



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN CIVIL ENGINEERING

EBC 2208 : STRENGTH OF MATERIALS II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE: Pick Date Aug 2019

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass, scientific calculator and student ID

This paper consists of **FIVE** questions. Attempt any **THREE** questions.

Do not write on the question paper.

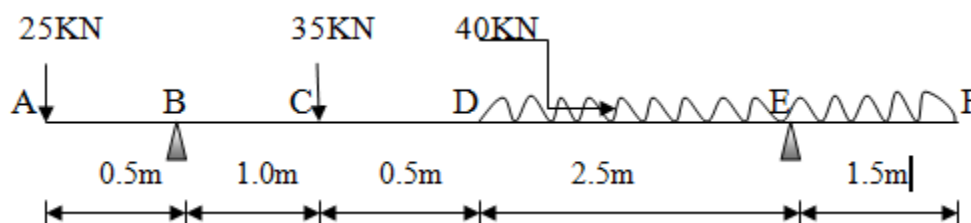
Question One

(a) A steel bar of rectangular cross-section 150x60mm is subjected to an axial tension of 250kN. Determine the changes that result in the cross-sectional dimensions given that $E=200\text{KN/MM}^2$ and poisson's ratio = 0.04 (7 Marks)

(b) A simply supported overhanging beam is loaded as shown in **Fig. 1** below:- (13 Marks)

(i) Calculate the support reactions

(ii) Draw the shear force and the bending moment diagram indicating the values at the critical points.



Question Two

(a) State Five assumptions made in Rankine's theory of earth lateral pressure. (5 Marks)

(b) The cross-section of a masonry dam retaining water against its vertical face is shown in fig. 2.

(i) Investigate the stability of the dam with respect to tension in the joints.

(ii) Calculate the ground bearing pressure at 'A' and 'B' and the coefficient of friction.

Take density of masonry at 2300kg/m^3 .

(15 Marks)

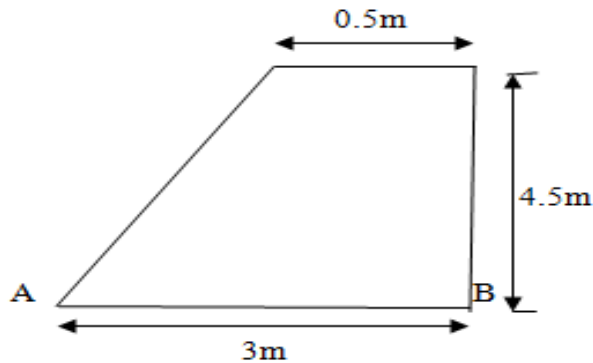


Fig. 2

Question Three

(a) State Five assumptions made in the theory of simple bending

(5 marks)

(b) Figure 3 shows an elevation and a section through a cantilever beam, the beam is of span 1.6m and carries a uniformly distributed load of intensity W KN/unit length along the full length of the top flange. If the maximum tensile and compressive stresses are not to exceed 35KN/mm^2 and 100N/mm^2 respectively, determine ;

(i) The allowable uniformly distributed load 'w' on the beam

(ii) The maximum deflection in (i) above, Take $E = 210\text{KN/mm}^2$

(15

marks)

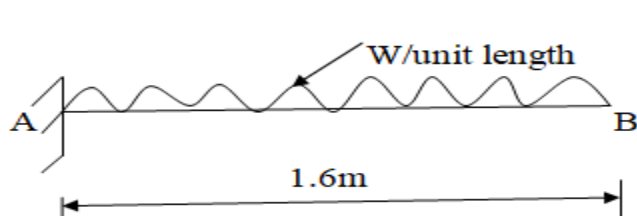
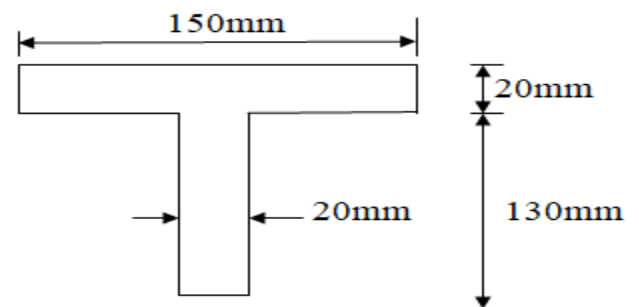


