



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

EBC 2302: THEORY OF STRUCTURES III

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination

- Answer booklet

This paper consists of **FIVE** questions

Answer question one (**compulsory**) and any other two questions

Maximum marks for each part of a question are as shown

This paper consists of **FOUR** printed papers.



QUESTION ONE (COMPULSORY)

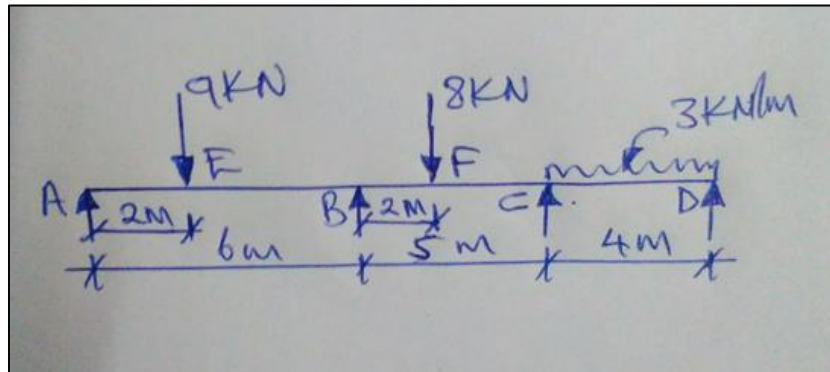
- a) A parabolic arch hinged at springings and crown has a span of 30m and central rise 6m. Determine the magnitude of maximum positive and negative bending moment at a section 10m from the left hand support when a point load of 90KN rolls over the beam. **(10marks)**
- b) For a simply supported beam with a central point load show that the slope and deflection at any section in the beam is given by:

$$\bar{i}_A = \bar{i}_B = \frac{wl^2}{16EI} \quad \text{and} \quad y_c = \frac{wl^3}{48EI} \quad \text{respectively} \quad \text{(15 marks)}$$

- c) A cantilever beam 2m long is subjected to a UDL of 5KN/m over its entire length. Find the slope and deflection of the cantilever beam at its free end. Take $EI = 2.5 \times 10^{12} \text{ mm}^2$ **(5 marks)**

QUESTION TWO

A cantilever beam ABCD, simply supported at A, B, C and D is loaded as shown below.



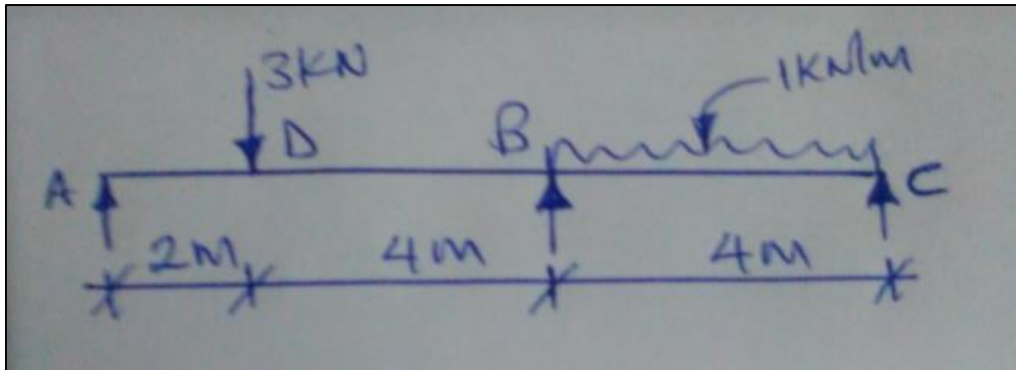
Find the moments over the beam and draw bending moment and shear force diagrams by three moment's theorem.

(20marks)



QUESTION THREE

- a) A cantilever beam ABC 10m long rests on three supports A, B, and C at the same level and is loaded as shown below.



Determine the moments over the beam and draw the bending moment diagram by moment distribution method. Calculate the reactions at the supports and draw the shear force diagram.

(20marks)

QUESTION FOUR

- a) A UDL of 50kN/m longer than the span rolls over a beam of 25m span. Using influence lines, determine the maximum shear force and bending moment at a section 10m from the left end support. **(12marks)**

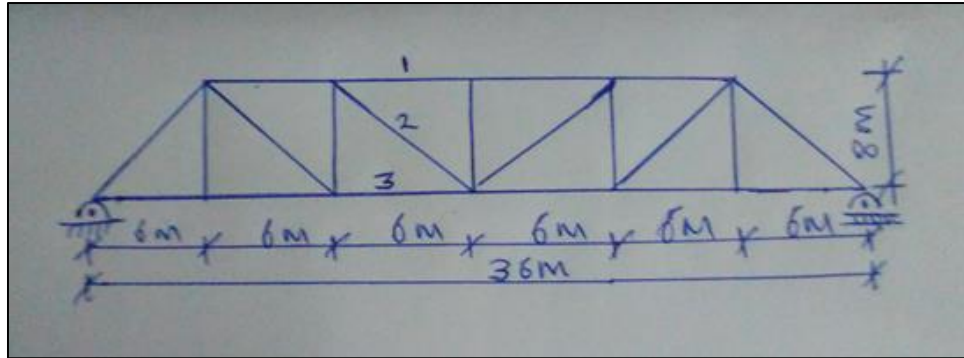
- b) A simply supported beam of span 20m a UDL of 20kN/m and 5m long crosses the span. Find the maximum bending moment produced at a point 8m from the left end support.

(8marks)



QUESTION FIVE

A Pratt truss consists of six panels each of 6m, its height being 8m as shown in the figure below:



It is simply supported over a span of 36m and loaded over the bottom chord

- i) Draw the influence lines for force in members 1, 2, and 3 in the third panel from the left giving principle values.
- ii) Calculate the maximum values in members 1, 2 and 3 when a UDL of intensity, 60KN/m longer than the span crosses over the structure.

(20marks)

