100 mA 4. Only one current flows in a leakage relay

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46.	What is the amplitude of sinusoidal alternating current if the ammeter shows the effective value 10A?	<ol style="list-style-type: none"> 1. 10A 2. 14.1A 3. 17.3A 4. 20A
47.	In a three-phase system with an earthed neutral, the voltage between phases is 280V. Determine voltage between phase and zero!	<ol style="list-style-type: none"> 1. 660V 2. 380V 3. 220V 4. 127V
48.	What does this cable marking mean XLPE - 3 x 50 + 1 x 25?	<ol style="list-style-type: none"> 1. A cable with three conductors with a 50mm diameter and two conductors with 25mm diameter 2. A cable with three conductors with a 50mm diameter and one conductor with 25mm diameter 3. A cable with three conductors with 50mm² cross section and one conductor with 25mm² cross section 4. Cable work voltage 25kV and permissible current in each conductor 50A
49.	Why does the rupture of a neutral conductor count as a breakdown in electric networks up to 1000V?	<ol style="list-style-type: none"> 1. Because the consumer will be below phase voltage 2. Because the consumer will be below line voltage 3. Because all consumers will be disconnected from electricity 4. A big consumer voltage asymmetry occurs
50.	What kind of current flows in the neutral conductor of a three-phase system, if the load is symmetrical?	<ol style="list-style-type: none"> 1. Short circuit-current 2. Single phase current 3. Current does not flow 4. Nominal current
51.	What function does the transformer substation fulfil?	<ol style="list-style-type: none"> 1. Produces electric energy 2. Modifies and divides electrical energy 3. Accumulates electric energy 4. Transmits electrical energy into distance
52.	What can be calculated with the formula $P = \sqrt{3}UI\cos\varphi$?	<ol style="list-style-type: none"> 1. Nominal angular momentum of an electric motor 2. Power factor in a three-phase network 3. Nominal power in a three-phase network 4. Nominal current in a three-phase network
53.	What for is the starting of asynchronous engine with a reduced voltage used?	<ol style="list-style-type: none"> 1. To increase starter moment 2. To reduce commutation 3. To reduce motor vibrations 4. To reduce inrush current
54.	What are three-bar packet switches intended for?	<ol style="list-style-type: none"> 1. To turn an electric motor on and off 2. For an automatic reversal of electric motors and electric circuits 3. To automatically switch over from star to triangle, to reduce starting current 4. For electric device protection
55.	How is the asynchronous electric motor regenerative braking regime achieved?	<ol style="list-style-type: none"> 1. By changing polarity of supply voltage 2. With brake blocks 3. By disconnecting motor from supply unit and by connecting a breaking resistance 4. By turning motor faster than idle running rotational speed
56.	In non-transformer rectifiers as voltage dividers are used ...	<ol style="list-style-type: none"> 1. Capacitors 2. Incandescent light bulbs

57.	Meters are made from	<ol style="list-style-type: none"> 1. D - latches 2. J-K latches 3. R-S latches 4. T latches
58.	For turning light on and off from several places, impulse relays might be used. What logical function do the buttons create which conduct relay?	<ol style="list-style-type: none"> 1. "And" 2. "Or" 3. "No" 4. "Excluding OR"
59.	What is the maximum allowed voltage for an electrical tool which can be used in especially dangerous rooms?	<ol style="list-style-type: none"> 1. 220V 2. 42V 3. 12V 4. 6V
60.	What is the electrical danger category of a room, in which the temperature is 40° C and relative humidity of 80%?	<ol style="list-style-type: none"> 1. Especially dangerous rooms 2. Rooms with increased danger 3. Rooms without increased danger 4. Dry rooms
61.	What is an additional electric protection product for equipment with voltage up to 1000V?	<ol style="list-style-type: none"> 1. Dielectric gloves 2. Isolating mat, rubber galoshes, portable earthing kits 3. Hand tool for electric installation works with isolating handles 4. Current clamps
62.	Which are basic electric protection products for devices up to 1000V?	<ol style="list-style-type: none"> 1. Gloves, galoshes, isolating bars, voltage indicator 2. Gloves, galoshes, isolating mats, hand tools 3. Isolating bars, indicators, voltage indicators, phase indicators 4. Gloves, galoshes, isolating bars, indicators, voltage indicators, phase indicators
63.	In case of ABC scheme, the ratio of artificial ventilation and indirect heart massage is ...	<ol style="list-style-type: none"> 1. 1x artificial ventilation and 5x indirect heart massage 2. 2x artificial ventilation and 30x indirect heart massage 3. 2x artificial ventilation and 5x indirect heart massage 4. 2x artificial ventilation and 15x indirect heart massage
64.	How can thread connections be protected in an earth circuit?	<ol style="list-style-type: none"> 1. By colouring the connections 2. Earth thread connections mustn't be covered 3. By wrapping adhesive tape around them 4. By spreading technical vaseline on them
65.	What is the minimum allowed height of overhead power lines with a voltage up to 1000V in a populated area?	<ol style="list-style-type: none"> 1. 5m 2. 10m 3. 6m 4. 3m
66.	Resistance of electric motor windings after their repair cannot be lower than...	<ol style="list-style-type: none"> 1. 10MΩ 2. 5MΩ 3. 1MΩ 4. 0.5MΩ

