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 MATERIAL II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2 HOURS

DATE: Sep 2018

Instructions to Candidates
You should have the following for this examination
    -*Answer Booklet, examination pass and student ID*
This paper consists of **FIVE** questions. Attempt any THREE questions.
Do not write on the question paper.

Question ONE

The figure 1 below shows a flitched beam consisting of two timber joists 150mm x 50mm and a steel plate of 120mm x 10mm bolted securely between them. The beam is to be simply supported over a span of 5m and carries an inclusive uniformly distributed load of 1.2KN/m. Determine the maximum and minimum bending stresses in the materials given the following:-

$E_{steel} = 210KN/mm^2$

$E_{timber} = 8.4KN/mm^2$ **(20 Marks)**
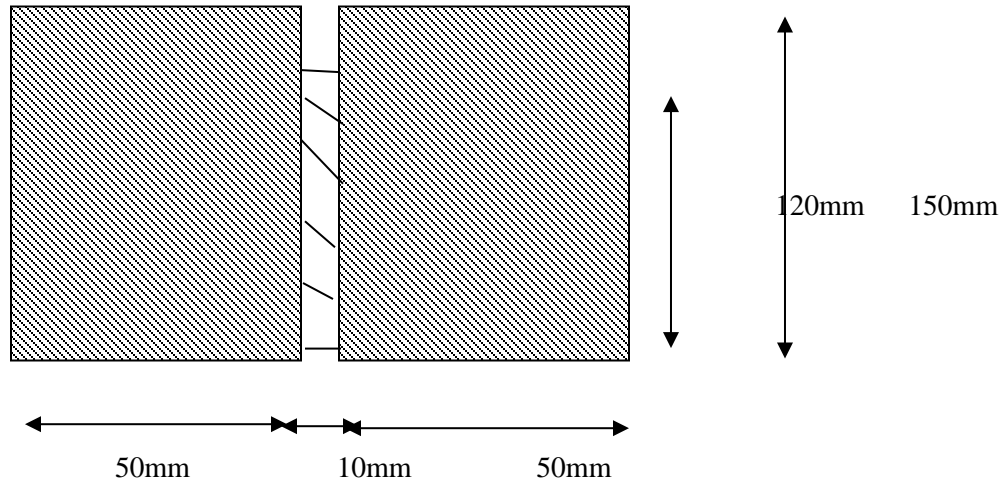
120mm   150mm

50mm   10mm   50mm

Fig. 1

Question Two

(a) Derive the expression for the maximum horizontal shearing stress across a homogeneous rectangular beam **(15 Marks)**

(b) Define the following terms as applied to a section of a loaded beam:-

      i)   Shearing force

      ii)   Bending moment **(5 Marks)**

Question Three

A masonry dam of trapezoidal section has a vertical face whose height is 12M, while the base is 8M wide and the top is 2.4M wide. The maximum water level allowed is 1.5M below the top of the dam. Examine the stability conditions of the dam with regard to:-

      i)   Tension in the joints

      ii)   Ground bearing pressure

      iii)   Factor of safety against overturning

      iv)   Factor of safety against sliding

Take coefficient of friction between the base and the foundation as 0.48.

Take the density of masonry as 2100Kg/m^3 and maximum allowable ground bearing pressure as 300KN/m^2 **(20 Marks)**

Question Four

(a) List down FIVE assumptions made in the theory of simple bending **(5 Marks)**

   (c) Derive an equation which gives the mathematical expression in the theory of simple bending

(15 Marks).

Question Five

Obtain the shear stress variation diagram of the figure 2 whose cross-section is shown, if its length is 4M and it also carries a UDL of 35 KN/M **(20 Marks)**
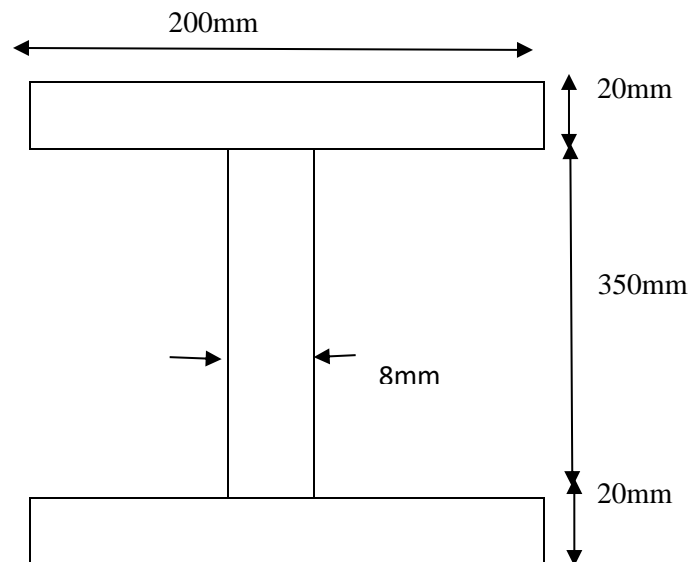

Fig. 2