Fig. 3



(a) Elevation of beam

(b) Beam section

Question Four

Calculate the shear stress distribution diagram where $Q=15\text{KN}$

(20 Marks)

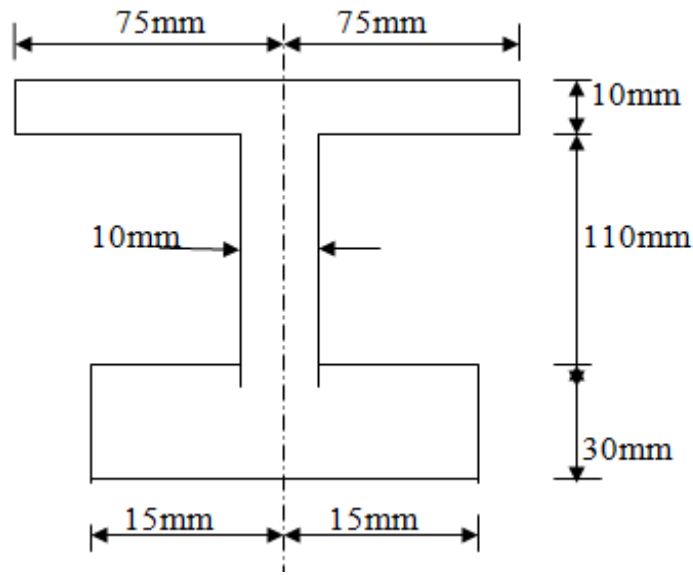


Fig. 4

Question Five

(a) A simply supported beam whose cross-section is shown in Fig. 5 is subjected to a maximum bending moment of 52.8KNM. Take $E=205\text{KN/MM}^2$, hence determine:-

(i) The maximum tensile and compressive stresses

(ii) The radius of curvature

(14^{1/2} Marks)

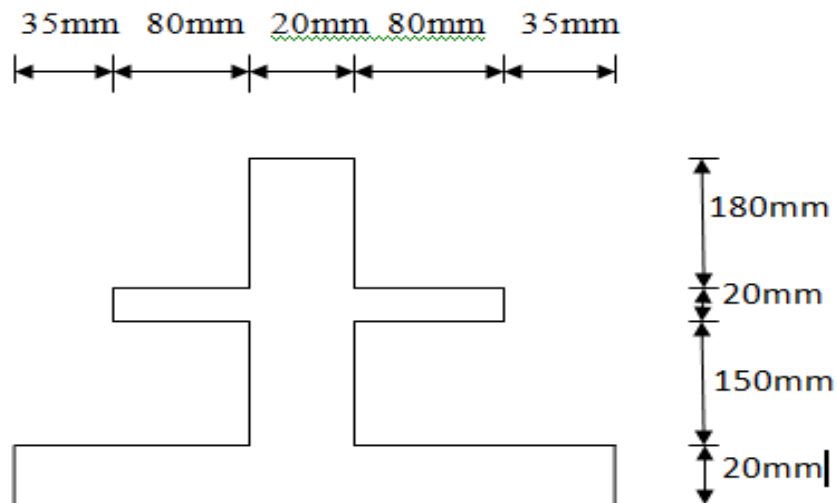


Fig. 5

(b) If the permissible stresses in compression and tension for the cross-section in Fig. 5 above were 45N/MM^2 and 25.5N/MM^2 respectively. Calculate;

(i) The safe bending moment for the section.

(ii) The safe uniform load which the beam can carry on a span of 6.8m if one end is free and the other fixed. (5¹/₂ Marks)