higher education & training

Department:
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T450**(E)**(A9) T

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N3

(11041823)

9 April 2019 (X-Paper)
09:00–12:00

This question paper consists of 7 pages.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
DIESEL TRADE THEORY N3
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.

2. Read ALL the questions carefully.

3. Number the answers according to the numbering system used in this question paper.

4. Sketches must be clear, neat and fully labelled.

5. Formulae:

$$Vs = \left[\frac{\pi D^2}{4}\right] \times Ls\,;\, Cr = \frac{Vs + Vc}{Vc}$$

$$N = 1 - \left[\frac{1}{R}\right]^{0,4}$$

6. Write neatly and legibly.

QUESTION 1

1.1 An engine has a cylinder diameter of 81 mm and a stroke length of 88 mm. The compression ratio is 13:1.

Calculate the clearance volume of the engine. (6)

1.2 The cylinder head of the engine mentioned in QUESTION 1.1 is warped and to straighten it 1,56 mm of metal has to be removed from the cylinder head.

Determine the new compression ratio. (6)

1.3 State FOUR negative effects that may occur in the engine when increasing the compression and explain how negative the negative effects listed may be eliminated, (4)

1.4 State FOUR mechanical defects which may cause a drop in the volumetric efficiency of an engine. (4)
[20]

QUESTION 2

2.1 FIGURE 1 below, shows a sectional diagram of a plunger element found in an inline plunger injection pump.

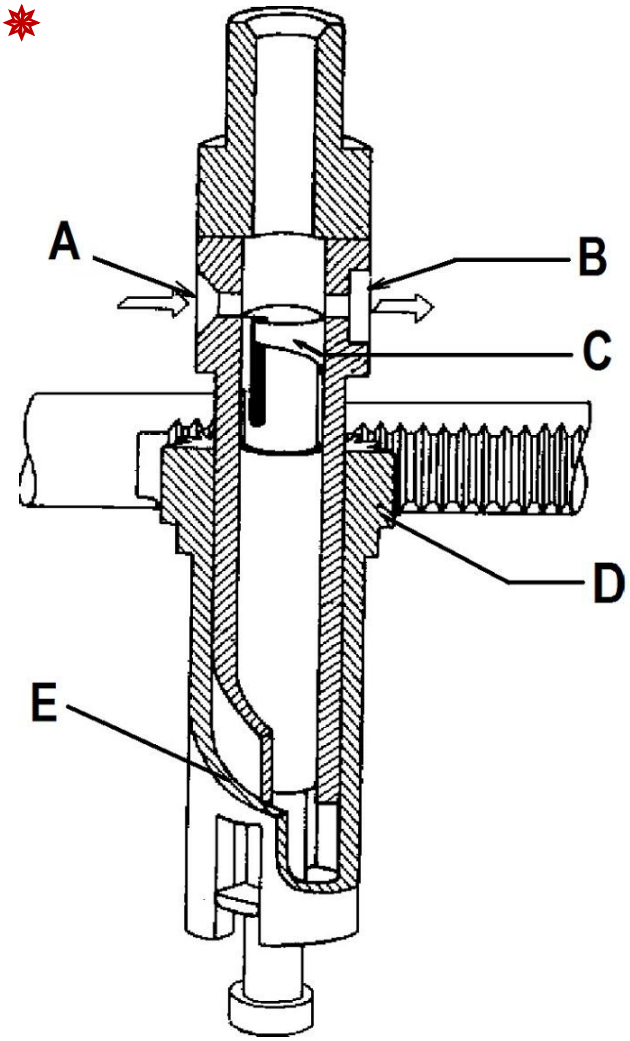

Figure 1

2.1.1 Name the components indicated on the sketch by writing only the answer next to the letter (A–E) in the ANSWER BOOK. (5)

2.1.2 Describe the operation of the pump during acceleration. (6)

2.2 Briefly describe how you would go about adjusting the injection pump timing, using the overflow method. (6)

2.3 Explain the purpose of a speed governor on a compression ignition engine. (3)
[20]

QUESTION 3

Before answering Question 3.1 all candidates must draw a table on their answer sheet as illustrated below. The response to Question 3.1.1 to Question 3.1.3 must be answered as indicated in the example included on the table. The components must be identified form Figure 2 below.

Example:
When forward reduction is obtained and the carrier driven, indicate on the table which components must be held and which will drive the carrier.

	Hold	Drive	Driven	Drive Conditions
E.g.	**B or A**	**A or B**	**Carrier**	**Forward Reduction**
3.1				
3.2				
3.3				

3.1 FIGURE 2 below shows components of an Epicyclic gear set. Different results may be obtained by locking or driving the different components indicated in the diagram.

