

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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**University Examinations 2015/2016**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR CERTIFICATE IN ELECTRICAL INSTALLATIONS

**SPS 1100: PHYSICAL SCIENCE**

**DATE: NOVEMBER, 2015 TIME:** $1½$**HOURS**

**INSTRUCTIONS:** *Answer questions* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE - (30 MARKS)**

1. Differentiate between fundamental and derived quantities. (4 Marks)
2. Write the chemical formula of sodium chloride. (1 Mark)
3. (i) Define work and state its S.I units (2 Marks)

 (ii) Find the work done by car engine when the car is accelerated from rest at a constant acceleration of $4ms^{-2}$ for 40 s assuming the car has a mass of 1500 kgs (4 Marks)

1. Distinguish between physical properties and chemical properties giving an example in each. (4 Marks)
2. Use ‘dot and cross’ diagram to show the type of bonding in;
3. Ammonia (2 Marks)
4. Magnesium fluoride (3 Marks)
5. Sketch V-T graphs to show a body moving with variable speed and uniform speed.

 (2 Marks)

1. A car is slowed down from a velocity of 50km/h to 20km/h in 12 seconds. What is the deceleration of the car? (4 Marks)
2. A healting coil provides 3600 Jmin-1 when the p.d across it is 24v. Calculate the length of the wire making the cool given that its cross section area is 1 x $10^{-7}m^{2}$ and resistivity is 1 x $10^{-6}Ω$m (4 Marks)

**QUESTION TWO (15 MARKS)**

1. Show that $V^{2}$ = $u^{2}$+ 2as given that u is the initial velocity, v is the final velocity , a is acceleration and s is the distance travelled by the particle. (7 Marks)
2. Why do electrically neutral atoms repel one another when they are close. (2 Marks)
3. State and explain three factors that influence the formations of ions. (6 Marks)

**QUESTION THREE (15 MARKS)**

1. What is an isotope, give an example. (2 Marks)
2. Explain ways in which individual atoms can achieve a closed shell electron configuration. (4 Marks)
3. Complete and balance the following equations;
4. CuCO3 + HNO3 $\rightarrow $ (3 Marks)
5. Pb (NO3)2 + KI$\rightarrow $ (3 Marks)
6. Draw ‘dot and cross’ diagram to represent the electron transfer which take place in formation of sodium chloride. (3 Marks)

**QUESTION FOUR (15 MARKS)**

1. A stone weighing 4.5 kg is tied to a chord 90cm long and kept moving in a circle at a uniform rate of 2 revolutions per second. Find its speed in km/h. (6 Marks)
2. A lorry of mass 1500 kg travelling at a constant velocity of 72km/h collides with a stationary car of mass 900kg. The impact takes 2seconds. Calculate:
3. the impulsive force (6 Marks)
4. the change in kinetic energy (3 Marks)