



First Semester Examination
2020/2021 Academic Session

February 2021

EAS451 – Timber and Masonry Engineering

Duration : 1 hour

Please check that this examination paper consists of **FOUR (4)** pages of printed material before you begin the examination.

Instructions : This paper contains **TWO (2)** questions. Answer **ALL** questions.

All questions **MUST BE** answered on a new page.

1. A suspended timber floor system in a domestic building is supported by series of joists on timber wall plates of loadbearing brickwork as shown in the **Figure 1** and **Figure 2**. Using the given data

- (a). Determine a suitable section size for the tongue and groove floorboards
[15 marks]
- (b). Determine a suitable section size for the main joist
[30 marks]
- (c). Assuming one end of the joist to be notched and supported by a wall plate as shown in Fig. 1.0 (ii), verify the shear capacity of the joist.
[5 marks]

Design data:

Centres of timber joist	450 mm
Bearing length	100 mm
Span of joist	5.2 m
Thickness of floor boarding	16 mm
Timber Grade, Density	SG6, Standard, 550 kg/m ³
Condition	Dry Timber
Imposed load on floor	4.0 kN/m ²
Self-weight of floor board	0.1 kN/m ²

Assume long-term load.

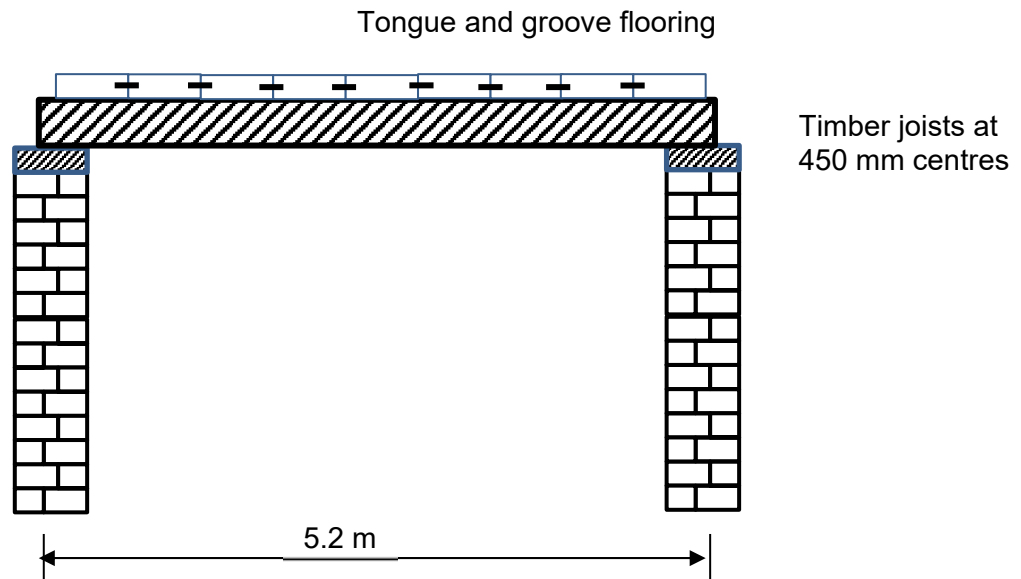


Figure 1

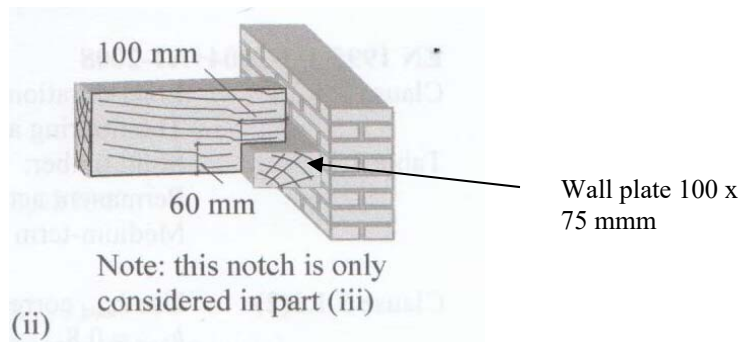


Figure 2 A suspended timber floor system

2. a) Design the masonry wall of a single storey bungalow house as shown in **Figure 2** when subjected to lateral loading, k (wind pressure). The wind pressure on the wall is 110 N/m^2 , the concrete block thickness is 140 mm and three sides are simply supported.

[25 marks]

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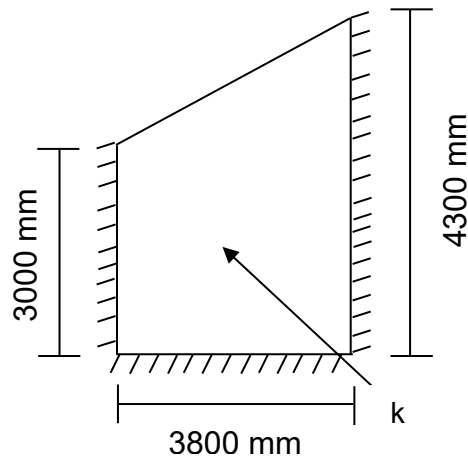


Figure 2

- b) **Table 1** shows three types of masonry unit. Determine the maximum height of a building wall and the vertical load resistance for each type of unit. Assume height (h) is equal to effective height (h_{ef}) and thickness (t) is equal to effective thickness (t_{ef}).

Table 1

	Solid fired clay bricks	Hollow concrete blocks	Solid concrete blocks
Size (length x width x height)	205 mm x 102.5 mm x 65 mm	390 mm x 190 mm x 190 mm	390 mm x 140 mm x 90 mm
Mortar designation	ii	iii	iv
Eccentricity	0.2t	0.3t	0.05t
Wind load (N/m^2)	110	100	90
Compressive strength of unit (N/mm^2)	13	34	27

[24 marks]

- (c). Specify **ONE (1)** factor affecting the vertical load resistance in designing a wall.

[1 marks]

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