Tertiary and Vocational Education Commission
Knowledge Assessment – April 2022
Electrician
National Vocational Qualification Level 04

Time: 03 Hours

Instructions for the Candidates

- Answer all questions
- In each of the questions from 1 to 50, pick the one of the alternatives (a), (b), (c), (d) which you consider is correct or most appropriate.
- Mark a cross (x) on the number corresponding to your choice in the answer sheet provided.
- This question paper consists of 08 pages

Part 1

1. The equipment that is used to rearrange a threads in a nail is;
   a) Central punch
   b) Tap set
   c) Rhymer
   d) Dye set

2. Which of the followings should be considered to make a full estimation for a planned electrical installation;
   a) Material quantities and cost
   b) Expenditure on labour
   c) Profit and other expenses
   d) All of the above

3. For a house receiving 60A current, which of the following wire is suitable to use between the electric meter and distribution box?
   a) 7/0.67mm ($2.5mm^2$)
   b) 7/0.50mm ($2.5\ mm^2$)
   c) 7/.35mm ($10\ mm^2$)
   d) 7/1.70mm ($16\ mm^2$)

4. When a person used an electrical oven, an electrical leakage was occurred and caused an electrical shock, In that case, which of the following device operates first?
   a) Miniature circuit breaker (MCB)
   b) Residual current circuit breaker (RCCB)
   c) Fuse
   d) All of the above

5. What is the purpose of using phase failure relay in a three phase power supply?
   a) To change the three phase power supply in to generator power supply
   b) To keep supply voltage constant
   c) To keep the rotation speed of the mortar
   d) To disconnect power supply if a one phase is broken

6. The highest value of resistance indicates by the Multi-meter when measured the resistance between the three ends of a ceiling fan is;
    a) Running terminal and common terminal
    b) Starting terminal and common terminal
    c) Starting terminal and running terminal
    d) None of the above

7. The correct method to change direction of the rotation of a single phase alternating current motor is;
    a) Provide the current supply after changing the live and neutral ends
    b) Provide the current supply after changing the end terminals of the
    c) Provide the current supply after changing the first and end terminals of the start coil
    d) Provide the current supply after changing the capacitance value

8. Which of the following is **not** performed when a generator is maintained;
    a) Check electrolyte level of the battery
    b) Check the water level in the radiator
    c) Adjust the valve gap of the engine
    d) Check the oil level in the engine and fill if necessary

9. The device that is used to connect power supply to a factory by CEB power supply and Standby power supply is;
    a) Bus bar
    b) Rotary switch
    c) Isolator
    d) Change over switch

10. The more appropriate method to keep a constant voltage of a Generator is to;
    a) Keep a constant rotation speed of the Generator
    b) Keep an accurate function of the Alternator
    c) Keep an accurate function of the Automatic voltage Regulator (AVR)
    d) Keep an accurate function of the Engine cooling system

11. Which of the following is measured by the Tachometer;
    a) Current
    b) Frequency
    c) Rotation speed
    d) Voltage

12. A measuring instrument that is manufactured using current transformer is;
    a) Multi meter
    b) Clip-on meter
    c) Tachometer
    d) Voltmeter

13. Carbon dioxide fire extinguisher can be used in case of electric fire. The standard colour that is used to recognize that equipment is;
    a) Red
    b) Blue
    c) Green
    d) Black

14. The suitable method to change speed of a three phase induction motor is;
    a) Change supply voltage and current
    b) Change supply frequency and number of poles
    c) Change the connected poles
    d) Change the slip

15. The suitable method to change the direction of a three phase induction motor is;
    a) Push to other side when motor is running
    b) Change the sides of motor and execute
    c) Change two phases
    d) Separate three phases and execute

16. The rate taken by three phase induction motor from the standard current at the start-up is;
    a) About three times
    b) About two times
    c) About four times
    d) About five times

17. The power class of the motor for the usage of DOL switch is;
    a) Lower than 2kW
    b) Lower than 5kW
    c) Higher than 5kW
    d) Higher than 10kW

18. Which of the following device converts mechanical energy to electrical energy;
    a) Fluorescent lamp
    b) Battery
    c) Electric motor
    d) Generator

19. The most important factor should be considered of an electrical wire in an electrical circuit is;
    a) Voltage regulation
    b) Current drop
    c) Voltage drop
    d) Value of the resistance

