



# MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examinations for 2013/2014

DEPARTMENT OF COMPUTING AND APPLIED SCIENCES

End of Term Examination for Diploma I Mechanical Engineering (Plant)

Science

**Date:** 21<sup>st</sup> March, 2014

**Time:** 2 Hours

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**INSTRUCTIONS:**

- a) Write your Admission Number clearly in the answer sheet
- b) Answer all questions

1. a) Differentiate between a normal and an acid salt (3marks)  
b) Using sulphuric acid write two equations to show the formation of the two salts in 1(a) above (4marks)  
c) Briefly explain why sodium chloride does not dissolve in petrol (2marks)  
d) With reference to enthalpy state the qualities of a good fuel (3marks)
2. a) Giving relevant examples explain oxidation and reduction reactions (4marks)  
b) From the example you have given in 3(a) above write an equation for:  
i). Oxidation Reaction (2marks)  
ii). Reduction Reaction (2marks)
3. (a) Using an appropriate example in each case describe the following:-  
(i) Metallic bond (2marks)  
(ii) Covalent bond (2marks)  
(iii) Polar Covalent bond (2marks)  
(b) Name two intermolecular forces (2marks)
4. Water measuring 200ml was heated from 25<sup>0</sup>C to 65<sup>0</sup>C using methanol as fuel. Initial mass of the methanol was 155.57g and final mass of ethanol was 151.4g.  
(a) Calculate:  
(i) Heat given out by the methanol (3marks)  
(ii) Molar heat of methanol (3marks)

(iii)  $\Delta H_c$  of methanol (3marks)

(b) The same volume of water in 5(a) above was heated from 20°C to 30°C by 0.80g of Hexane.

Calculate:

(i) Heat given out by the Hexane (3marks)

(ii) Molar heat of Hexane (3marks)

(iii)  $\Delta H_c$  of Hexane (3marks)

*(Show your working clearly in each case)*

(c) Between ethanol and Hexane which one is better fuel? (1mark)

(ii) Explain your choice in C (i) above (2marks)

*(Specific heat capacity of water 4.2 j/g, C= 12, H=1, O=16).*

5. State the difference between s-block and d-block elements of the Periodic Table (4marks)

6. Copy and complete the following table (9marks)

Element	Atomic No	RAM	No. Of Protons	No. of Neutrons	No. of Electron	Electronic configuration
U	17	35				
V		16				
W		39		19		
X		40				

7. a) Using the water molecule explain the meaning of chemical polarity (5marks)

b) Describe how polarity influences solubility of substances (4marks)

8. An element Y has an ion  $Y^{2+}$  and a mass number of 40 and 20 protons.

a) State its:

i) Atomic number (2 marks)

ii) Number of neutrons (explain your answer) (2 marks)

b) Write the electronic structure of Y using the *spdf* sub-energy levels (4 marks)

c) Using dots (.) and crosses (x) show how element Y would combine with element T, which has an atomic number of 9 (4 marks)

9. Outline the procedure that you would follow to separate a mixture of water, kerosene, sodium chloride and sand (9 marks)

10. With the aid of a diagram, explain how you would demonstrate that the water molecule is electrically polarized (8marks)