



Technical University of Mombasa

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
HIGHER DIPLOMA IN BUILDING & CIVIL ECONOMICS
(KIHBIT)

EBE 3116 : THEORY OF STRUCTURES II

SEMESTER: EXAMINATIONS

SERIES: APRIL 2014

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. You should have the following for this paper
 - *Answer booklet*
 - *Scientific calculator*
2. This paper consists of **FIVE** questions.
3. Answer any **THREE** Questions
This paper consists of 3 PRINTED pages

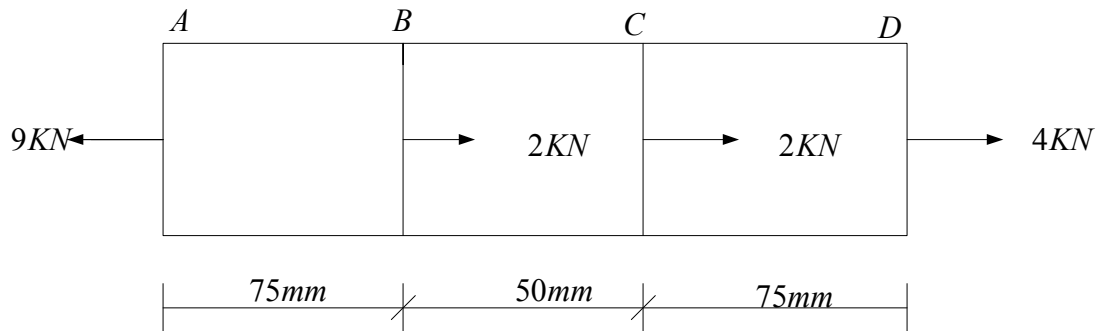
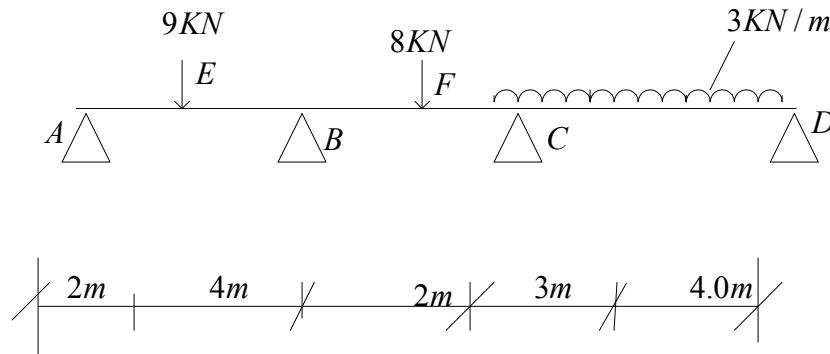
QUESTION ONE

- a) Figure Q1 is a continuous beam loaded at point E and F with point load and in span C-D with a Udl of 3KN/M. Using three moment theorem determine moments at B and C and hence draw the bending moment diagram. **(15 marks)**

- b) Define the principle of superposition **(1 mark)**

- c) A steel bar of x-sectional area 10cm^2 is subjected to axial force as shown in figure Q1(c) below.

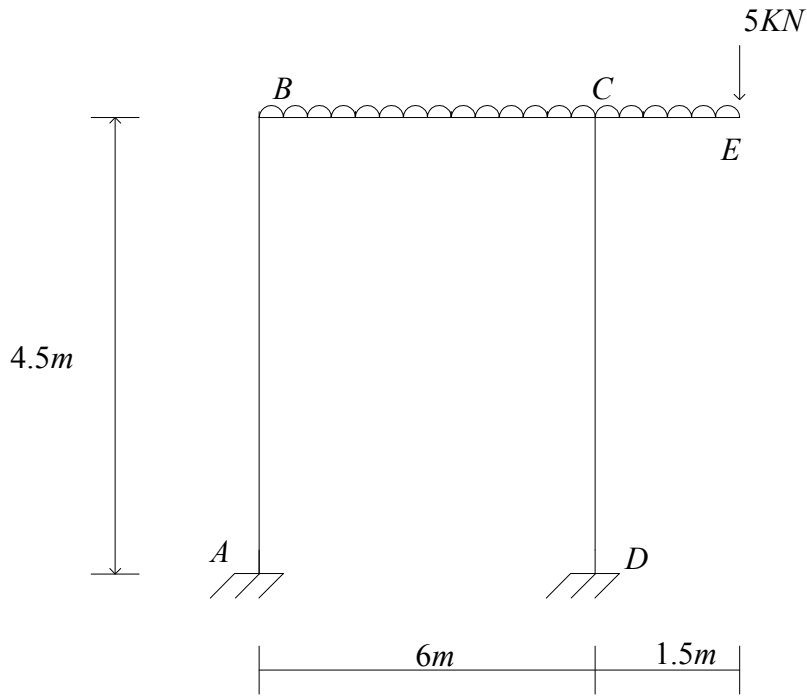
Given that $E = 0.8 \times 10^3 \text{ KN/mm}^2$ find the total elongation using principle of superposition.



