

**ELECTRICAL KNOWLEDGE**

**ASSIGNMENT**

**IST YEAR**

**Electrical Trades**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Complete the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Quantity | Formula Symbol | Quantity Symbol | Unit |
| Voltage | V |  |  |
|  |  | A |  |
|  |  |  | Watts |
|  |  |  | Ohms |

# Indicate the direction of conventional and electron current flow as appropriate:

|  |  |
| --- | --- |
|  |  |
| Figure 1 - Conventional | Figure 2 - Electron |

# Explain the function of the following devices when used within an electric circuit:

## Switch

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| --- |
|  |
|  |

## Fuse

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| --- |
|  |
|  |

## Slow blow fuse

|  |
| --- |
|  |
|  |

## Circuit breaker

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| --- |
|  |
|  |

## Earth leakage circuit breaker (RCD)

|  |
| --- |
|  |
|  |

# Complete the following table

|  |  |  |  |
| --- | --- | --- | --- |
| Metric Prefix | Meaning Of Prefix | Symbol | Standard Engineering Notation |
|  |  | µ |  |
|  | Times by 0.001 |  |  |
| GIGA |  |  |  |
|  | Times by 1,000,000 |  |  |
|  | Times by 0.000,000,001 |  |  |
|  |  | p |  |
|  |  |  | 10 3 |
| TERRA |  |  |  |
|  | Times by 1 |  |  |

# Sketch a circuit (figure 3) containing a voltage source, a fuse, a switch, a lamp, a voltmeter and an ammeter. The two meters are to be connected, with the appropriate polarity, in order measure the voltage applied to the lamp and the current in the circuit.

Ammeter

Voltmeter

Figure 3

# List three examples of each of the following types of materials:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Conductors |  | Semi-Conductors |  | Insulators |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# List six methods of creating electrical energy:

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1. Describe the effects of passing a Current through a wire.

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| --- |
|  |
|  |
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|  |

1. List the factors that affect the value of resistance

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| --- |
|  |
|  |
|  |
|  |

1. Match the following terms

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Electric Charge | a |  | 1 | Voltage |
| Electric Current | b |  | 2 | Coulomb |
| ElectroMotive Force | c | 123456 | 3 | Ampere |

1. Refer to the figure 4. Identify the switch position that best describes open circuit, short circuit or closed circuit

|  |  |  |
| --- | --- | --- |
| figure1  Figure 4 | Switch Position | |
| 1 | * 1. open circuit,   2. short circuit or   3. closed circuit |
| 2 | * 1. open circuit   2. short circuit or   3. closed circuit |
| 3 | * 1. open circuit,   2. short circuit or   3. closed circuit |

1. Describe the principle of operation of a Residual Current Device.

|  |
| --- |
|  |
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|  |

1. Correctly match each parameter with the unit of measurement.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Amount of Substance | a | 1231236123123 | 2 | Kelvin |
| Electric Current | b |  | 6 | Mole |
| Length | c |  | 3 | Ampere |
| Luminosity | d |  | 5 | Kilograms |
| Mass | e |  | 7 | Candela |
| Temperature | f |  | 1 | Second |
| Time | g |  | 4 | Metres |

1. Identify the value of a four colour band resistors which has the following colours

Yellow Violet Red Gold

* 1. 47kΩ 20%
  2. 4k7Ω 20%
  3. 47kΩ 5%
  4. 4k7Ω 5%

1. Given  and I = 10 mA and R = 1 kΩ Find V

|  |
| --- |
|  |
|  |
|  |
|  |
|  |

# Complete the following table by using Ohm’s law to calculate the missing values in each row.

|  |  |  |  |
| --- | --- | --- | --- |
| VOLTAGE | CURRENT | RESISTANCE | POWER |
| 12 V | 16 mA |  |  |
| 9 V |  | 1k5Ώ |  |
|  | 1µ2A | 33MΏ |  |

Calculations:

