

## Tertiary and Vocational Education Commission Knowledge Assessment – March/ April 2021 Electrician National Vocational Qualification – Level 04



## Time: 03 Hours

### **Instructions for the Candidates**

- This Question Paper Comprises of 2 sections as Part 1& 2
- This paper consists of Multiple Choice Questions (MCQ) and short answer questions. Choose the most suitable answer from the given four answers of each questions in Part A and mark as "X" in the appropriate places of the answer sheet
- Answer 6 questions from Nos. 1 7 including the question No. 1 and you should answer either 8 or 9.
- This question paper consists of 14 pages.

## <u> Part - 1</u>

- 1. Atoms are made of which of the following particles
  - a. Protons, Electrons
  - b. Protons, Neutrons
  - c. Electrons, Neutrons
  - d. Electrons, Protons, Neutrons
- 2. Ampere is meant by,
  - a. the rate of flow of charges in a conductor is 1 mill second
  - b. the rate of flow of charges in a conductor is 1 second
  - c. the rate of flow of charges in a conductor is 1 coulomb
  - d. the rate of flow of charges in a conductor is 2 coulomb
- 3. The measuring unit of potential difference is by,
  - a. Ampere
  - b. Watts
  - c. Volts
  - d. Coulomb
- 4. The conductor's resistance is proportionally of the same lengthwise by
  - a. Inverse
  - b. proportion
  - c. proportion and inverse
  - d. converse
- 5. The unit of the resistant is exactly shown in,
  - a.  $\Omega m^2$
  - b. Ω m
  - c.  $m \Omega$
  - d. <u>Ωm</u>
    - Μ

- 6. The measuring tool you need to use to get the diameter of the winding wire is,
  - a. Steel ruler
  - b. Micro Meter
  - c. Divider Caliper
  - d. Vernier Caliper
- 7. The revolving direction of a DC motor is depend upon
  - a. by connecting in addition to an extra resitant to the field coil
  - b. by changing the direction of the current providing to the field coil
  - c. by changing the direction of the current to the armarture
  - d. by reducing the voltage
- 8. The transformer's connection between the numbers of strands and the potential difference is exactly shown as
  - a.  $\frac{NP}{VP} = \frac{NS}{V_S}$ b.  $\frac{NP}{N_S} = \frac{VP}{K}$ c.  $\frac{NP}{N_S} = \frac{K}{Y}$ d.  $\frac{NP}{N_S} = \frac{VP}{V_S}$
- 9. The value of an equivalent resistant received by parallel connections between 2  $\Omega$  and 3  $\Omega$  resistant is

a.	2.5 Ω	c.	6/5 Ω
b.	6/4 Ω	d.	3Ω

- **10**. After the preparation of an estimate for the power installation, the approval of the client for the commencement of the work is essential. Because
  - a. to have an issue regarding the power installation
  - b. for the complete awareness of the client regarding the expenditure
  - c. to participate in the process of purchasing materials
  - d. None of the above
- 11. The suitable circuit design to be submitted for the electrical installation by an electrician is
  - a. Direct circuit design c. Primary design
  - b. Active deign d. Brief design
- 12. The appropriate wire to be used for the distribution panel and the factory power supply meter receiving 60 amps. current is
  - a. 7/0.67 mm 2.5 square mm
  - b. 7/1.04 mm 6 square mm
  - c. 7/1.35 mm 10 square mm
  - d. 7/1.70 mm- 16 square mm

