TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

INSTITUTION BASED PROGRAMME

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

EBC 2207 : THEORY OF STRUCTURES II

END OF SEMESTER EXAMINATION

SERIES: JULY 2017

TIME: 2 HOURS

DATE: Pick Date JULY 2017

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 in the examination room.

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1. a) Using the Mohr's moment area method, prove that the deflection at the end of a cantilever carrying a point load t it end is given by

$$y_b = -\frac{WL^3}{3EI}$$

(10 marks)

b) Obtain the expression for the slope at the supports and deflection at mid span of a simply supported beam carrying a uniformly distributed load. (10 marks)

2. The figure 1 below shows a simply supported beam carrying a concentrated load at the mid span.
   Determine (a) The maximum deflection
   (b) The slope and deflection at quarter span, point D on the beam.
   Take EI= $80x10^3$ Kn/m2 (20 marks)

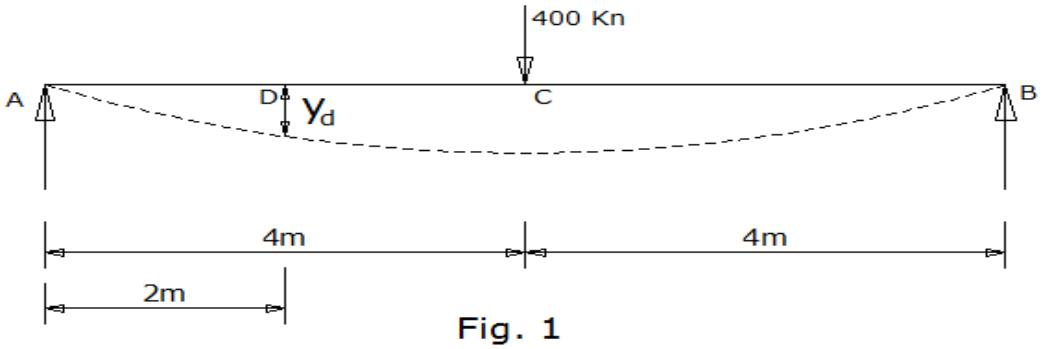

Fig. 1

3. Show that the general Differential equation for deflection is given by (20 marks)

$$\frac{M}{EI} = -\frac{d^2y}{dx^2}$$

4. A timber beam of breath 100 mm and depth 300 mm is simply supported and carries a concentrated load of 15 mm at the centre of its span of 4.2 m. Calculate the maximum deflection due to this load.
   Take Young's modulus of timber = $10Kn/mm^2$ (20 marks)

5. The cantilever shown in figure 2 below is built in at A and supported at the lower end of an 8 mm diameter rod at B. The upper end of the rod is secured to a rigid support at C. If the rod is horizontal and the rod unstrained before the application of the load, determine the stress in the rod and the bending moment in the beam at A due to the uniform load shown. The second moment of area of the beam is 15x106 mm4 and young's modulus is the same for both the rod and the beam.

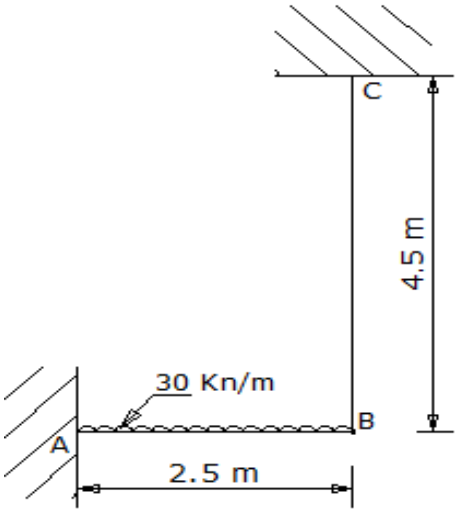

Fig. 2