



MURANGA UNIVERSITY COLLEGE
(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)
University Examinations 2014/2015
END OF TERM EXAMINATION
FOR DIPLOMA IN APPLIED BIOLOGY ASB/BIO/14D

ASB 1106: SCIENCE

DATE: 28TH JULY 2015

TIME:

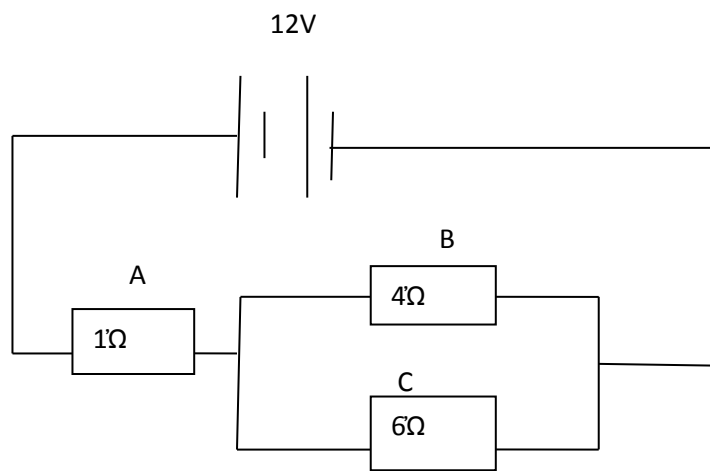
SECTION A:-PHYSICS

Attempt ALL the questions [50 marks]

Q1 A lagged Copper Calorimeter of mass 0.75kg contains 0.9kg of water at 20⁰c .A bolt of mass 0.8kg is transferred from an oven at 400⁰c to the calorimeter and a steady temperature of 50⁰c is reached by the water after stirring. Calculate the specific heat capacity of the material of the bolt .Given (Specific heat capacity of Copper is 400J/kgk, and that of water is 4200J/kgk) (6marks)

Q2 An electric Motor rated 2.5kw is used to lift bales of hay to a store in a dairy farm. A single bale has a mass of 5kg. If the store is 4 meters above the ground how many bales can the motor raise in 2 minutes? (10marks)

Q3 The figure below shows a 12V battery of internal resistance of 0.6Ω Connected to three resistors A, B, and C .Find the current in each resistor. (10marks)



Q4(a) Draw a ray diagram to show how a concave mirror produces a magnified virtual image of a suitably placed object and show where an eye must be positioned in order to see the image (6marks)

(b) A concave mirror has a focal length of 15cm calculate. Its radius of curvature, and the position of the image of an object standing

(i) 30cm from the mirror

(ii) 20cm from the mirror

(iii) 10cm from the mirror.

In each case state the nature and magnification of the image formed (12marks)

Q5 A rectangular block 0.01m by 0.02m, by 0.04m has a mass of 0.64kg. Calculate

(i) The density of the material of the block

(ii) The weight of the block

(iii) The pressure the block would exert when resting on its smallest side (Assume $g=10\text{m/s}^2$)

(6marks)

SECTION B CHEMISTRY

Answer ALL questions (50 marks) Time: 1 hr.

1. Define the following terms

- (i) Fehling solution (1 mark)
- (ii) a zwitterions (2 marks)
- (iii) fractional crystallization (2 marks)
- (iv) chemical equilibrium (2 marks)

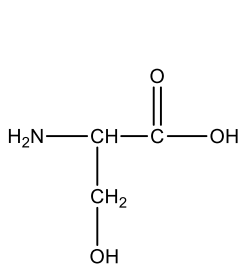
2. Write the condensed formula of the acid whose symbol formula is **18:1 (9)** (2 marks)

3. Explain why an aqueous solution of sodium hydrogencarbonate is considered an electrolyte (2marks)

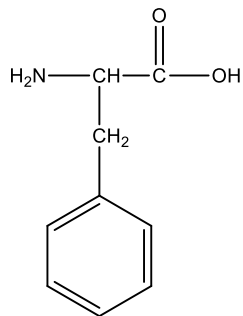
4. State one biological function of waxes in birds and one commercial application of waxes (2marks)