- 13. The exact statement indicating which expresses the correct order for the Electric meter of a domestic connection with the service fuse, main switch, trip switch and the distribution box is,
  - a. service fuse, Electric meter, main switch, distribution box, trip switch
  - b. service fuse, Electric meter, main switch, trip switch distribution box,
  - c. service fuse, Electric meter, trip switch, main switch, distribution box,
  - d. Electric meter, service fuse, trip switch, main switch, distribution box,
- 14. The phase angle (  $\cos \phi$ ) is defined by
  - a. The phase angle between current and the resistant
  - b. The phase angle between current and the voltage
  - c. The phase angle between current and the induction
  - d. The phase angle between voltage and the induction
- 15. Which of the following fact belong to the value of voltage gained by multi meter
  - a. Maximum value c. RMS value
  - b. Average value d. Frequency
- 16. Which of the switch connection obtained by using to control a single bulb from three different places is,
  - a. single pole switch
  - b. change switch and an intermediate switch
  - c. an intermediate switch and single pole switch
  - d. two change switches and an intermediate switch
- 17. The frequency of electric supply in Sri Lanka is, f=50 HZ. This electric supply phase interval is

a.	0.045 seconds	c.	0.02 seconds
b.	0.05 seconds	d.	0.01 seconds

18. The exact illustration of connections among the star connection, Line voltage and the phase voltage is,

a. 
$$\frac{VP}{V_L}$$
  
b. 
$$V_L = V_P$$
  
c. 
$$V_L = \sqrt{3}V_P$$
  
d. 
$$V_L \sqrt{3} = V_P$$

**19**. The exact illustration of connections among the Delta connection, Line voltage and the phase voltage is,

a. 
$$VL = \sqrt{3} V_P$$
  
b.  $\underline{V}_L = \sqrt{3}$   
 $V_P$   
c.  $V_L \times VP$   
d.  $V_L = VP$ 

- 20. The equation for finding the total of the power load in a Star and delta connections with the balanced three phase load is
  - a.  $P = V_L I_L$
  - b.  $P = \sqrt{3} I_L \cos \emptyset$
  - c.  $P = \sqrt{3}V_L I_L$
  - d.  $P = 3\sqrt{V_L} I_L COS \emptyset$
- 21. Which of the following is the correct statement regarding the synchronous speed
  - a. The frequency (f)of the power supply is proportionally synchronous speed  $\left(N_{2}\right)$  inversely
  - b. while the synchronous speed  $(N_2)$  of Frequency (f) of the power supply is inversely proportional, the number of the pole is inversely proportional
  - c. The number of the pole is proportionally inverse it proportionally inverse to the frequency
  - d. The number of the pole is proportionally inverse to the power supply frequency while it proportionally inverse to the synchronous speed  $(N_2)$
- 22. How much is the synchronous speed  $(N_2)$  of the motor when the pole number of the motor is four
  - a. 3000
  - b. 2750
  - c. 1500
  - d. 1475

23. The slip of the induction motor is known as

- a. Speed of the rotor is higher than the synchronous speed  $(N_2)$
- b. Speed of the rotor is lower than the synchronous speed  $(N_2)$
- c. Speed of the rotor is lower when the synchronous speed  $(N_2)$  is higher
- d. None of the above
- 24. After the Capacitor Start, Capacitor Run Induction, the first capacitor separated from the circuit is
  - a. Running Capacitor
  - b. Centrifugal Switch
  - c. Starting Capacitor and Running Capacitor
  - d. Starting Capacitor
- 25. By fixing the Phase Failure Relay to the motor connected three phase power supply, the expectation is to
  - a. Controlling the rotating speed of the motor
  - b. to change three phase power supply for the generator power supply
  - c. Keep the supply voltage and the current constantly
  - d. disconnect the power supply when there is a phase breakdown to prevent the presence of unbalance

- 26. The correct method when changing the rotating direction of the alternate current single phase motor is
  - a. Changing the terminals of neutral and live
  - b. Changing the terminals of capacitor
  - c. Supply should be provided after changing the prime terminal of the starter coil
  - d. The value of the capacitor is changed
- 27. The which of the following is **<u>not</u>** the test to be conducted when the electrician checking the electrical installation
  - a. Continuity test
  - b. Polarity Test
  - c. Zero Test
  - d. Insulation Test
- 28. It is mentioned in the Carbon dioxide firefighting equipment can be used, when there is an electrical fire. The standard colour code of the firefighting equipment is
  - a. Red Colour
  - b. Blue Colour
  - c. Green Colour
  - d. Black Colour
- **29**. The security accessory needed to automatically activate when robbers and enemies entering the house
  - a. Current transformer
  - b. Motion sensor
  - c. LED
  - d. Smoke detector
- 30. The measuring equipment made up of using the Current Transformer is,
  - a. Multi Meter
  - b. Tacho Meter
  - c. Volt Meter
  - d. Clip on Meter