67.	What is called an earth device?	<ol style="list-style-type: none"> 1. Earthing unity with electric devices 2. Earthing lead 3. Earthing and earthing lead unity 4. Unity of the conductor and electric devices
68.	How does the conductance of a copper wire change the temperature increases?	<ol style="list-style-type: none"> 1. It does not change 2. It increases 3. It decreases 4. Moves
69.	Why are cable conductors with a cross section area $S > 16\text{mm}^2$ usually multi-conductor, i.e. twisted from many wires with a small cross section area?	<ol style="list-style-type: none"> 1. In order to reduce voltage losses 2. To increase cable flexibility 3. In order to increase cross section area 4. To facilitate wire connection
70.	From what material are transformer cores made?	<ol style="list-style-type: none"> 1. Aluminium 2. Silver 3. Electrical steel 4. Copper
71.	At what load in the formula $P=IU \cos \phi$ power factor is equal to 1?	<ol style="list-style-type: none"> 1. If the inductive load is bigger than the capacitive load 2. If the capacitive load is bigger than the inductive load 3. If the capacitive load is the same as the inductive load 4. If the capacitive load is not the same as the inductive load
72.	<p>The resistance of an incandescent light bulb is 100Ω. What should the resistance of rheostat be in order to reduce current in an incandescent light bulb three times if the connected voltage remains the same?</p> 	<ol style="list-style-type: none"> 1. 200Ω 2. 100Ω 3. 400Ω 4. 500Ω
73.	Which excitation direct current motor rapidly increases rotation speed in idle running?	<ol style="list-style-type: none"> 1. Series excitation 2. Shunt excitation 3. Separate excitation 4. Compound excitation
74.	Which of these devices fulfils excitation winding functions for a direct current motor which does not have this excitation winding?	<ol style="list-style-type: none"> 1. Throttle 2. Capacitor 3. Permanent magnet 4. Rheostat
75.	What is marked with this graphic symbol?	<ol style="list-style-type: none"> 1. Thyristor with cathode conductor 2. Thyristor with anode conductor 3. Symmetrical thyristor 4. Tunnel diode
76.	Which formula is used to calculate shunt for current measurement range increase (n – increase in measurement range)?	<ol style="list-style-type: none"> 1. $R_{\xi} = R_a(n-1)$ 2. $R_{\xi} = R_a/(n-1)$ 3. $R_{\xi} = U/I*n$ 4. $R_{\xi} = R_1 * R_2 / (R_1 + R_2)/n$
77.	What does leakage current relay react to?	<ol style="list-style-type: none"> 1. To current which is higher than the nominal 2. To voltage which is higher than the nominal 3. To voltage which is lower than the nominal 4. To input and output current difference

78.	What is the meaning of a short circuit winding in a coil core of a magnetic starter?	<ol style="list-style-type: none"> 1. Reduces magnetic field strength 2. Prevents coil overheating 3. Prevents coil core vibration 4. Increases current strength in coil
79.	Why is an additional element, which moves current in a phase and voltage in starter winding, connected in series with single-phase asynchronous motor starter winding?	<ol style="list-style-type: none"> 1. To reduce inrush current 2. To create starter moment 3. To reduce starting time 4. To increase starter moment
80.	In 20kV electric devices, the permissible distance between a person and live parts is 0.6 meters. What might happen if a person came closer than the allowed distance?	<ol style="list-style-type: none"> 1. An electric arc may occur between the current conducting part and the person 2. The person can get electric shock 3. In result of influence of electric field intensity in person's organism may happen irreversible changes 4. Induced voltage may happen in the person

Answer sheet of the theory test of the centralised professional qualification exam									
Name, surname of the examinee				Educational institution				Group	
Evaluation:									
For each correct answer in tasks 1 to 70 - 1 point									
For each correct answer in tasks 71 to 80 - max. 3 points									
1	2	3	4	5	6	7	8	9	10
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
11	12	13	14	15	16	17	18	19	20
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3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
21	22	23	24	25	26	27	28	29	30
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4	4	4	4	4	4	4	4	4	4
31	32	33	34	35	36	37	38	39	40
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4	4	4	4	4	4	4	4	4	4
41	42	43	44	45	46	47	48	49	50
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51	52	53	54	55	56	57	58	59	60
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61	62	63	64	65	66	67	68	69	70
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4	4	4	4	4	4	4	4	4	4
71	72	73	74	75	76	77	78	79	80
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
Total point for the theoretical part:									
.....									
Evaluated by: _____									
first name, surname, signature									