5. State the difference between a ketose sugar and an aldose sugar (2 marks)

6. Below are structures of two amino acids. Draw the structures of the two possible peptides formed by the two (3 marks)

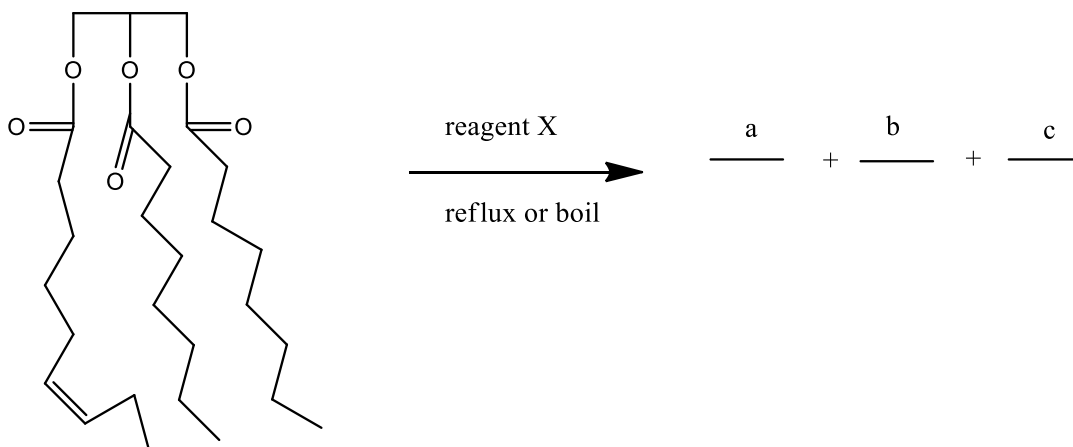


serine

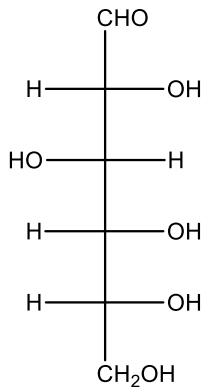


phenylalanine

7. Explain how the following can be enhanced (2 marks)
- Solubility of carbon dioxide in a soft drink
 - Solubility of ninhydrin crystals in water
8. Calculate the total pressure in atmospheres of a gas mixture that contains 1.0g Hydrogen H_2 and 8.0g Argon Ar in a 3 litre container at 27°C . What are the partial pressures of the two gases (3marks)
9. Using a diagram explain how the boiling point of ethanol is elevated when sugar crystals are dissolved into it. (3 marks)
10. In the hydrolysis reaction below draw the structures of the three products **a**, **b**, **c** and identify reagent **X** (3 marks)



11. Draw the Harworth projection of for the glucose molecule represented below by a Fischer projection (3 marks).



12. Explain how one can prepare a saturated solution of NaCl (2 marks)
13. Compare the effusion of carbon monoxide and oxygen under similar temperature and pressure conditions. (2 marks)
14. Explain why pure water cannot be used for intravenous rehydration (2 marks)
15. State any two characteristics that distinguish colloids from other types of mixtures (2 marks)
16. 7.68mg of unknown hydrophobic vitamin was dissolved in chloroform to form a 10mL solution. And the osmotic pressure of the solution was found to be 26.57mmHg at 25°C. [$\pi = cRT$ and $R = 0.08206 \text{ L. Atm/mol. K}$]
- Calculate the concentration of the vitamin (2 marks)
 - Calculate the moles of vitamin present in 10mL (2 marks)
 - Calculate the molar mass of the vitamin (2 marks)
 - Why is chloroform used and not water (1 mark)
17. State three factors that can influence the rate of a chemical reaction (3 marks)

END