

Applied Mechanics - Syllabus C (BA)
00-6001/C.BA

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Probatoire Technique Examination

JUNE 2016

Date: Thursday 26-05-2016

Series/ Specialties	Civil Engineering (Building Construction Option) (F4BA)
Subject Title	Applied Mechanics - Syllabus C (BA)
Subject Code No.	00-6001/C.BA
Type of Exam	WRITTEN
Weighting (Coef.)	SEE INSIDE

Duration: 14:00 - 17:00

General Instructions

*You are reminded of the necessity for good English and orderly presentation of your material.
Where calculations are involved show your working, giving your answer at each stage.*

Content: QUESTIONS

Specific Instructions

Turn over

APPLIED MECHANICS

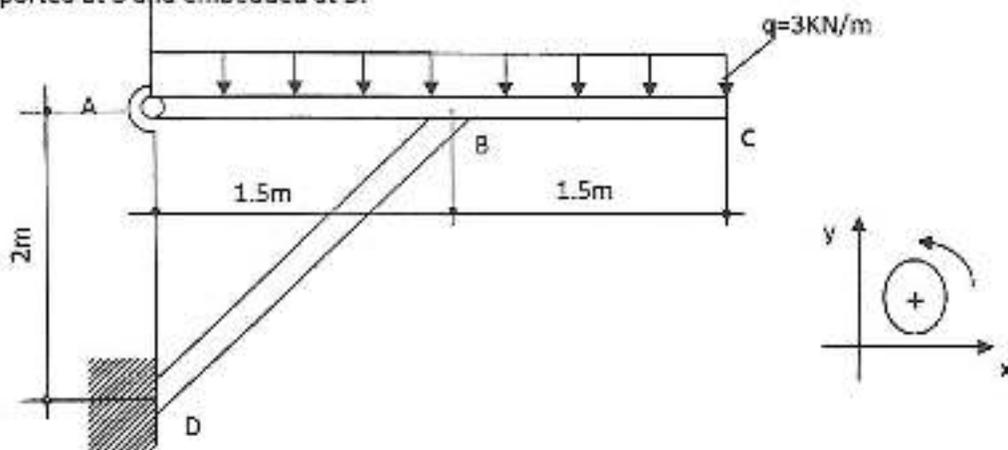
- No documents are allowed except those handed to the candidates by the examiners
- Before you start work, make sure you have from page 1 / 2 to 2 / 2

PART 1: PRINCIPLES AND DEFINITIONS /3 marks

- 1a. What is a physical system mechanically speaking? Give two examples of physical systems in the field of civil engineering. (1mk)
- 1b. Give four examples of properties that can be determined for the cross-section of a structural element. (1mk)
- 1c. State Archimedes principle of floatation. (1mk)

PART 2: STATICS AND STRENGTH OF MATERIALS /7 marks

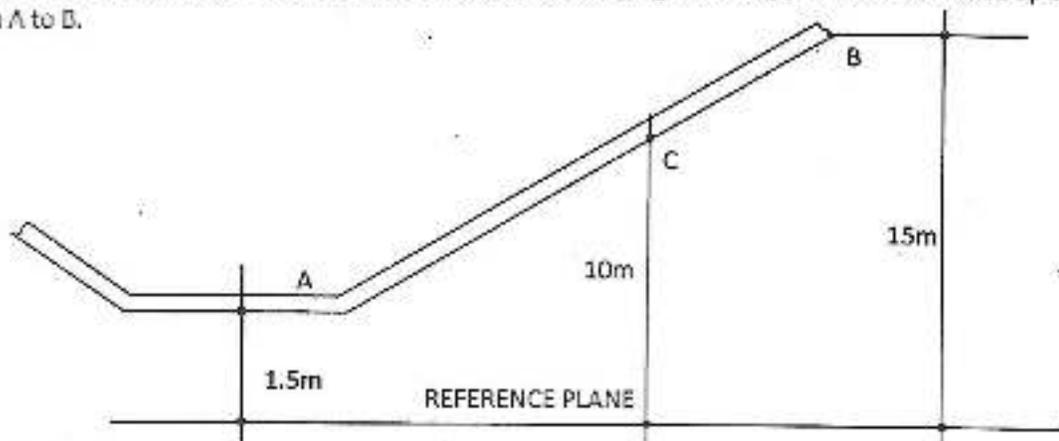
Consider the physical system below. It is hinged at A, simply supported at B and embedded at D. It is hinged at A, simply supported at B and embedded at D.



- 2a. Determine the reactions at A B and D. (3 marks)
- 2b. Write the equations of bending moments along the bar ABC given that the reactions at A are $R_{Ax} = -10.31 \text{ kN}$, $R_{Ay} = -4.5 \text{ kN}$ and the inclined reaction at B= 16.88 kN . (2mrks)
- 2c. Determine the diameter of the hinge bolt at A if the vertical reaction at A is 4.5 kN and the shearing yield stress is 210 MPa . The factor of safety is 1.15 . (2mrks)

PART 3: HYDRAULICS / 5 marks

Consider the drawing below which represents a pipe conveying water supplied to a residence up a hilly quarter from A to B.



The velocity of water arriving at A is 30m/s. The pressure difference between point A and B is 2700Pa.

- 3a. Determine the velocity of water when it arrives at point B. (2 marks)
3b. Determine the diameter at A and B if the flow rate is envisaged at 40l/s. (3 marks)

PART 4: KINEMATICS / 5 marks

The position coordinate of a particle which is confined to move along a straight line is given by $s = 2t^2 - 24t + 6$ where s is measured in meters from a convenient origin at t in seconds. Determine

- 4a. The time required for the particle to reach a velocity of 72m/s from its initial condition at $t=0$. (2mrks)
4b. The acceleration of the particle when $v=30\text{m/s}$ (2mrks)
4c. The net displacement of the particle during interval $t=1$ to $t=4\text{sec}$. (1mrk)