



Province of the  
EASTERN CAPE  
EDUCATION

**DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)**

**HOME SCHOOLING SELF-STUDY WORKSHEET**

<b>SUBJECT</b>	<b>FITTING AND MACHINING</b>	<b>GRADE</b>	12	<b>DATE</b>	JULY 2020
<b>TOPIC</b>	SYSTEMS AND CONTROL (DRIVE SYSTEMS) (SPECIFIC)	<b>TERM 1 REVISION</b>	()	<b>TERM 3 CONTENT</b>	(√)
<b>TIME ALLOCATION</b>	2 hrs.	<b><u>TIPS TO KEEP HEALTHY</u></b>			
<b>INSTRUCTIONS</b>	This topic focused study material is intended to assist learners in the various approaches used by examiners.	1. <b>WASH YOUR HANDS</b> thoroughly with soap and water for at least 20 seconds. Alternatively, use hand sanitizer with an alcohol content of at least 60%. 2. <b>PRACTICE SOCIAL DISTANCING</b> – keep a distance of 1m away from other people. 3. <b>PRACTISE GOOD RESPIRATORY HYGIENE:</b> cough or sneeze into your elbow or tissue and dispose of the tissue immediately after use. 4. <b>TRY NOT TO TOUCH YOUR FACE.</b> The virus can be transferred from your hands to your nose, mouth and eyes. It can then enter your body and make you sick. 5. <b>STAY AT HOME.</b>			

## QUESTION 1

- 1.1 State THREE advantages of a belt drive system.
- 1.2 Describe the principle of operation of a gear drive.

**QUESTION 2** A hydraulic system is being used to move machine parts during the assembling process. The specifications of the system are diagrammatically presented in FIGURE 1

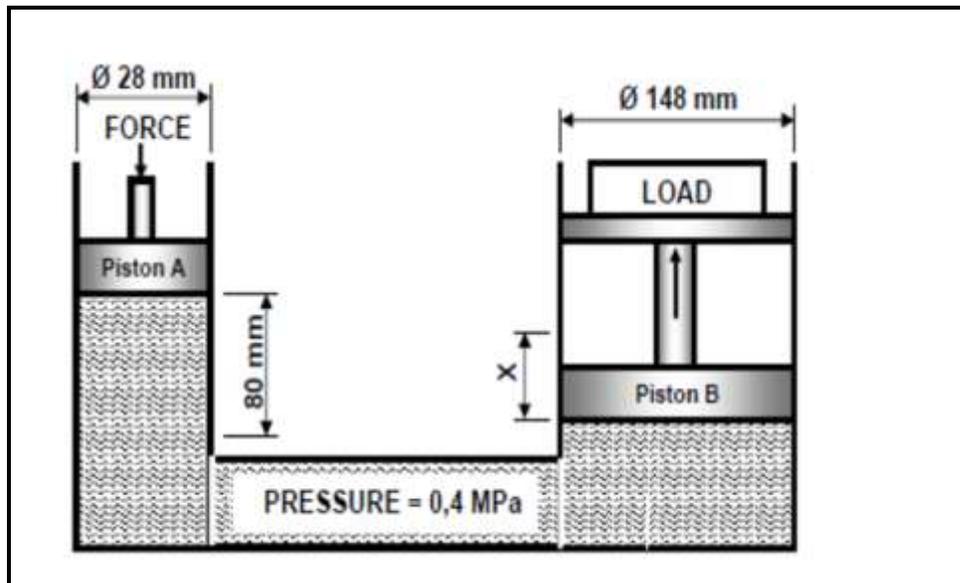


FIGURE 1

Calculate the following:

- 2.1 The force applied to piston A
- 2.2 The distance X, in millimetres, that piston B will move with 10 strokes of piston A

**QUESTION 3 Hydraulic system:**

The diameter of a piston is 120 mm and the pressure in the cylinder is 1,2 MPa. Calculate the force during the effective stroke.

**QUESTION 4**

State TWO functions of the reservoir in a hydraulic system.

