



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN CIVIL
ENGINEERING

BCECD 313: STEEL AND TIMBER DESIGN

DATE: 31/5/2017

TIME: 2.00-4.00 PM

INSTRUCTIONS:

- This paper comprises of **five** questions
- Question **one** is **compulsory** and carry 30 marks
- Answer **question one** and any **other two** questions

- 1 A simply supported beam spanning 6.0m has a central point load and imposed loads of 150KN and 100KN respectively. Assuming the beam is fully laterally restrained select and check suitable UB sections in grade S275 steel to satisfy shear, bending and deflection criteria. (30 marks)
- 2
 - a) State the factors which influence the strength of timber and explain how the strength of timber is assessed in practice. (8 marks)
 - b) Design a baseplate for the axially loaded column shown below assuming it is supported on concrete of compression characteristic strength 30N/mm^2 . (12 marks)

3. A 305 × 305 × 137 UC Section extends through a height of 4.5m.
- a) Check that the section is suitable for plastic design using grade S275 steel. (15 marks)
 - b) Calculate the squash load for grade S275 steel. (5 marks)
- 4
- a) Distinguish between softwood and hardwood and grade stress and permissible stress. (12 marks)
 - b) Briefly explain the factors accounted for by the modification factor k_{12} in the design of timber compression members. (8 marks)
- 5
- a) Explain with the aid of sketches the following terms used in welded connections:
 - i Fillet weld
 - ii Butt weld
 - iii Throat size (9 marks)
 - b) A bracket made from a 406 × 178 × 60 universal beam is welded to a steel column as shown below. The bracket is designed to support an ultimate load of 500KN. Show the proposed welding scheme for this connection is adequate. Assume the steel is of grade S275 and the electrode strength is 42. (11 marks)

