THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

PRE-CERTIFICATE IN INFORMATION TECHNOLOGY
(PCIT/JAN 2012 S-FT)

APS 1002: FUNDAMENTALS OF PHYSICS

END OF SEMESTER EXAMIANTION

SERIES: APRIL 2012
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

Question One (30 Marks)

a) Explain the following giving an example of each:
    (i)   Scalar quantity
    (ii)   Vector quantity   (4 marks)

b) State Newton's laws of motion   (4 marks)
c) State laws of reflection   (5 marks)
d) Explain 'reflaction'   (3 marks)
e) With aid of diagram explain 'total internal reflection'   (4 marks)
f) Distinguish between mass and weight stating the units of measuring each   (4 marks)
g) Define the following terms:
    (i)   Frequency
    (ii)   Wavelength
    (iii)   Amplitude   (6 marks)

SECTION B (Answer Any Two Questions)

Question Two (15 marks)

a) Sketch velocity time graphs to show the following:
    (i)   Body travelling with uniform velocity
    (ii)   Body travelling with uniform acceleration   (4 marks)

b) A body travelling with a velocity of 72km/h is accelerated for 10 seconds and reaches a final velocity of 142km/h. Calculate the:
    (i)   Acceleration of the body
    (ii)   The final velocity of the object
    (iii)   The distance travelled by the object   (6 marks)

c) A force acts on an object of mass 2000kg travelling at 36km/h in the direction in which the object is moving. After 10 seconds, the object reaches a velocity on 72km/h. Assuming that there was no other force acting on the object calculate:
    (i)   The acceleration of the object
    (ii)   The force acting on the body   (5 marks)

Question Three (15 marks)

a) Explain what is meant by 'virtual image'   (2 marks)

b) State Snells's law   (2 marks)

c) The sketch shows a ray of light passing from air to some medium. Given that the angle of incident is 52° and the angle of refraction is 18°, calculate:

Figure 1

      (i)   The refractive index of the medium
      (ii)   The velocity of the light ray in the medium
      (iii)   The critical angle of the light ray   (6 marks)

d) If the frequency of the ray is 4.6×10^{14} Hz, calculate the wave length of the light ray in:
      (i)   Air
      (ii)   The medium   (4 marks)

e) Explain 'specular reflection'   (1 mark)

Question Four (20 marks)

a) State Ohm's Law   (2 marks)
b) Describe a simple capacitor   (2 marks)
c) Describe any **THREE** application of capacitors   (3 marks)
d) Calculate the charge on a capacitor if its capacitance is 100 μF and a voltage of 12V is applied

   across the capacitor   (2 marks)
e) Three capacitors C1, C2 and C3 are connected as shown in the figure. Their capacitances are 10 μF, 20 μF, and 15 μF respectively.

   Figure 2

   Calculate:
      (i)   The equivalent capacitance of the circuit
      (ii)   The charge stored in the circuit   (3 marks)

f) Three capacitors C1, C2 and C3 are connected as shown in the figure. Their capacitances are 10 μF, 20 μF, and 15 μF respectively.

Figure 3

Calculate:
   (i)   The equivalent capacitance of the circuit
   (ii)   The charge stored in the circuit   (3 marks)

Question Five (20 marks)

a) The diagram shows resistors connected in a certain circuit.

 Calculate
   (i)   The total resistance of the resistors
   (ii)   The current in each of the resistors
   (iii) The p.d across each resistor   (11 marks)

b) Briefly explain the generation of laser light   (4 marks)