THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Applied & Health Sciences

DEPARTMENT OF PURE & APPLIED SCIENCES
DIPLOMA IN ANALYTICAL CHEMISTRY (DAC 011)
DIPLOMA IN NEUTICAL SCIENCE (DNS 011)

APS2101: PHYSICS I

END OF SEMESTER EXAMINATION
SERIES: AUGUST/SEPTEMBER 2011
TIME: 2HOURS

Instructions to Candidates:
You should have the following for this examination
- Answer booklet

This paper consists of **FIVE** questions
Answer Question **ONE** (Compulsory) and attempt any other **TWO** questions
This paper consists of **THREE** printed pages

Question One (30 marks)

a) The reading on a mercury barometer at a place is 700mm. What is the pressure at the place in Nm^{-2}. (Density of mercury is $1.36 \times 10^4 kg/m^3$) (3 marks)

b) State the **TWO** advantages of mercury over alcohol as a thermometric liquid (2 marks)

c) Derive a formula to calculate pressure in liquids (4marks)

d) 80cm3 of water is mixed with $140cm^3$ of liquid of density $0.83g/cm^3$. What is the density of the mixture if there is no change in total volume on mixing? (4 marks)

e) Convert the following into their SI units:

(i) 72km/h (2 marks)

(ii) $13.6g/cm^3$ (2 marks)

(iii) 4.2J/gK (2 marks)

f) Discuss the **THREE** modes of heat transfer (6 marks)

g) Draw a labeled diagram of a simple apparatus for finding the pressure of a gas supply (5 mark)

Question Two (20 marks)

a) Explain why a dam is thicker at the bottom than at the top (2 marks)

b) State the factors that determine pressure in:

(i) Solids (2 marks)

(ii) Liquids) (2 marks)

c) Describe a method for determination of density of an irregular object (4 marks)

d) What is Atmospheric Pressure? (1 mark)

e) A force of 100N is applied on the small piston of area $0.25m^2$. Calculate the force produced in the large piston of area $10m^2$ (4 marks)

f) Give **THREE** properties of a liquid to be used as a brake fluid (3 marks)

g) State the principle of transmission of pressure in liquids (2 marks)

Question Three (20 marks)

a) State and briefly explain the **THREE** Newton's law of motion (6 marks)

b) Distinguish between Centrifugal force and Centripetal force (4 marks)

c) Derive the wave equation (4 marks)

d) Discuss the types of waves on the following basis:

(i) Transverse vs longitudinal (2 marks)

(ii) Electromagnetic vs mechanical (2 marks)

(iii) Travelling vs stationery (2 marks)

Question Four (20 marks)

a) The air pressure at the base of a mountain is 75cm of mercury and at the top is 60 cm of mercury. Given that the average density of air is 1.25kg/m^3 and the density of mercury is 13,600kg/m^3, calculate the height of the mountain. (4marks)

b) Describe the special features that make a clinical thermometer better than other types of thermometers in measuring human body temperatures (4 marks)

c) Discuss the circumstances under which the following occurs;

(i) Interferences (2 marks)

(ii) Refraction (2 marks)

(iii) Diffraction (2 marks)

d) A piece of metal has a volume of 15cm^3 and a mass of 27g. what is its density in kg/m^3 (4 marks)

e) Define force and give its units of measurement (2 marks)

Question Five (20 marks)

a) Give the radiations of the electromagnetic spectrum in their order of increasing wavelength stating the sources of each radiation (7 marks)

b) Give the characteristics of the radiations in the electromagnetic spectrum (3 marks)

c) Distinguish between static and dynamic friction (4 marks)

d) What factors does friction depend o? (2 marks)

e) Give TWO situations where friction is:

(i) Essential

(ii) A disadvantage (4 marks)