20. The best type of circuit breaker used in air conditioners for protection is;
    a) Type A
    b) Type B
    c) Type C
    d) Type F

21. The voltage that is used to measure the insulation resistance of a household electrical circuit is;
    a) 230V
    b) 120V
    c) 500V
    d) 750V

22. The suitable specification of a RCCB used for three phase circuit is;
    a) 220V/ 50Hz / 30mA/2pole
    b) 220V/ 50Hz / 30MA/2pole
    c) 220V/ 60Hz / 30mA/2pole
    d) 220V/ 50Hz / 30A/2pole

23. According to the new standard, the three phases of the three phase electric circuit are;
    a) Red, Black, Brown
    b) Black, Brown, Grey
    c) Black, Green, Red
    d) Blue, Yellow, Brown

24. What are the two stages where a Miniature Circuit Breaker (MCB) is in operation;
    a) Voltage and current
    b) Efficiency and Current
    c) Heat protection and magnetic protection
    d) Current and Capacity

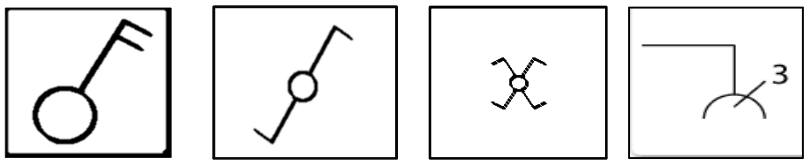
25. A method that is used to protect electrical equipment from overloading is;
    a) Conductor
    b) Semi-conductor
    c) Bimetals
    d) Ebonite

26. The Earth leakages relay (ELR) in a circuit panel mounted with;
    a) Miniature circuit breaker (MCB)
    b) Residual current circuit breaker (RCCB)
    c) Earth leakage current breaker (ELCB)
    d) Molded case circuit breaker (MCCB)

27. The conductor used for 13A plugs is;
    a) 7/1.04 conductor
    b) 7/0.29 conductor
    c) 7/0.67 conductor
    d) 7/0.52 conductor

28. The equation that is used by an electrician to find voltage drop in a circuit is;
    a) $\frac{mV \times I_b \times length}{100}$
    b) $\frac{mV \times I_b \times width}{1000}$
    c) $\frac{mV \times I_b \times length}{1000}$
    d) $\frac{I \times I_b \times length}{1000}$

29. Which of the following shows the names of the given symbols used in an electrical circuit diagram in the correct order;



a) Three phase plug, change over switch, intermediate switch, two poles switch
b) Two poles switch, change over switch, three phase plug, intermediate switch
c) Two poles switch, change over switch, three phase plug, intermediate switch
d) Two poles switch, change over switch, intermediate switch, three phase plug

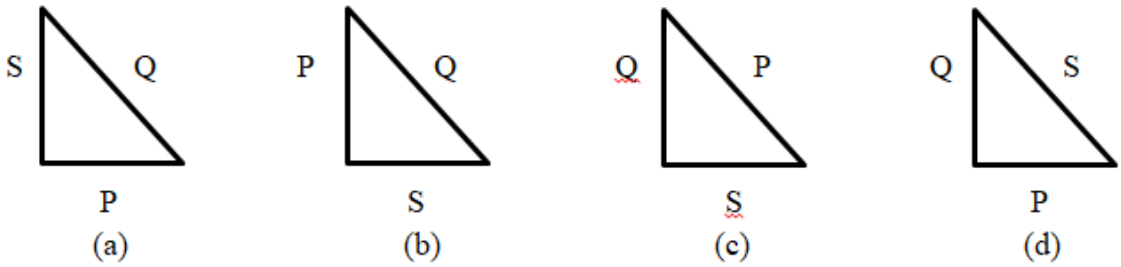
30. What should be done to change the rotation direction of a series type motor?
a) Change the supply terminals
b) Remove the commutator and switch the terminals of field coil
c) Supply direct current to the terminals of the field coil
d) Switch the terminals of commutator

31. The correct statements regarding the function of centrifugal switch are;
i). The terminals are not connected during running
ii). The terminals are connected during running
iii). The switch is disconnected when the motor runs about 75% of its speed
iv). The terminals of switch is not connected when it is not running
a) i and ii
b) ii and iii
c) iii and iv
d) i and iv

