



UNIVERSITY OF JOHANNESBURG
FACULTY OF EDUCATION
JUNE EXAMINATION 2015

PROGRAMME: B Ed (SENIOR PHASE)

MODULE: TECHNOLOGY 2A

CODE: TEG2A10

TIME: 2 hours

MARKS: 100

EXAMINER: Mr W Engelbrecht

MODERATOR: Dr CF van As

(This paper consists of 4 pages)

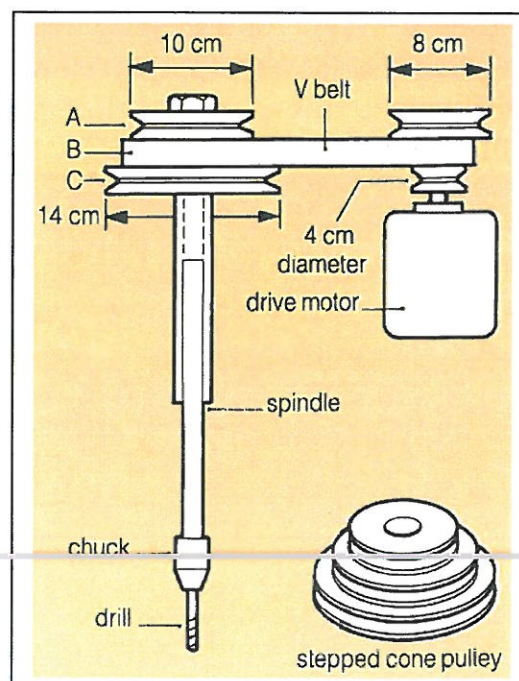
INSTRUCTIONS:

Read the following instructions carefully before answering the questions:

1. Answer all the questions.
2. Questions may be answered in English or Afrikaans.

QUESTION 1

- 1.1 Briefly explain what the function of a mechanism is. (2)
- 1.2 Figure 1 shows a stepped cone pulley system as used on some pillar drills. By changing the position of the V belt, three different shaft speeds can be obtained.



- 1.2.1 In which position must the belt be engaged to provide the highest drill speed? (2)
- 1.2.2 If the drive motor runs at 1400rpm, calculate the highest possible drill speed. (4)
- 1.2.3 Calculate the slowest possible speed at which the drill will turn. (4)
- (12)**

QUESTION 2

- 2.1 Figure 2 shows two different sets of spur gears. Study the figure and briefly explain the difference between the two sets of gears. Decide which of the two sets is the best type of gears to use in a transmission system and motivate your answer. (6)

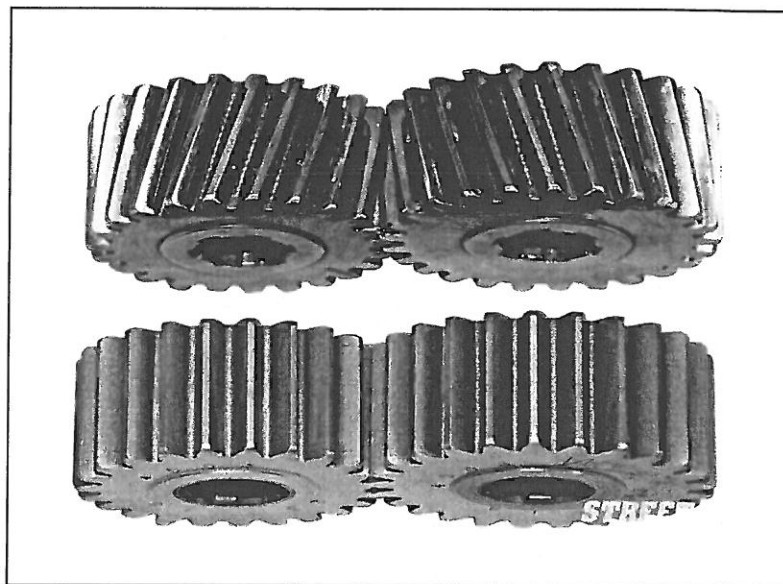


Figure 2

- 2.2 Figure 3 shows the drive system of a bicycle. Identify this drive system and briefly explain why this particular drive system is used on bicycles. Also refer to the systems disadvantages. (5)