 $(1 \times 30 = 30 \text{ Marks})$ 

## <u>Part - 2</u>

# Answer 6 questions from Nos. 1 - 7 including the question No. 1 and you should answer either 8 or 9. ( you need to answer a total of 7 questions only)

Calculator can be used

1. Following is an electric circuit which you may across during an electrical installment. This is a diagram which displays where  $S_{1-}S_2 - S_3$  switches and  $L_{1-}L_{2-}L_3$  bulbs work together on/off operations.

Consider Plug  $P_1 - P_2 - P_3$  as 13A.. Fig. 1



i) Draw the Summary Plan and the Function Plan for this circuit (06 Marks)

- ii) Write the necessary list of material according to the specifications required for this circuit. (02 Marks)
- iii) What are the testings done by an electrician once he completes the installation prior to the commission of electrical supply (02 Marks)

2. Provide answer to this question referring to the drawing provided below.



i) Find the equivalent resistance of the circuit

(04 Marks)

		ii) Find the flow of current through this circuit	(03 Marks)
		iii) Find the flow of current of each resistant separately	(03 Marks)
3.			
	i)	Name three types of Single Phase Induction Motors	(03 Marks)

ii) Draw the electric circuits of them

(03 Marks)

iii) What is the testing you do whether the capacitor used for the single phase motor operations? What are the electric equipment uses for this purpose? (02 Marks)

iv) Explain the functions of a Centrifugal Switch connected to the Single Phase motor (02 Marks)

- 4. Three Capacitors are mentioned namely as  $4\mu$ F,  $8\mu$ F,  $2\mu$ F. Calculate the values available by connecting the three capacitors in the following manner.
  - i) Connected in series (in drawing)

ii) Connected in parallels (in drawing)

(02 Marks)

(02 Marks)

iii) Find the equivalent capacity of the connected in a series (03 Marks)

5.

i) What are the main parts of a three phase induction motor (02 Marks)

ii) Write in detail the process of the functioning of a three phase motor. What are the hand tools for this purpose? (03 Marks)

iii) If the velocity of a three phase motor is 5 KW, mention the starter used. Draw the circuit map. (with the details of power and the control details) (05 Marks)

i) Indicate the three advantages of high voltage the power transmission during electric power transmission (03 Marks)

ii) Indicate the type of transformer fixed to the Distribution Substation (02 Marks)

iii) Show in a drawing the winding of the connection of the transformer (03 Marks)

iv) What is the range of transmission voltage exist in Sri Lanka (02 Marks)

6.

i) Mention 2 things to be considered when connecting a generator to an electric system. (03 Marks)

ii) Calculate the Kilowatt amount obtainable from a 160 KVA transformer (consider the power as 0.8) (03 Marks)

iii) What is the cross section area of the appropriate cable used from the main switch of this transformer? (02 marks)

iv) What are the components to be examined when servicing a generator? (02 marks)

In a five storied building Six security cameras were installed. What are the materials needed for the installation? Draw the circuit diagram for submission for the installation of the camera complex you are planning. (10 Marks)

9. You are assigned to operate a concrete mixer functioning on an electric motor connected to the 230V supply. (10 Marks)

Design a PLC circuit including the accessories mentioned below

- i) A pressure switch to check the pressure in the tank while getting connected to the mixture tank
- ii) A Temperature switch to find the temperature of the mixture
- iii) A manual switch (on/off)
- iv) A over load switch, Contactor