**QUESTION 5**

Draw the symbols for the following hydraulic components used in a hydraulic flow diagram:

3.1 Electrical motor

3.2 Pressure gauge

**QUESTION 6**

A power saw's motor has a pulley, 125 mm in diameter, that turns at 1100 rpm. The speed at which the driven pulley drives the saw blades is 375 rpm.

Calculate the diameter of the driven pulley.

**QUESTION 7**

FIGURE 2 below shows a belt drive system with a 230 mm driver pulley rotating at 1 440 r/min. The effective tensile force in the system is 165 N.

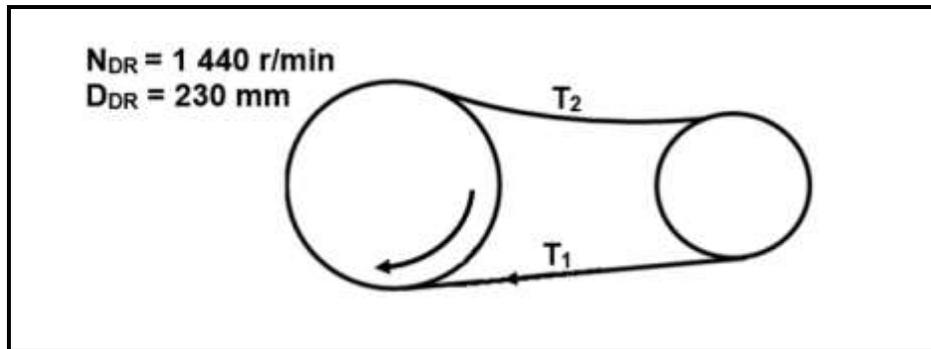


FIGURE 2

With reference to Figure 2 above, determine in 7.1 and 7.2 by means of calculations:

7.1 The belt speed in  $\text{m.s}^{-1}$

7.2 The power transmitted in kW.

7.3 Give TWO advantages of belt drives.

**QUESTION 8**

FIGURE 3 below indicates a gear system in a gearbox. Gear A with 102 teeth rotates clockwise at 120 r/min.

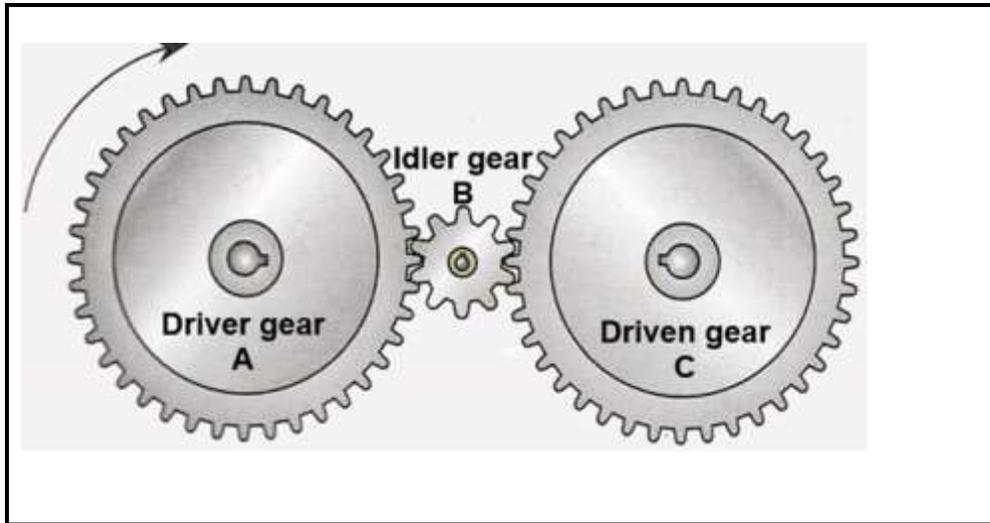


FIGURE 3

8.1 Determine the direction of rotation of driven gear **C** if driver gear **A** rotates clockwise, as indicated in FIGURE 2.