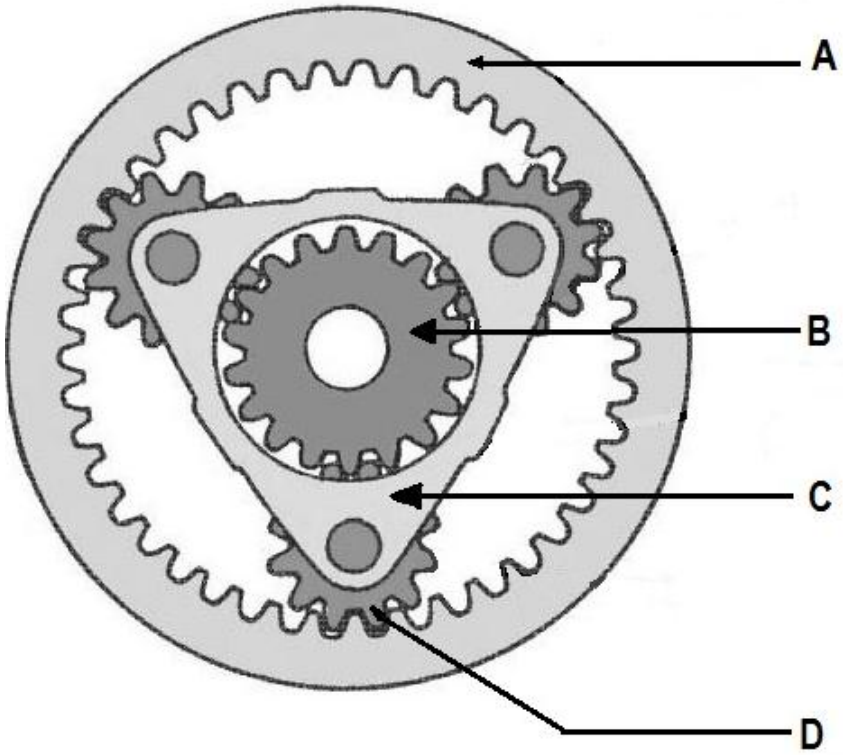

Figure 2

3.1.1 If the Ring gear is locked, and the Sun Gear Drives the Planetary Carrier, what drive condition will be obtained. (4)

3.1.2 During Forward Overdrive, the Ring Gear Drives the Carrier. Indicate Which components will be locked. (4)

3.1.3 During reverse reduction indicate the condition of the Ring Gear, the Planetary Carrier and the Sun Gear. (4)

3.2 FIGURE 3 below, illustrates the internal layout of a component, commonly used in fluid clutches.

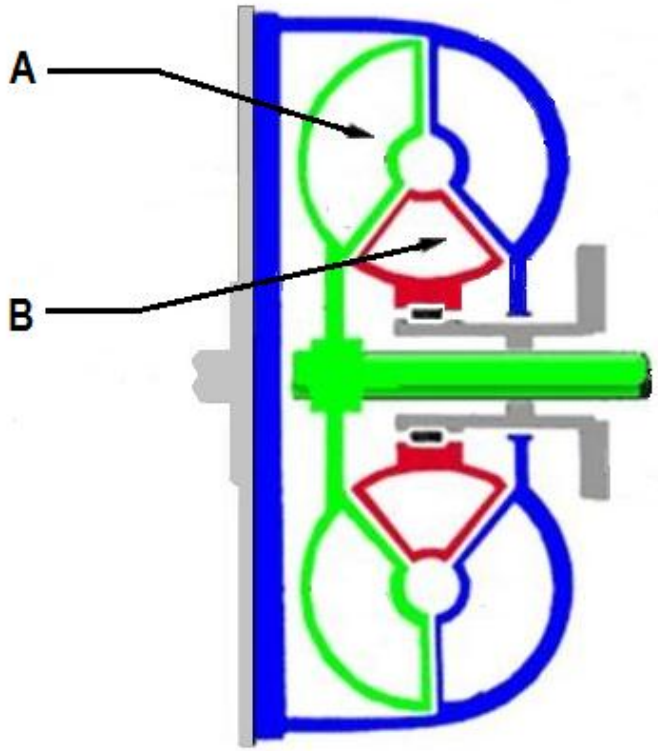

Figure 3

3.2.1 Identify the component in Figure 3 above. (1)

3.2.2 Identify and describe the difference between the two elements numbered A and B in of Figure 3. (6)

3.3 State ONE advantages of an overdrive unit when compared to a manual gearbox. (1)

[20]

QUESTION 4

4.1 List FOUR differences in construction between a limited slip differential and a conventional differential. (4)

4.2 List THREE defects that will cause Hard Steering in a vehicle fitted with power steering to steer heavy. List on correction for each fault listed. (6)

4.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only True or False next to the question number (4.3.1–4.3.5) in the ANSWER BOOK.

4.3.1 The head of an inlet valve has a bigger diameter than the head of an exhaust valve. (1)

4.3.2 The function of the valve spring is to close the valve and hold it in position on the valve seat. (1)

4.3.3 The adjusting nut on valve adjusters must be tighten to 10 NM to ensure that the valve clearance is adjusted according to the manufactures specification. (1)

4.3.4 Through valve rotation, the valve stem is kept free of carbon deposits, which can make the valve get stuck. (1)

4.3.5 Valve overlap occurs during the period when both the intake valve and exhaust valve are closed. (1)

4.3.2 Explain the term Masked intel valve and describe the advantages and disadvantages of using masked intake valves in an engine. (6)

[21]

QUESTION 5

5.1 Make TWO neat sketches of a rotor and a cylinder and describe the operation of the fuel injection pump of the distributor. (8)

5.2 State THREE functions of the speed governor used on an injection fuel pump. (3)

5.3 Name the FIVE divisions or staff to whom the copies of a five-part job card are distributed. (5)

5.4 Give THREE reasons why tool stocktaking is necessary. (3)

[19]

TOTAL: 100