



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATIONS FOR DIPLOMA IN CIVIL
ENGINEERING
BCECD 313 STEEL AND TIMBER DESIGN

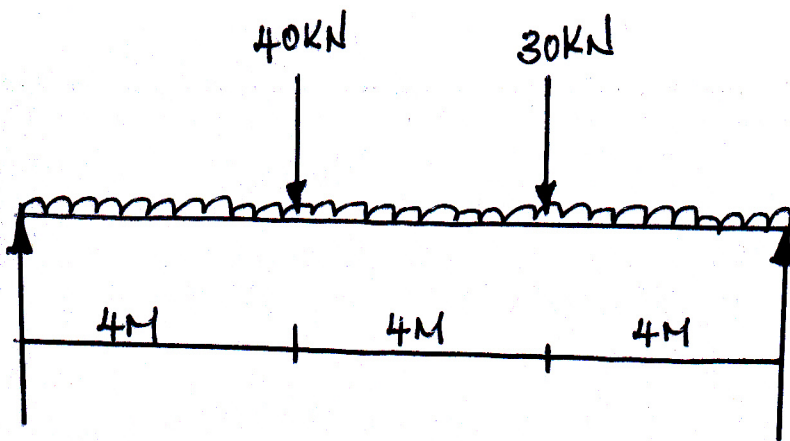
DATE: 14/12/2017

TIME: 8.30-10.30 AM

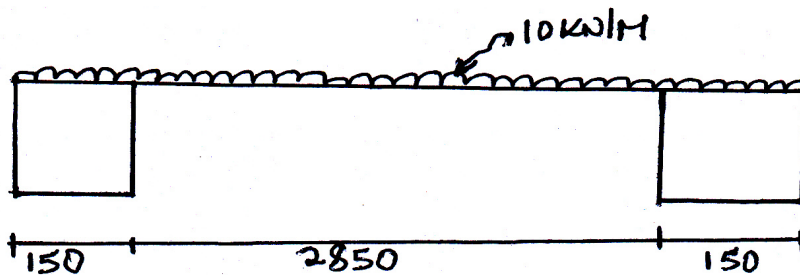
INSTRUCTIONS

Answer Question One and Any Other Two Questions

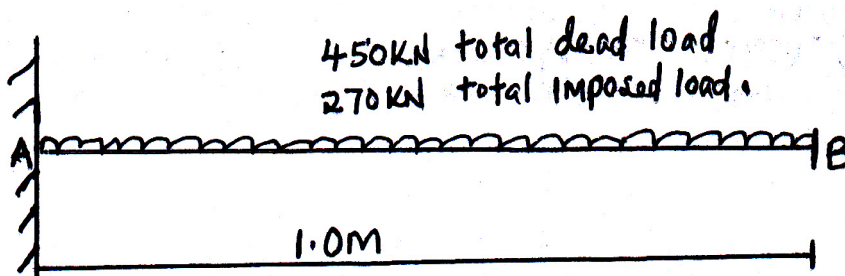
1. a) Define the following terms as used in structural design timber
- | | |
|-----------------|-------------------------|
| i. Basic stress | vi. Shear |
| ii. Bearing | vii. Permissible stress |
| iii. Dry stress | viii. Deflection |
| iv. Buckling | ix. Strength class |
| v. Grade stress | x. Effective span |
- (20 marks)
- b) Describe five types of timber connections (10 marks)
2. A main floor beam support, two equidistant floor joists over an effective span of 12m as shown. Design a suitable universal beam in grade S275 steel to satisfy bending, shear and deflection. The beam is fully laterally restrained. Take $E=205\text{KN/MM}$ (20 marks)



3. A timber beam with a clear span of 2.85m supports a UDL of 10kN inclusive of self-weight. Determine a suitable section for the beam using timber of strength class SC16. Assume that bearing length is 150mm and that the ends of the beam are held in position and compression edge held in line. (20 marks)



4. A proposed cantilever beam 1m long is to be built into a concrete wall as shown below. It supports characteristics dead and imposed loads of 450 and 270kN respectively. Select a suitable UB section in grade S 275 steel to satisfy bending and shear criteria. (20 marks)



5. Design the timber floor joists for a domestic dwelling using timber of strength class SC2 given that:
- The joists are spaced at 400mm c/c
 - The floor has an effective span of 3.8 m
 - The flooring is tongue and groove boarding with a self weight 0.1kN/m².

- iv. The ceiling plaster is of plaster board with a self-weight of 0.2 kN/m^2 (20 marks)