(4 marks)

QUESTION TWO

- a) Figure Q2 is a frame loaded as shown using movement distribution diagram analyse the structure and calculate the actual sway hence, draw the bending moment diagram.



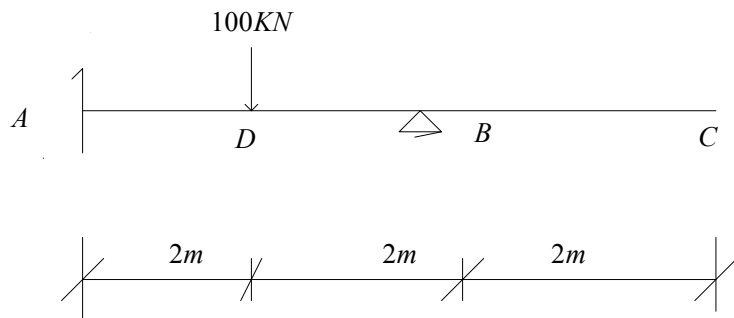
FigQ2.(a)

- b) List five effects of a free board in a gravity Dam and give the maximum height of free board as per the current practice

(4 marks)

QUESTION THREE

- a) Figure Q3(a) is a propped cantilever loaded as shown. Find the maximum deflection in span AB and deflection at C in terms of EI



FigQ3.(a)

- b) From principles of energy theorem and using a well labelled sketch, show that, the total work done in a body over a full displacement is given by:

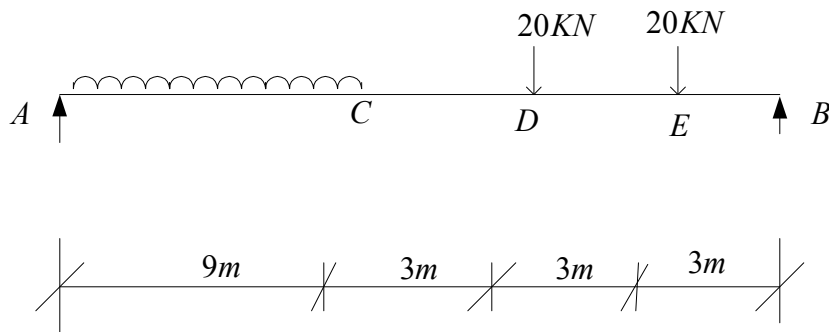
$$W = \int_0^D P.dA.$$

(5marks)

QUESTION FOUR

Beam AB shown in figure Q4 is simply supported at A and B and has flexural rigidity EI . Using Macaulay's Method determine the maximum slope and deflection.

(20marks)

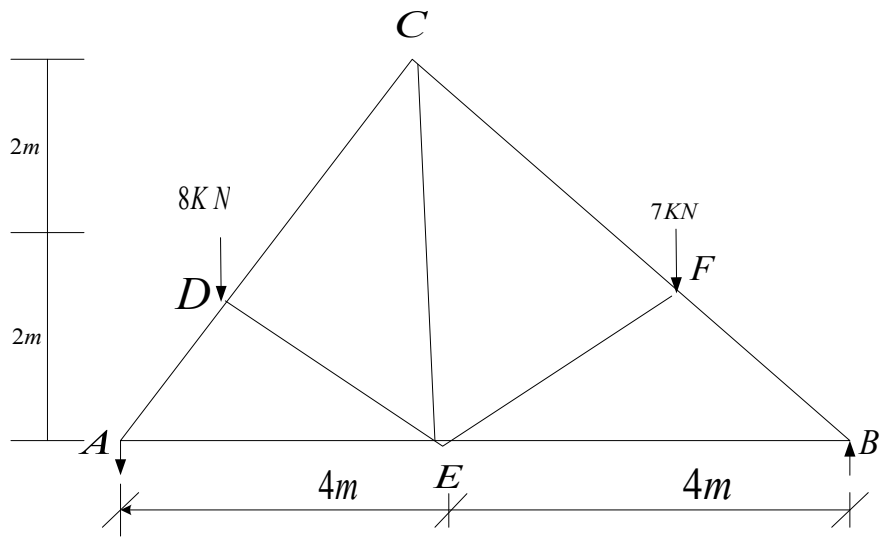


FigQ 4.

QUESTION FIVE

Figure Q5 is a roof truss loaded as shown. Using strain energy and applying the energy principles, find vertical deflection at point F.

(20marks)



FigQ5