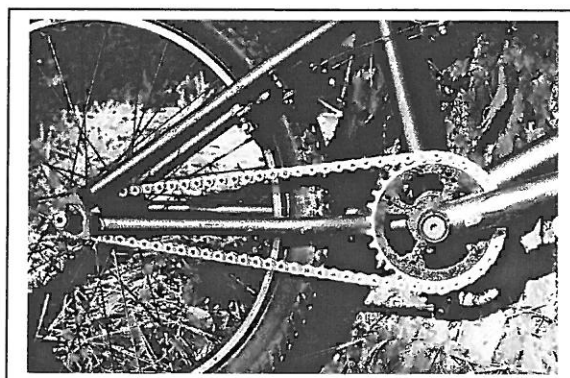


Figure 3

- 2.3 Briefly explain what an idler gear does in a spur gear system. Draw an example of such a gear system to support your answer. (5)
(16)

QUESTION 3

- 3.1 What is the name of the transmission system in Figure 4? (2)

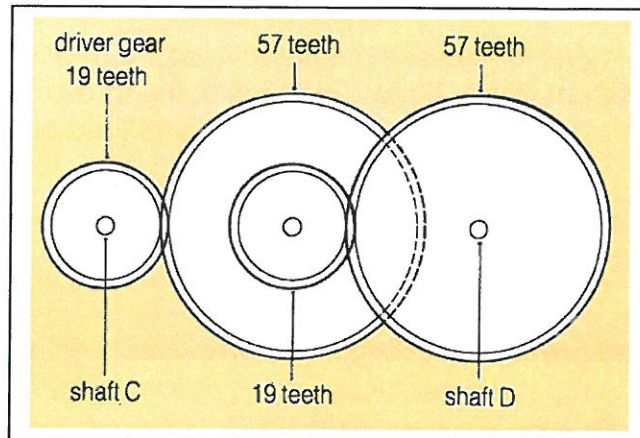


Figure 4

- 3.2 Calculate the gear ratio of the system. (5)
- 3.3 If shaft C rotates at 36rpm, calculate at what speed shaft D will rotate. (3)
- 3.4 Give an example of where a transmission system like this is typically used. (2)
- 3.5 Briefly explain the difference between V thread and square thread used on screw mechanisms by referring to the advantages and disadvantages of each. Support your answer by referring to an application of each type of screw thread. (6)
(18)

QUESTION 4

- 4.1 Figure 5 shows a wheelbarrow.

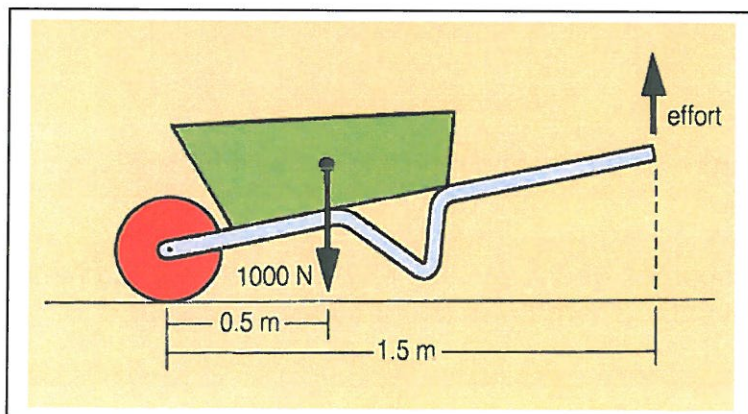


Figure 5

- 4.1.1 What class of lever is this wheelbarrow? (2)
- 4.1.2 Calculate the effort required to support the wheelbarrow as shown. (3)
- 4.2 Briefly explain the concept "paired levers". Support your answer by referring to two examples. (4)
- 4.3 There are three different types or classes of levers – each with a fulcrum, effort and load arranged in different ways. Draw diagrams of the three different types of levers and label them. Indicate the fulcrum, effort and load on each lever. (9)
- (18)**

QUESTION 5

- 5.1 Which mechanism is used to make a sewing machine's needle go up and down? (2)
- 5.2 Briefly explain what in the mechanism determines the distance that the needle moves up and down. (2)
- 5.3 Design a possible mechanism for a car's window wipers by making a freehand sketch. (6)
- (10)**

QUESTION 6

- 6.1 Explain the difference between pneumatic and hydraulic systems, and name an application of each. (6)
- 6.2 Calculate the force produced by a pneumatic piston if the air pressure in the cylinder is $2,5 \text{ N/mm}^2$, and the diameter of the piston is 80mm. (5)
- 6.3 Briefly explain why it is possible to lift the weight of a car with your hand, using a hydraulic jack. (4)
- (15)**

QUESTION 7

- 7.1 Briefly explain the nature of energy and referring to five different types of energy (7)
- 7.2 Discuss our current sources of energy and why it might have to change in the near future. Suggest some alternatives to our current sources. (4)
- (11)**

TOTAL: 100