



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

(INSTITUTION BASED EXAMINATION)

EBC 2203: STRENGTH OF MATERIALS

SERIES: MARCH 2017

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

-Pocket calculator

This paper consists of **FIVE** questions. Attempt any **THREE** questions

Do not write on the question paper

Mobile Phones are NOT allowed inside the examination room

QUESTION ONE

- a) Draw shear and moment equations for the beams in the following problems. In each problem, let x be the distance measured from left end of the beam. Also, draw shear and moment diagrams, specifying values at all change of loading positions and at points of zero shear. Neglect the mass of the beam.

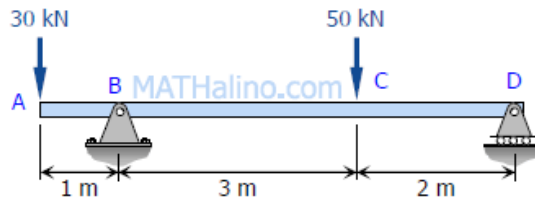


Fig. Q1

(12 marks)

- b) A hollow steel tube with an inside diameter of 100 mm must carry a tensile load of 400kN. Determine the outside diameter of the tube if the stress is limited to 120 MN/m².

(8 marks)

QUESTION TWO

The following data were obtained during a tension test of an aluminum alloy. The initial diameter of the test specimen was 0.505 in. and the gage length was 2.0 in.

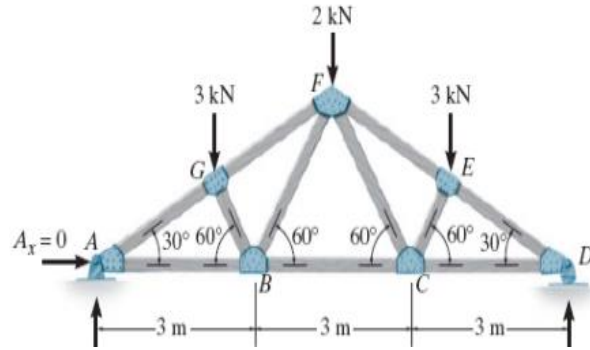
Load (lb)	Elongation (in.)	Load (lb)	Elongation (in.)
0	0	14 000	0.020
2 310	0.00220	14 400	0.025
4 640	0.00440	14 500	0.060
6 950	0.00660	14 600	0.080
9 290	0.00880	14 800	0.100
11 600	0.0110	14 600	0.120
12 600	0.0150	13 600	Fracture

Plot the stress-strain diagram and determine the following mechanical properties: (a) proportional limit; (b) modulus of elasticity; (c) yield point; (d) yield strength at 0.2% offset; (e) ultimate strength; and (f) rupture strength.

(20 marks)

QUESTION THREE

Determine the force in each member of the roof truss shown in figure Q3 and State whether the members are in tension or compression **HENCE** draw the force diagram.

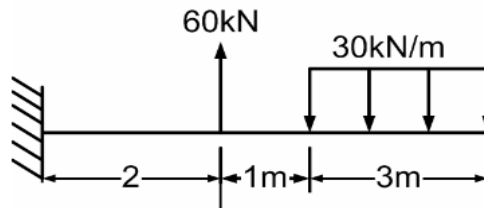


(20 marks)

QUESTIONFOUR

- a) A concrete post with a 50.8 cm diameter is supporting a compressive load of 8910 Newton's.
 - i) Determine the stress the post is bearing (5 marks)
 - ii) The concrete post in (i) above has an initial height of 0.55m. how much shorter is the post once the load is applied (give your answer in mm) (5 marks)

- b) Analyze the cantilever beam shown in figure Q4(b) hence draw the shear force and bending moment diagram (10 marks)



figureQ4 (b)

QUESTION FIVE

Determine the moments of inertia and the radius of gyration of the shaded area with respect to the x and y axes of figure Q5 below

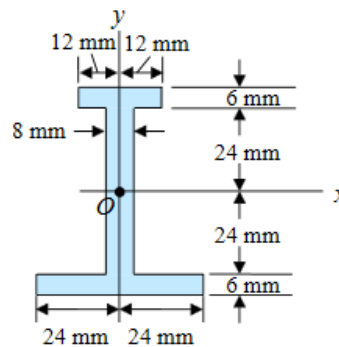


Figure Q5

(20 marks)