



UNIVERSITY
OF
JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT: PURE AND APPLIED MATHEMATICS

MODULE: APM2EA1 (Old code: APM1A2E)
INTRODUCTION TO STATICS - EXTENDED

CAMPUS: AUCKLAND PARK KINGSWAY

SUPPLEMENTARY EXAMINATION

DATE: JULY, 2017

ASSESSOR:

MR JM HOMANN

MODERATOR:

DR GJ KEMP

DURATION: 2 HOURS

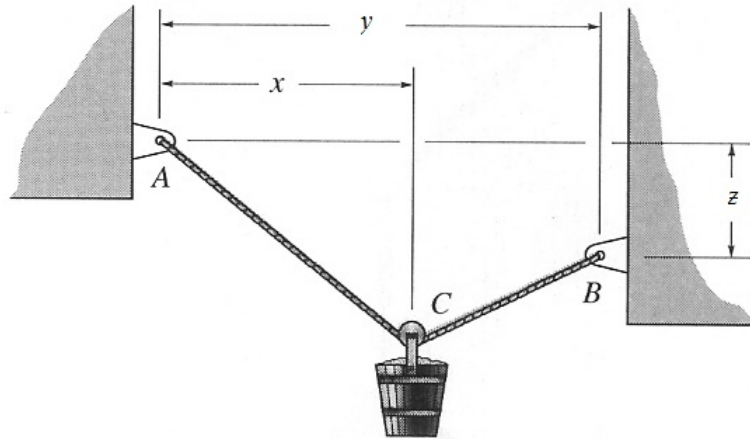
MARKS: 50

Instructions and remarks:

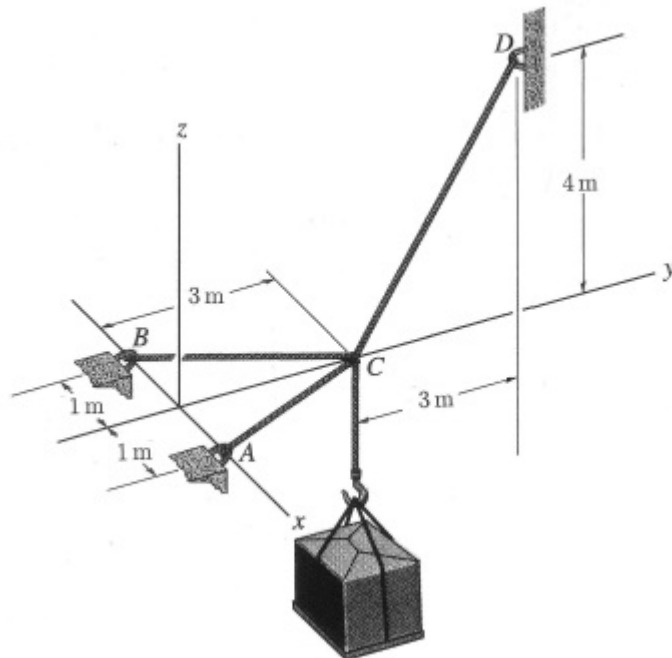
1. This question paper consists of 2 pages, excluding this one.
2. Vectors are indicated throughout by the bar notation. For example, \overline{F} .
3. You will be penalised if you fail to distinguish between vectors and scalars by means of notation.
4. You will be penalised if you do not use the same notation as described in each question.
5. The use of pocket calculators is permitted. Only use your calculator for the final answer. No marks will be awarded for using rounded off answers in intermediate steps and no marks will be awarded for an incorrect final answer due to rounding errors during calculations.
6. You may answer the questions in any order, however you must clearly indicate the question number. Furthermore, rule off after each question.
7. If you answer a particular question more than once, then clearly indicate which one is to be marked by means of neatly scratching out the answers which are not to be marked. If you fail to indicate which answer should be marked, then the marker will choose exactly one of the questions to mark, without complaint from the test taker.

QUESTION 1 [8 MARKS]

An inelastic rope of length r is fixed at points A and B , as shown. The bucket and its contents have a weight of W and are suspended from the rope by means of a small, frictionless pulley, at C . Determine x in terms of y, z and r and then, secondly, determine the tension in the rope in terms of W, y and r .

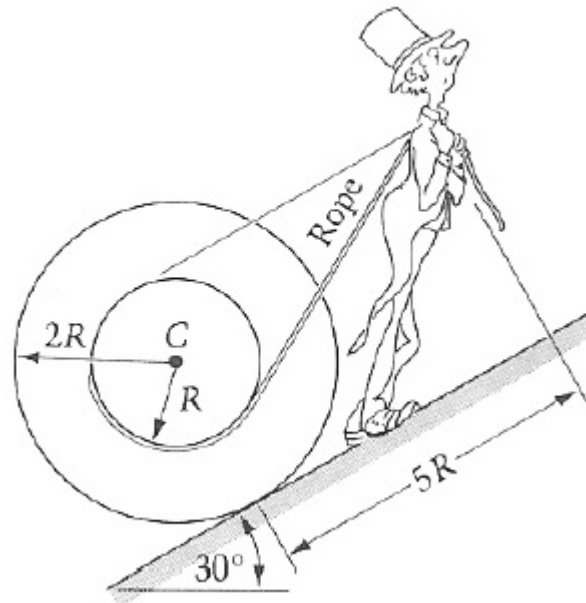
**QUESTION 2** [11 MARKS]

In terms of W , determine the force in each cable needed to support the $4W$ load (see the following figure).



QUESTION 3 [11 MARKS]

With reference to the following figure, the man is holding the wheel of weight W in equilibrium on the rough inclined plane. Determine the tension in the rope, in terms of W . Assume sufficient friction to prevent slip.

**QUESTION 4** [20 MARKS]

With reference to the following figure, the 2 m boom carries a load W at C and is held by a ball and socket at A and by two cables EBF and DC ; the cable EBF passes around a frictionless pulley at B . In terms of W , determine the tension in each cable as well as the magnitude of the reaction at A .

