(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS 2019/2020 ACADEMIC YEAR

THIRD YEAR SEMESTER TWO MAIN EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL ENGINEERING

COURSE CODE: CSE 314

COURSE TITLE: STRUCTURAL TIMBER DESIGN

DATE: WEDNESDAY 4TH NOVEMBER 2020 TIME: 9.00 – 11.00 AM

INSTRUCTIONS:

1. This paper contains **FOUR** questions
2. QUESTION ONE IS COMPULSORY
3. Attempt any other TWO questions
4. BS 5268-2 is allowed
5. Marks for each question are indicated in the parenthesis.

Examination duration is **2 Hour**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

Question ONE (30 marks)

a) Design the timber floor joist for a domestic dwelling **(Figure Q1a)** using timber of strength class C18 given that:

i. The joists are spaced at 400 mm Centers;

ii. the floor has an effective span of 3.8 m;

iii. the flooring is tongue and groove boarding with a self-weight of 0.1 kN/m^2;

iv. the ceiling is of plasterboard with a self-weight of 0.2 kN/m^2

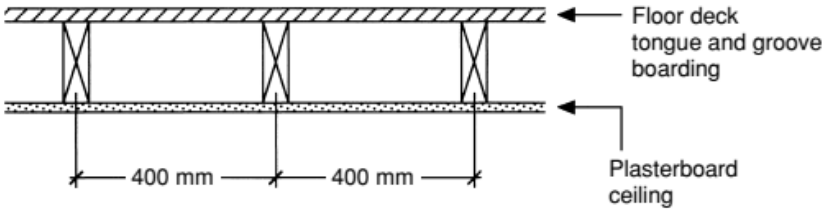


Figure Q1a

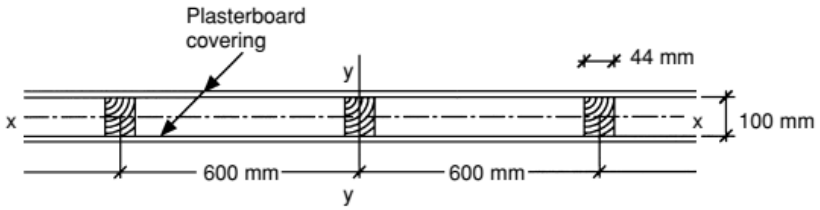
[20 Marks]

b) Discdiscuss the permissible stress design and state its major drawback [4 Marks]

c) Discuss the physical properties of timber [6 Marks]

Question TWO (20 marks)

a) A stud wall panel **(Figure Q2)** has an overall height of 3.75 m including top and bottom rails and vertical studs at 600 mm centres with nogging pieces at mid-height. Assuming that the studs, rail framing and nogging pieces comprise 44 × 100 mm section of strength class C22, calculate the maximum uniformly distributed long term total load the panel is able to support.



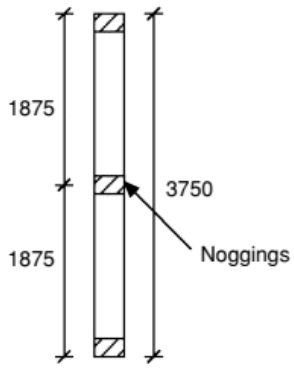


Figure Q2 [12 Marks]

b) State and explain the natural defects in timber [8 Marks]

Question THREE (20 marks)

Design of a glued laminated timber beam for the roof of a restaurant is required. The beam is to span 9.8m centre to centre on 125mm wide bearings under service class 2 conditions. It is proposed to use a combined-grade lay-up using softwood timber in strength classes of C18 and C16 with laminations of 36 mm finished thickness. The beam is subjected to a dead load of 0.67 kN/m excluding self-weight, from t & g boarding and roofing, and an imposed medium-term load of 2.25 kN/m. [20 Marks]

Question FOUR (20 marks)

A proposed temporary platform is to be constructed using decking supported by the timber ply-web I-beam sections indicated in **Figure Q4**. Using the design data given, check the suitability of the proposed beam section with respect to:

i. Bending,

ii. Panel shear,

iii. Rolling shear and

iv. Deflection.

Design data:

Characteristic dead load (including self-weight) 0.3 kN/m

Characteristic imposed load (medium term) 3.0 kN/m

Span of beam 5.4 m

Exposure condition Service Class 2

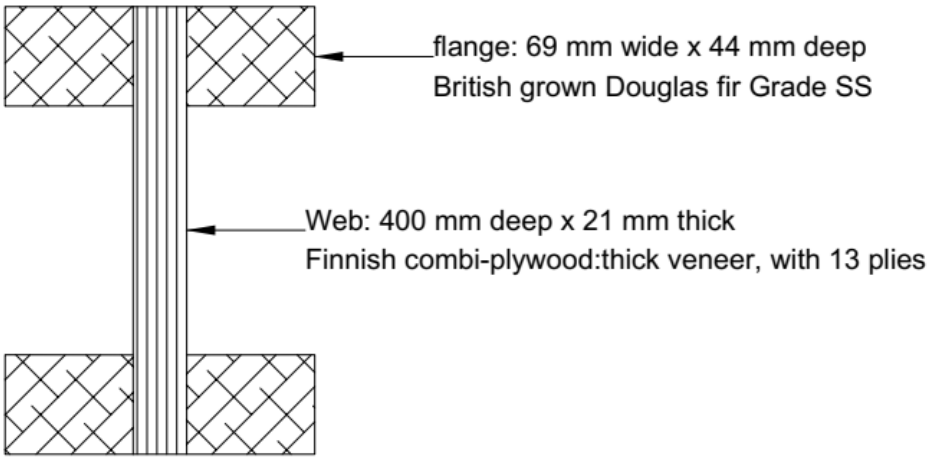


Figure Q4

[20 Marks]