THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

DIPLOMA IN ARCHITECTURE AND
DIPLOMA IN CIVIL ENGINEERING

STRENGTH OF MATERIAL I

END OF SEMESTER EXAMINATIONS

APRIL/MAY 2010 SERIES

TIME: 2 HOURS

Instructions to Candidates

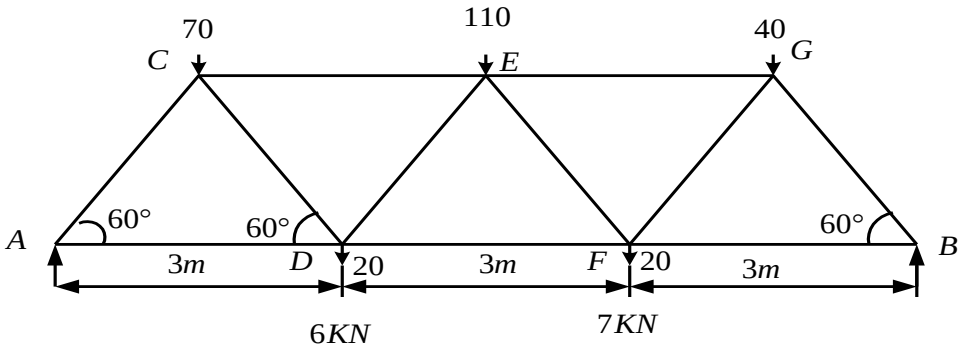
You should have the following for this examination:

- Answer booklet
- Scientific calculator

This paper consists of **FIVE** Questions.
Answer question **ONE** is COMPULSORY and any other **TWO** Questions.
Marks for each part of a question are as shown.

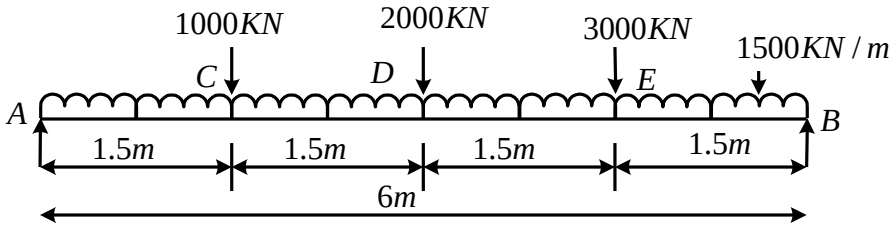
Question ONE (COMPULSORY)

The figure below shows a warren girder consisting of eleven members and freely supported at its end points. The girder is loaded at points C, E, G, D and F using any analytical method. Find all the member forces in the truss indicating whether the forces are in tension or compression. **(30 Marks)**



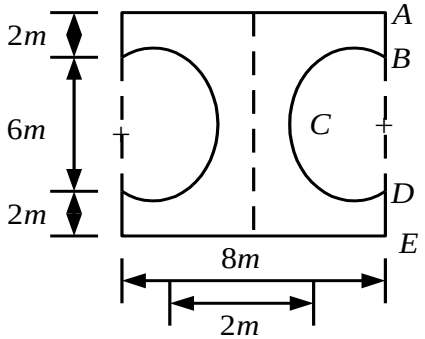
Question TWO

Figure below shows a beam 6m long which is simply supported at the ends and carries a uniformly distributed load of 1500KN/m, and three concentrated loads of 1000KN, 2000KN and 3000KN respectively. Draw the shear force Bending Moment diagrams and hence determine the value of maximum bending moment. **(20 Marks)**



Question THREE

The steel section shown below is subjected to shear force of 10,000N. Determine the shear stress at the important points and sketch the shear distribution diagram. (units = metres)



Question FOUR

(a). Derive from the basic principles the general expression used in the theory of bending. **(15 Marks)**

(b). Sketch the typical stress strain graph for mild steel and show the following points:

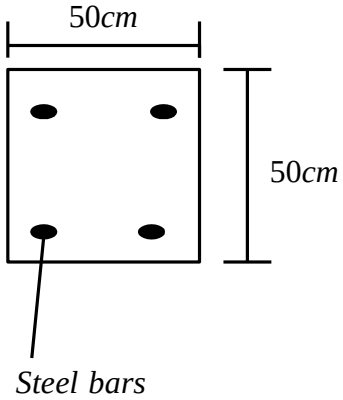
(i). Limit of proportionality
(ii). Elastic limit
(iii). Yield stress
(iv). Ultimate stress
(v). Breaking strength.

(5 Marks)

Question FIVE

(a). A Reinforced concrete Column 50 x 50cm in section is reinforced with 4 steel bars of 2.5cm diameter one in each corner. The column is carrying a load of 200Tonnes. Find the stresses in the concrete and steel bars in kg/cm^2. **(10 Marks)**

Take E for steel = $2.1 \times 10^6 kg/cm^2$
E for concrete = $0.14 \times 10^6 kg/cm^2$



(b). The figure 5(b) below shows a warren girder loaded at point C and E and freely supported at its ends. Using an appropriate analytical method of analysis, determine force in member DC, EF and BC. **(10 Marks)**