32. A feature of a starting capacitor is;
a) Inability to flow current
b) Reduce voltage
c) Reduce the capacitance
d) Increase the capacitance

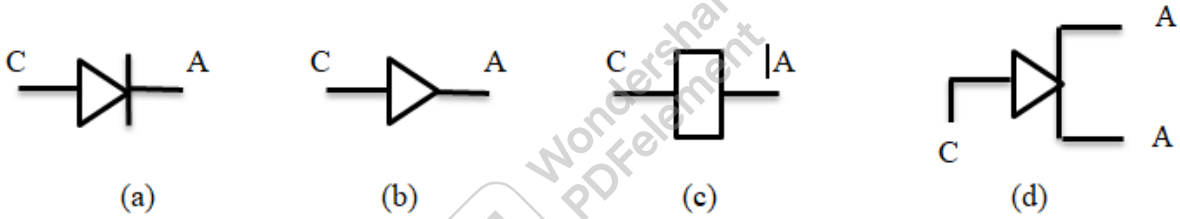
33. A feature of a running capacitor is;
a) Reduce current and voltage
b) Reduce voltage
c) Increase voltage and reduce capacitance
d) Reduce voltage and increase capacitance

34. Which of the following diagram shows the correct relation between the main components available in a three phase power system? (Q - Reaction power, S - Visual power, P -Real power)

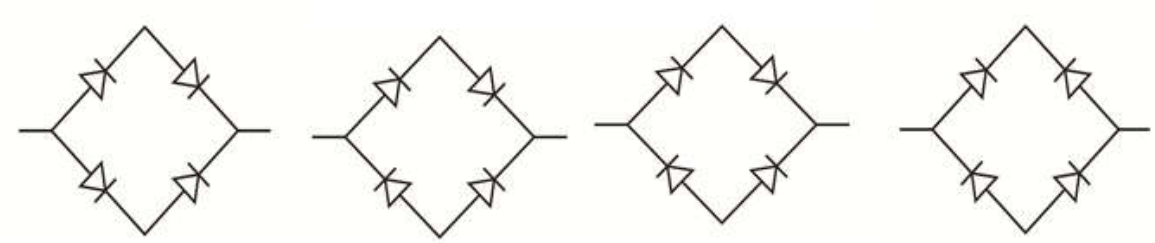


35. The method of earthling that is practiced in Sri Lanka is;
    a) TN-C method
    b) TN-S method
    c) TT method
    d) IT method

36. Correct symbol of a diode is;



37. The correct diode circuit for the full wave rectifying is;



38. The method of connecting Voltmeter in a circuit is;
    a) In a series
    b) In parallel
    c) As a star
    d) As a delta

39. The correct formula that is used to show the connection of star connected line current and phase current is;
    a) $\frac{I_p}{I_l}$
    b) $\frac{I_l}{I_p}$
    c) $I_p = I_l$
    d) $I_l = I_p I_l$

40. The correct formula used to show the connection of star connected line voltage and phase voltage is;
    a) $\frac{V_p}{V_l}$
    b) $V_l = V_p$
    c) $V_l = \sqrt{3}V_p$
    d) $V_p = \sqrt{3}V_l$

41. The formula used to find full power of overload in star or delta connection which has balanced three phase load is;
    a) $P = V_l I_l$
    b) $P = \sqrt{3}V_l Cos\emptyset$
    c) $P = \sqrt{3}V_l I_l$
    d) $P = \sqrt{3}V_l I_l Cos\emptyset$

42. The equivalence resistance, when two resisters of 20Ω and 30Ω connected in parallel is;
    a) 12Ω
    b) 3Ω
    c) 6Ω
    d) 24Ω

43. The connector that is used to network a CCTV camera protection circuit is;
    a) VGA connector
    b) RJ11 connector
    c) RJ45 connector
    d) HDMI connector

44. The rotations per minute (RPM) of a four poles single phase motor when connected to 230V/50Hz supply is;
    a) 3000
    b) 2750
    c) 1500
    d) 1250

45. The reason for reduce the speed of a ceiling fan is;
    a) Disconnect the running coil
    b) Disconnect the starting coil
    c) Disconnect the capacitor
    d) Reduce the capacitance of the capacitor

