



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR FIRST SEMESTAR EXAMINATION FOR DIPLOMA IN CIVIL
ENGINEERING

BCECD 212: STRENGTH OF MATERIALS II

DATE: 6/12/2017

TIME: 8.30-10.30 AM

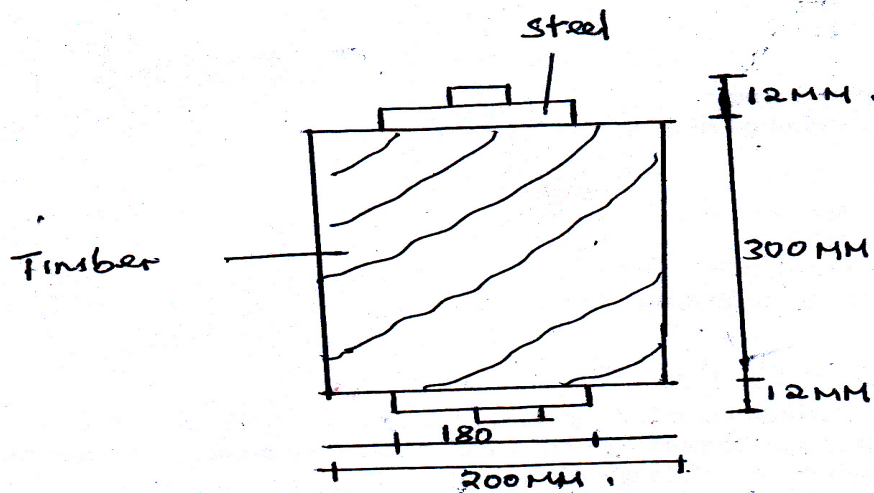
INSTRUCTIONS

Answer Question One and Any Other Two Questions

1.
 - a) With the aid of sketches, show simple bending of a simple beam. (5 marks)
 - b) Give four assumptions made in theory of simple bending. (8 marks)
 - c) With the aid of a sketch, derive the expression of simple bending

$$\frac{E}{R} = \frac{M}{I} = \frac{f}{y}$$

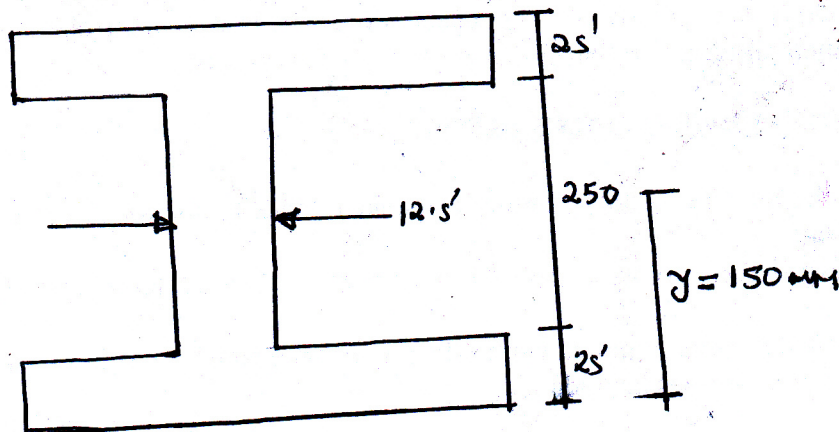
2.
 - a) A composite beam consist of 300mm by 200mm timber joiced strengthen by addition of two steel members 180mm by 12mm as shown below.
Give; safe stress in timber is 5.5N/mm^2 and safe stress in steel is 105N/mm^2 .
 $M = 30$
Calculate moment of resistance in N/mm (20 marks)



3. With the aid of a diagram, describe a flitched beam. Also derive an expression to show that $M = f_{ty}(m \cdot I_s + I_t)$
4. A steel beam section has the following dimension.

Flange width = 150mm Oval depth = 300mm
 Thickness = 25mm web thickness = 12.5mm

Calculate the safe uniformly distributed load for this beam if the effective span = 5m and maximum permissible stress = 155 N/mm^2 .



5. A 406mm by 152mm by 60Kg universal beam section used as freely supported beam with a span of 6m carries a udl of 176.6 kN/m . Calculate the stress in the beam at a point 102mm beneath the top of the contraction frame of a beam section 1m from the left.

Draw a stress variation diagram of the beam at the given section. Take $Z_{xx} = 1011 \text{ cm}^3$

(6 marks)