



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

CERTIFICATE IN BUILDING & CIVIL ENGINEERING

APS 1101: APPLIED PHYSICS

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*

This paper consists of **FIVE** questions. Answer any **THREE** question questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One (20 Marks)

- a) Use the Kinetic Theory of matter to explain the change in state for the **THREE** states of matter. **(8 marks)**
- b) Calculate the density of a rectangular block of mass 10kg measuring 2m by 40 cm by 2cm. **(3 marks)**
- c) (i) Explain using illustration on how to measure density of sand using density bottle **(4 marks)**
(ii) State the precautions taken in the experiment in c (i) **(2 marks)**
- d) What volume of brass that has a density of 8.5gcm^{-3} which must be attached to a piece of wood of mass 100g and density 0.2gcm^{-3} so that the two will just submerge beneath water. Take: Density of water as 1gcm^{-3} . **(3 marks)**

Question Two (20 marks)

- a) Define capillarity. **(2 marks)**
- b) State **THREE** factors that affect capillary. **(3 marks)**
- c) Show that $Y = \frac{rh\rho g}{2}$ where Y = surface tension ρ = density r = radius and g = gravitational acceleration. **(5marks)**
- d) Differentiate between adhesion and cohesive forces. **(4 marks)**
- e) Illustrate **TWO** ways of measuring a acute angle of contact and obtuse angle of contact. **(2 marks)**
- f) Explain the relationship between the angle of contact and capillary. **(4 marks)**

Question Three (20 marks)

- a) A rubber cord of catapult has a cross-sectional area of 2mm^2 and initial length of 0.20m and is stretched to 0.24m to fire a small object of mass 10g. Calculate the initial velocity of the object when it just leaves the catapult. $E = 6 \times 10^8$ pa for rubber. **(5 marks)**
- b) Define modulus of rigidity **(2 marks)**
- c) (i) State hook's Law
(ii) Describe with help of a rough graph the behavior of a copper which hangs vertically and is loaded with a gradual increasing load until it finally breaks. **(8 marks)**
- d) A wire of original length 100cm and diameter 0.5cm was stretched to 102cm and its diameter reduced to 0.495cm. Calculate the Poisson's ratio. **(3 marks)**
- e) State the SI units of: **(2 marks)**
 - i) Stress

ii) Spring constant

Question Four (20 marks)

- a) Show that for a bicycle ride round circular track. **(5marks)**
$$\tan \theta = \frac{V^2}{rg}$$
- b) Explain the operations of centrifuges. **(4 marks)**
- c) A model car moves round a circular track of radius 0.3m at 2 revolutions per second determine.
i) The angular speed
ii) The period T
iii) Speed V for the car. **(9 marks)**
- d) Explain why a body in a circular motion is said to accelerate yet its moving with a constant speed. **(2 marks)**

Question Five (20 marks)

- a) Define: **(8 marks)**
i) Distance
ii) Displacement
iii) Velocity
iv) Acceleration
- b) A car travels at a uniform velocity of 20m/s for 5s. The breaks are then applied and the car comes to rest with uniform retardation in further 8 second. Draw a sketch of velocity time graph. How far does the car travel after the breaks are applied? **(4 marks)**
- c) Change the following angles to radian:
i) 305°
ii) 60° **(8 marks)**