46. The function of the laminated sheet used in a transformer is;
    a) Reduce voltage
    b) Reduce current
    c) Increase the magnetic flux
    d) Create the eddy current

47. The feature of a Isolating transformer is;
    a) High input supply
    b) Low output supply
    c) Same input and output supply
    d) Change voltage value

48. The voltages of the primary and secondary coils of a transformer are 200V and 40V respectively and rotation of the primary windings is 400, the rotation of the secondary winding is;
    a) 20
    b) 30
    c) 40
    d) 80

49. The purpose to mentioned as IP in a motor is;
    a) To interpret the resistance of the motor to the external environment
    b) To interpret the power of the motor
    c) To interpret the number of rotations of the motor
    d) To interpret the voltage of the motor

50. The three terminals of a three phase ceiling fan are taken out and they are named as A, B and C. Resistance between those terminals are as follows;
    - The resistance between A and C terminals is 430Ω.
    - The resistance between B and C terminals is 210Ω.

    The two terminals of the starting coil is;
    a) B and C
    b) A and C
    c) A and B
    d) None of the above

(01 x 50 = 50 Marks)

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Instructions for the Candidates

- Answer four (04) questions including question number one (01). (Question number one (01) is compulsory and total number of questions should be answered is four (04))
- Answer the questions in the spaces provided in the same question paper
- This question paper consists of 06 pages.
- Nonprogrammable calculators are allowed.

Part 2

1.

a) Draw a fluorescent lamp circuit diagram which can be operated separately from two locations.

i). Draw a function plan and name the parts. (06 Marks)

ii). Draw the summary plan (02 Marks)

iii). Write down the material list (02 Marks)

b) There are three (03) lamps mounted around a house. Those lamps can be operated separately. But when all these lamps are switched off by the relevant switches, all lamps can be switched on by the main switch in the house. Draw a suitable circuit diagram for this process. (Function Plan and Summary plan)

(10 Marks)

2.

a) Calculate the current flow through a 1500W heater connected to a 230V alternative current.

(04 Marks)

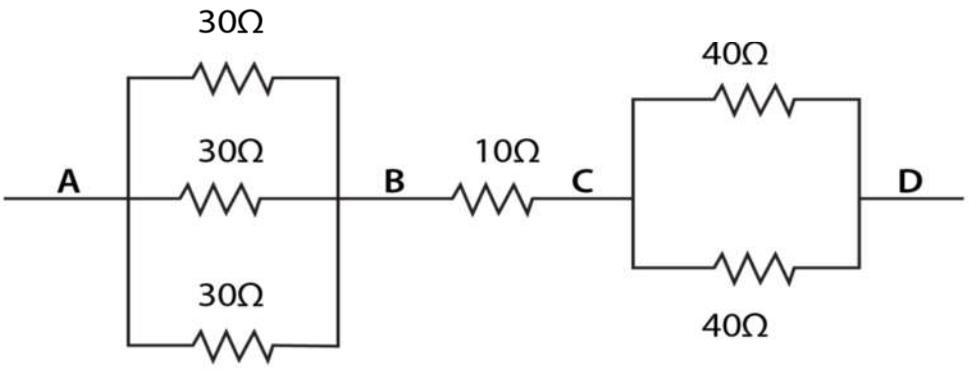
b) Calculate the power of the resistance when the 2A current flows through the 5Ω resistor.

(02 Marks)

c) Calculate the voltage if the and 4mA current flows through the 3kΩ resistor.

(02 Marks)

3. Answer for the following questions using the circuit diagram below.



a) Find the equivalence resistance between A and B. (02 Marks)

b) Find the equivalence resistance between B and C. (02 Marks)

c) Find the equivalence resistance between C and D. (02 Marks)

d) Calculate the current flows through the circuit when supplied a voltage of 5V through the circuit.

(04 Marks)

4.

a) Write down the four (04) methods that can be used to check a new electrical circuit system by an electrician before supply the power

(02 Marks)

b) Explain each of the above four (04) tests by using appropriate diagrams

(02 x 4 = 08 Marks)

5.

a) List down the devices and symbols used in motor control circuits.

(05 Marks)

b) Draw a Star and Delta connections available in a terminal box of three phase motor separately.

(05 Marks)

6. A noise occurred when a three phase motor is running. At this point, write down the checking process one by one as an electrician. (Name the measuring equipment and devices used for these)

(10 Marks)