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

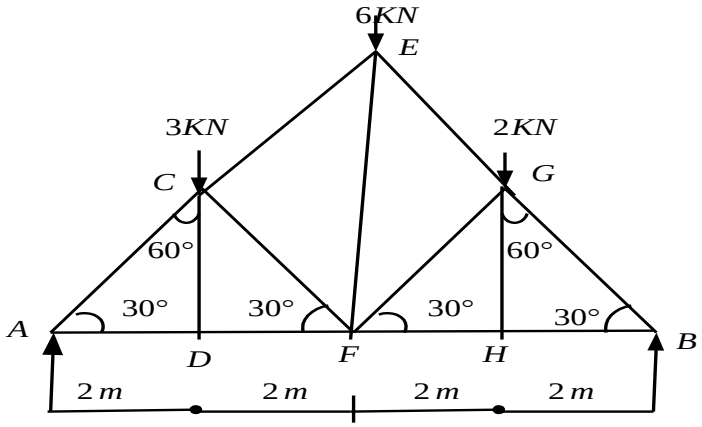
You should have the following for this examination:

- 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) (30 Marks)

The figure below shows a roof truss loaded at point C, E and G, and simply supported at the ends. Using any analytical methods, determine the forces in each member indicating whether the member is a tie or strut.

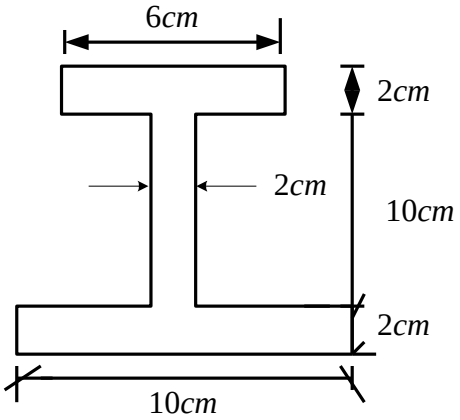


(30 Marks)

Question TWO

(a). Outline the **FIVE** assumptions of the theory of simply bending. **(5 Marks)**

(b). The beam shown below is subjected to a bending moment of 5KN/m at its N/A. Find the maximum stress induced in the beams in (KN/cm^2). **(15 marks)**



Question THREE

(a). Sketch a typical stress-strain graph of a mild steel and hence explain fully the following terms associated with it.

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

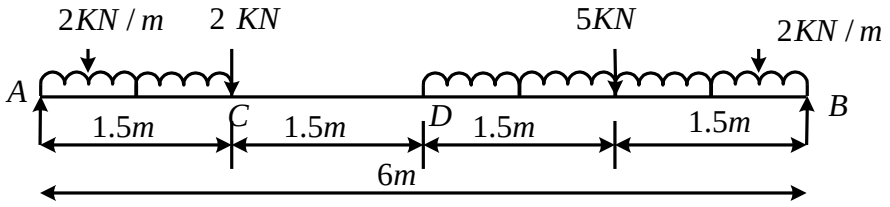
(12 Marks)

(b). A short timber post of rectangular section has one side of its section twice the other.

When the post is loaded axially with 9.8KN it contracts 0.119mm per metre length. If E for timber = 8.4KN/mm^2. Calculate the sectional dimensions of the post. **(8 Marks)**

Question FOUR

A simply supported beam AB, 6m long is loaded as shown in the figure below:



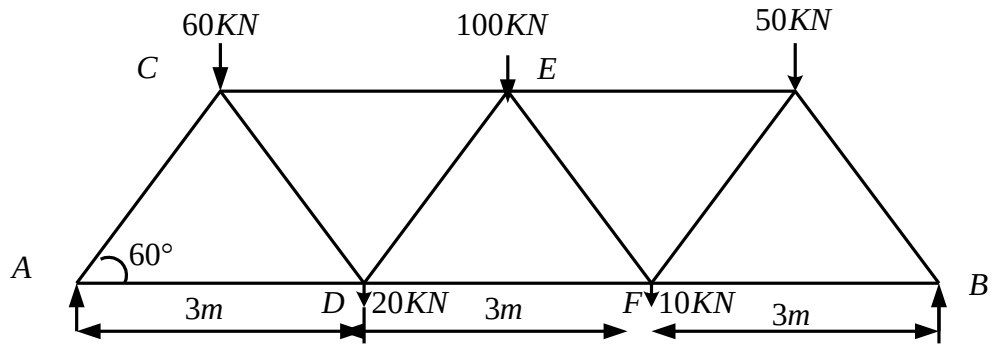
Construct the shear force diagram, bending moment diagram for the beam and hence find the position and value of maximum bending moment. **(20 marks)**

Question FIVE

(a). Define the principle of superposition, giving its mathematical expression and the parameters used. **(5 Marks)**

(b). The figure below shows a warren girder loaded at points C, D, E, F and G and freely supported at its ends. Using the method of section, determine the magnitude and nature of forces in members CD, DE, DF, EG AND FG.

(15 Marks)


60KN
100KN
50KN
C
E
A
60°
B
3m
D
20KN
3m
F
10KN
3m