202: Principles of electrical science  
**Sample questions version B**

**Answer guide**

**There are 40 multiple choice questions. Answer them all, selecting the correct answer out of the four provided.**

1. From a 50 metre cable drum, you have installed 13.6 metres of cable. (L 1.1)  
   What percentage of cable has been used?
   1. 3.8%
   2. 72.8%
   3. **27.2%**
   4. 65%
2. An insulation resistance tester is used to record the following values: (L 1.1)  
   55MΩ, 72MΩ, 55MΩ, 18.5Ω, 10 MΩ and 89MΩ. What is the mean of   
   these values?
   1. **49.9MΩ**
   2. 89MΩ
   3. 55MΩ
   4. 18.5MΩ
3. The SI unit for resistivity is? (L2.2)
   1. Ohm
   2. **Ωm**
   3. R
   4. Ω
4. Potential Difference is measured in? (L2.2)
   1. Amps
   2. **Volts**
   3. Newton’s
   4. Joule’s
5. In the SI system, time is measured in? (L2.1)
   1. Hours
   2. Minutes
   3. **Seconds**
   4. Kelvin’s
6. Which instrument would be used to measure the resistance of a circuit? (L2.3)
   1. **Ohm meter**
   2. Conductance meter
   3. Continuity meter
   4. Amp meter

1. The SI unit for Capacitance is the? (L2.2)
   1. Volt
   2. Henry
   3. Hertz
   4. **Farad**
2. A load generates a force of 300 Newton’s. Calculate the mass of the load. (L3.4)
   1. 3.6 kg
   2. 3060 kg
   3. 306 kg
   4. 30.6 kg
3. Lifting a load an electric motor uses 180,000 Joules of energy in 1 ½ minutes. (L3.4)  
   What is the power rating of the motor?
   1. 500 W
   2. 1 kW
   3. 1.5 kW
   4. **2 kW**

1. Crowbars are an example of what type of lever? (L3.2)
   1. **Class 1**
   2. Class 2
   3. Class 3
   4. Class 4
2. Force on a load is considered to be a combination of: (L3.3)
   1. **mass and gravity**
   2. time and acceleration
   3. weight and energy
   4. energy and work done
3. An electric motor has a 1.8 kW input and an efficiency of 88%. (L3.4)  
   What is the motor’s output?
   1. 1.12 kW
   2. 160 W
   3. **1.6 kW**
   4. 160 kW
4. A four pulley system is required to lift a load force of 20000 Newton’s. (L3.4)  
   What is the effort force required to lift this load?
   1. **5000 N**
   2. 800000 N
   3. 5000 kg
   4. 10000 N
5. A set of gears has a ratio of 16:1. The smaller cogwheel has 9 teeth. (L3.2)  
   How many teeth does the larger cogwheel have?
   1. 14
   2. 41
   3. 82
   4. **144**
6. Current is described as: (L4.1)
   1. the pressure to move the charge within a circuit.
   2. **the movement of electrons within a closed circuit.**
   3. the movement of protons within a conductor.
   4. the standing force of the neutrons within an open circuit.
7. Porcelain is best described as? (L4.2)
   1. A good conductor of electricity
   2. A semi-conductor of electricity
   3. An unstable conductor of electricity
   4. **A good insulator of electricity**
8. A 2.5mm2 copper conductor has a resistance of 1.5 Ohms. (L4.4)  
   If the conductor’s length is doubled what would the resulting resistance be?
   1. 6 Ohms
   2. 1.5 Ohms
   3. **3 Ohms**
   4. 0.3 Ohms
9. A copper conductor has a resistance of 0.62 Ohms and is 36 (L4.3)  
   meters long. What size is the conductor? Take the resistivity   
   of copper to be 0.0172µΩm.
   1. **1mm2**
   2. 1.5mm2
   3. 2.5mm2
   4. 4mm2
10. Two 4mm2 copper conductors are connected in parallel. (L4.4)  
    Each conductor has a resistance of 0.5 Ohms. What is the combined   
    resistance of the two conductors?
    1. 0.5 Ohms
    2. **0.25 Ohms**
    3. 1 Ohm
    4. 0.75 Ohms
11. Four resistors each with an equal value of 6 Ohms are wired in parallel. (L4.5)  
    What is the combined total resistance of the resistors?
    1. 24 Ohms
    2. 3 Ohms
    3. **1.5 Ohms**
    4. 0.75 Ohms
12. A 5 Ohm resistor and a 7 Ohm resistor are wired in series and (L4.5)  
    connected to a 25 volt supply. What is the power dissipated in   
    the 7 Ohm resistor?
    1. 52 Watts
    2. 57 Watts
    3. 89 Watts
    4. **30 Watts**
13. A copper conductor is forty meters long and has a c.s.a of 6mm2. (L4.3)  
    If the conductor material was changed to aluminium the resulting   
    resistance would be:
    1. the same
    2. lower
    3. **higher**
    4. unstable
14. Which statement is correct with regards to what makes a good insulator? (L4.2)
    1. **The electrons are tightly bound to the nucleus.**
    2. The electrons are loosely bound to the nucleus.
    3. The protons are tightly bound to the nucleus.
    4. The protons are loosely bound to the nucleus.

