THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

DA 09

END OF SEMESTER EXAMINATIONS

APRIL/MAY 2010 SERIES

CE2C1204 : THEORY OF STRUCTURES I

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination:

- Answer booklet
- Scientific calculator

This paper consists of **FIVE** Questions in Sections **A and B.**
Answer **question ONE** in Section **A** and any **TWO** Questions in Section **B.**
The maximum marks for each part of a question is as shown**.**

Question ONE (COMPULSORY)

A masonry pier of 3 x 4m supports a vertical load of 80KN as shown in fig.1.

(i) Find the stress developed at each corner of pier.
(ii) What additional load should be placed at the centre of pier, so that there is no tension anywhere in the pier section.
(iii) What are the stresses at the corners with the additional load at the centre.

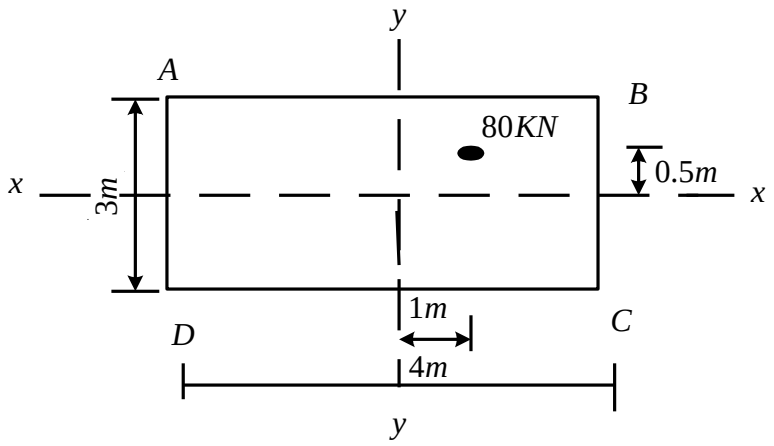

Fig. 1

(30 Marks)

Question TWO

(i). State FOUR assumptions upon which Euler's formula is based.

(ii). A tubular pin-jointed strut 3m long has an outer and inner diameter of 37.5mm and 32.5mm respectively. Compare the crippling loads given by Euler's and Rankine's formula for the strut given the following:

Yield stress	=	$330N/mm^3$
Young's modulus	=	$210KN/mm^3$
Rankine's constant	=	$1/7500$

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(20 Marks)

Question THREE

(i). State Mohr's theorems for slope and deflection.

(ii). Fig. 2 shows a loaded cantilever beam. Using Mohr's theorems, determine the deflection at points 'B'. 'C' and the solve at 'C' in terms of EI.

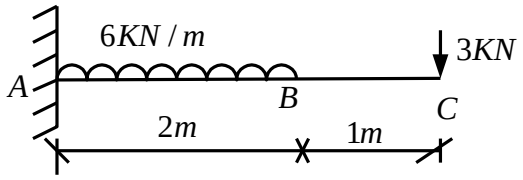

Fig. 2

(20 Marks)

Question FOUR

A universal column, section acting as a stanchion carries an axial load and two further loads from incoming beams supported on brackets. The arrangements of loads may be assumed to be as shown in Fig.3. Determine the extreme fibre stresses acting at the corners A, B, C and D. Properties of the universal column section:

A = 11,400mm^2, I_{xx} =143 x 10^{6}mm^4, I_{yy} = 48 x 10^6 mm^4. **(20 Marks)**

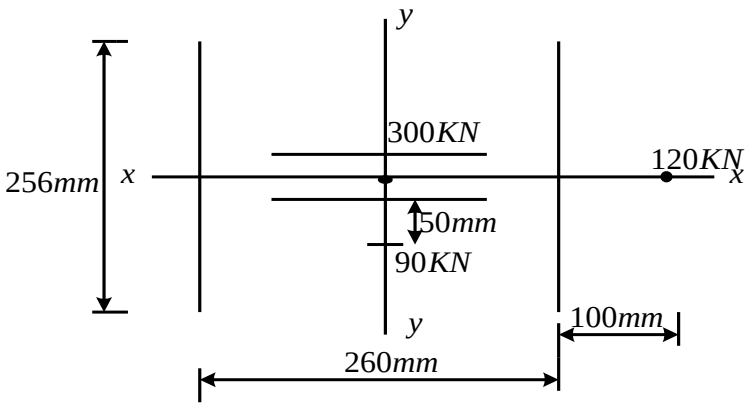

Fig.3

Question FIVE

Using Macaulay's method, determine the position and magnitude of the maximum deflection for the beam loaded as shows in fig. 4, given E as 200KN/m^2 and I as 160 x 10^{6}mm^4.

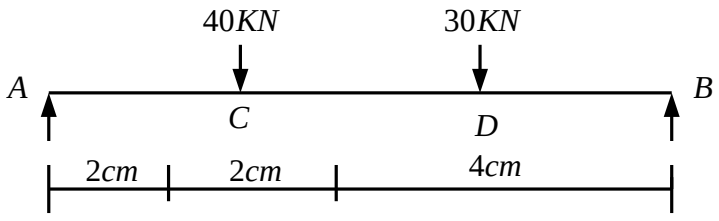

Fig. 4

(20 Marks)