8.2 Calculate the number of teeth on gear **C** if it needs to rotate at 80 r/min.

8.3 What is the function of the idler gear (B) as indicated in Figure 3 above?

**QUESTION 9** Compound Gear System.

FIGURE 4 below shows a gear drive system. A driver gear on the shaft of an electric motor has 24 teeth and meshes with a gear on a counter shaft with 40 teeth. On this counter shaft is another driver gear with 20 teeth that meshes with a gear with 48 teeth on a second counter shaft. The second counter shaft has a driver gear with 42 teeth which drives a gear with 90 teeth on the output shaft.

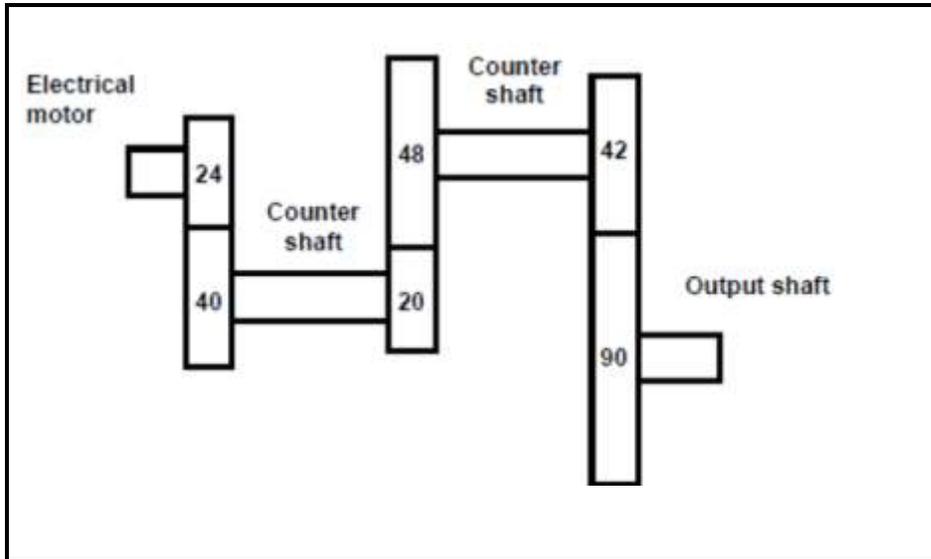


FIGURE 4

Calculate the following:

9.1 The rotational frequency of the output shaft if the electric motor rotates at 1440 r/min.

9.2 The velocity ratio between the input and output shaft.

**QUESTION 10**

Derive the units for Torque.

**QUESTION 11**

The chain drive system of a bicycle is shown in FIGURE 5 below. Calculate the gear ratio of the system.

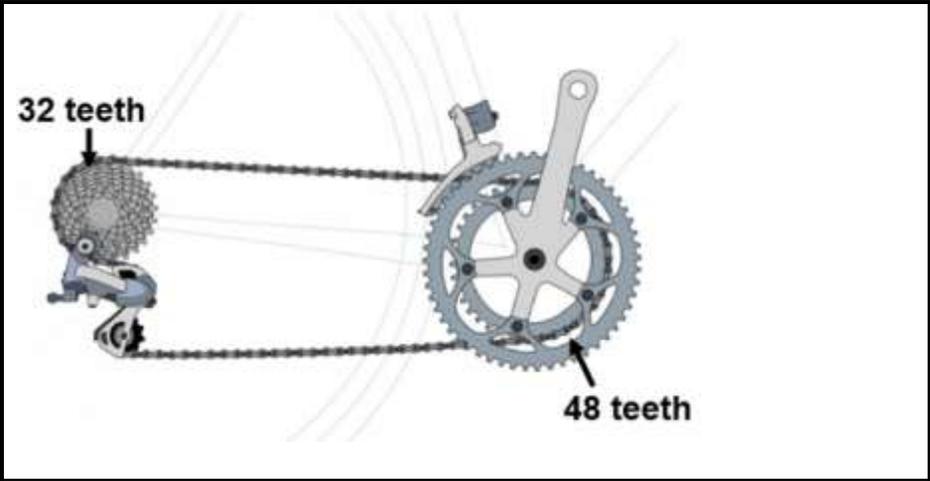


FIGURE 5