1. Which of the following materials is a good conductor of electricity? (L4.2)
   1. Air
   2. **Tungsten**
   3. Glass
   4. Sand

1. Which effect would make a Fuse blow? (L4.8)
   1. Chemical
   2. Magnetic
   3. **Thermal**
   4. Solar
2. What is the total combined resistance of the resistors show in the figure below? (L4.5)

20Ω

10Ω

5 Ω

* 1. 35 Ohms
  2. 11.6 Ohms
  3. **2.9 Ohms**
  4. 4.5 Ohms

1. What is the missing voltage value in the figure below? (L4.5)

17.3VV

1.92AA

?

7.7V

13 Ω

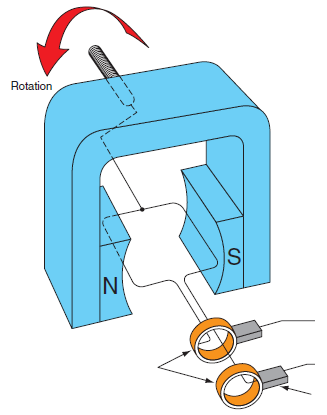
9 Ω

4 Ω

* 1. **25 Volts**
  2. 12.5 Volt
  3. 50 Volts
  4. 27.5 Volts

1. A 16 Amp motor is connected to a cable with a very high resistance. (L4.7)  
   Which of the following issues would occur?
   1. The motor will pull more current than it is designed to pull and damage itself.
   2. Too much voltage will appear at the motor terminals damaging the motor.
   3. **There will be not enough voltage to operate the motor.**
   4. The motor would run in reverse.
2. An aluminium conductor has a resistance of 0.88 Ohm’s and a c.s.a of 1.5mm2. (L4.3)  
   How long is the conductor if it’s resistivity is 2.84x10-8 Ωm?
   1. **46.5 m**
   2. 23 m
   3. 34.5 m
   4. 62 m
3. Magnetic Flux Density is defined by: (L5.2)
   1. the measurement of quantity of magnetic flux.
   2. **the amount of flux in a given area.**
   3. the strength of a magnetic.
   4. the magnets north and south poles.

1. A electric motor has a magnetic flux density of 30 Tesla’s which covers (L5.2)  
   an area of 250mm2. What is the motor’s magnetic flux value?
   1. 75 Wb
   2. 750 Wb
   3. **7.5mWb**
   4. 7.5µWb

1. To induce an EMF into a conductor, what must you do? (L5.3)
   1. Wrap the conductor around a magnet
   2. Place and hold still a closed conductor within a magnetic field
   3. Attach a magnet onto a conductor
   4. **Pass a closed conductor through a magnetic field**
2. Identify the slip rings in the figure below. (L5.4)

* 1. **A**

C

* 1. B

D

* 1. C
  2. D

A

B

1. Identify the figure below the Period? (L5.5)

D

C

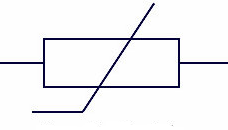
B

A

* 1. A
  2. B
  3. C
  4. **D**

1. The formula to calculate the induced EMF within a conductor is: (L5.4)
   1. E=VIL
   2. E=BIL
   3. **E=vBl**
   4. E=WbIL
2. How long would a conductor need to be to produce 12 Volts (L5.4)  
   when passed through a 0.9 Tesla magnet at 4m/s?
   1. 33 m
   2. **3.3 m**
   3. 33 cm
   4. 33 mm
3. Identify the device in the figure below? (L6.2)  
     
     
   1. Triac
   2. Diac
   3. Resistor
   4. **Diode**

1. In which of the following equipment would you expect to find a (L6.2)  
   light dependant resistor?
   1. Smoke Detector
   2. Rectifier
   3. **Solar sensor**
   4. Dimmer switch
2. Identify the device in the figure below? (L6.2)



* 1. Triac
  2. **Thermistor**
  3. Resistor
  4. Inverter

1. Which device is used to change alternating current into direct current? (L6.2)
   1. Inverter
   2. Pacifier
   3. Converter
   4. **Rectifier**