R3

R2

R1

*Figure 5*

# Questions 16 to 21 refer to Figure 5

1. If R1 = 1K Ώ R2 = 5K6 Ώ R3 = 100 Ώ

Calculate the total resistance

|  |
| --- |
|  |
|  |
|  |
|  |
|  |

1. If R1 = 125 Ώ R2 = 250 Ώ R3 = 225 Ώ

# Calculate the total resistance

|  |
| --- |
|  |
|  |
|  |
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|  |

# If R1 = 125 Ώ R2 = 250 Ώ R3 = 225 Ώ VIN = 60V

# Calculate the value of IR3

|  |
| --- |
|  |
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# If R1 = 125 Ώ R2 = 250 Ώ R3 = 225 Ώ VIN = 60V

# Calculate the value of PT

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# If R1 = 125 Ώ R2 = 250 Ώ R3 = 225 Ώ VIN = 60V

# Calculate the value of VR2

|  |
| --- |
|  |
|  |
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|  |

# If VR1 = 10V VR2 = 3V VR3 = 25V

# Calculate the value of VIN

|  |
| --- |
|  |
|  |
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|  |



V1

V2

V3

**Figure 6**

Questions 22 to 24 refer to **Figure 6**

# If R1 = 10k Ώ R2 = 50k Ώ R3 =100k Ώ VIN = 60V

# Calculate the values of

|  |
| --- |
| V1 |
|  |
| V2 |
|  |
|  |
| V3 |
|  |
|  |

# Refer to the question ABOVE if the value of R1 is increased to 20kΏ

## Only V1 would change

## Only V2 would change

## Only V3 would change

## V2 and V3 would change

# This type of circuit is commonly called a:

## Current divider

## Voltage divider

## Voltage regulator

## Current regulator

25. State the theory of the conservation of energy.

|  |
| --- |
|  |
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|  |

26. Calculate the efficiency of a device that consumes 100W of energy and has a resultant output of 65W. Show formula.

|  |
| --- |
|  |
|  |

27. Define static electricity

|  |
| --- |
|  |
|  |

28. Define current electricity

|  |
| --- |
|  |
|  |

29. Describe why electricity is distributed long distances via high voltage

|  |
| --- |
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|  |

30. State what electrical supply is required to operate the following equipment.

|  |  |
| --- | --- |
| Electric heater |  |
| iPad |  |
| Fluorescent light |  |
| Cordless drill |  |

31. Energy is defined as:

|  |  |
| --- | --- |
| A | Energy is Newtons per square metre |
| B | Energy is power per second |
| C | Energy is the ability to do work |
| D | Energy is Pascals per ampere |

32. What minimum power rating resistor would be required in a circuit where a 12Volt supply is connected to a 48 Ώ resistor.

|  |  |
| --- | --- |
| A | ½ Watt |
| B | 1 Watt |
| C | 5 Watt |
| D | 10 Watt |

33. A potentiometer with the markings 10kΏ (A) would have a reading of how many ohms at 50% rotation.

|  |  |
| --- | --- |
| A | 2k5Ώ |
| B | 7k5Ώ |
| C | 5kΏ |
| D | 10kΏ |

34. A 10Ώ - 5 Watt resistor is most likely.

|  |  |
| --- | --- |
| A | Carbon Film |
| B | Wire Wound |
| C | Metal Film |
| D | Metal Oxide |

35. What effect would a rise in temperature have on the resistance value of a positive temperature co-efficient resistor (PTC).

|  |  |
| --- | --- |
| A | Resistance would increase |
| B | Resistance would remain the same |
| C | Resistance would be infinity |
| D | Resistance would decrease |

36. Can a primary cell be recharged.

|  |  |
| --- | --- |
| Yes/No |  |

37. What is the voltage output of each cell of a car battery.

|  |  |
| --- | --- |
| A | 1.5V |
| B | 2.1V |
| C | 3.7V |

38. What device could be used to operate an automatic light to turn on when the ambient light decreases below a certain level.

|  |  |
| --- | --- |
| A | A VDR (voltage dependent resistor) |
| B | An LDR (light dependent resistor) |
| C | An NTC (negative temperature co-efficient resistor) |
| D | A Rheostat |