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Department:
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REPUBLIC OF SOUTH AFRICA

T450**(E)**(A3) T

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N3

(11041823)

3 August 2018 (X-Paper)
09:00–12:00

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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 large, neat and fully labelled.
5. Write neatly and legibly.
6. **FORMULAE:**

C.R. = $\frac{Vs+Vc}{Vc}$ Vc = $\frac{\pi d2}{4}$ × h Vs = $\frac{\pi d^2}{4}$ × SL N = $1 - \left(\frac{1}{r}\right)^0$

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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 Explain the negative effects of increasing the comparison ratio of an engine beyond the manufacturers specifications, and what corrective measures must be put in place to ensure that the engine operate efficiently. (8)

[20]

QUESTION 2

2.1 FIGURE 1 shows a sectional diagram of a plunger element used in an in-line plunger injection pump.

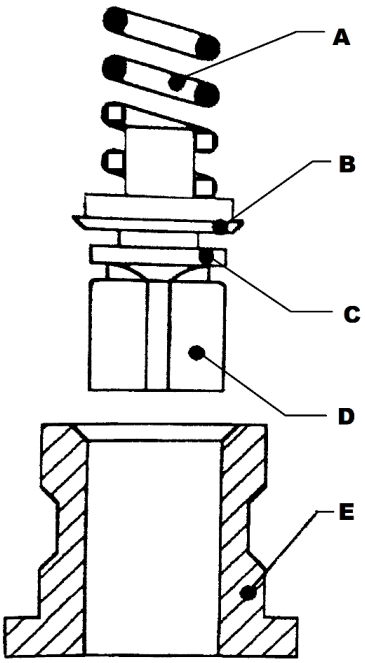

FIGURE 1

2.1.1 Name the components Labelled A to E shown in FIGURE 1 above. Write only the answer next to the letter (A–E) in the ANSWER BOOK. (5)

2.1.2 Describe the operation of the delivery valve shown in **FIGURE 1**. (6)

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2.2 Name Four types of pressures required to accurately control the fuel pressure in the operation of a DPA injection pump during operation. (4)

2.3 State TWO functions of a governor used in diesel fuel systems. (2)

2.4 Give THREE advantages of a DPA injection pump over the inline plunger type. (3)
[20]

QUESTION 3

3.1 **FIGURE 2** shows a sectional view of an epi-cyclic gear set**.**

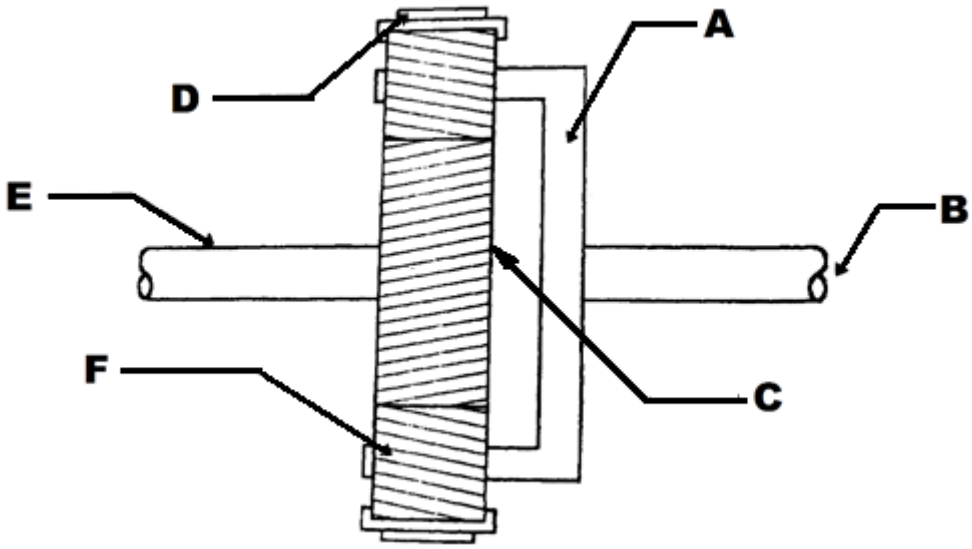

FIGURE 2

3.1.1 Name the components labelled **(A – F)** in **FIGURE 2** above**.** (6)

3.1.2 Give THREE disadvantages of Epicyclic gears over conventional gears. (3)

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3.2 **FIGURE 3** shows a layout of a shift valve used in an automatic gearbox.

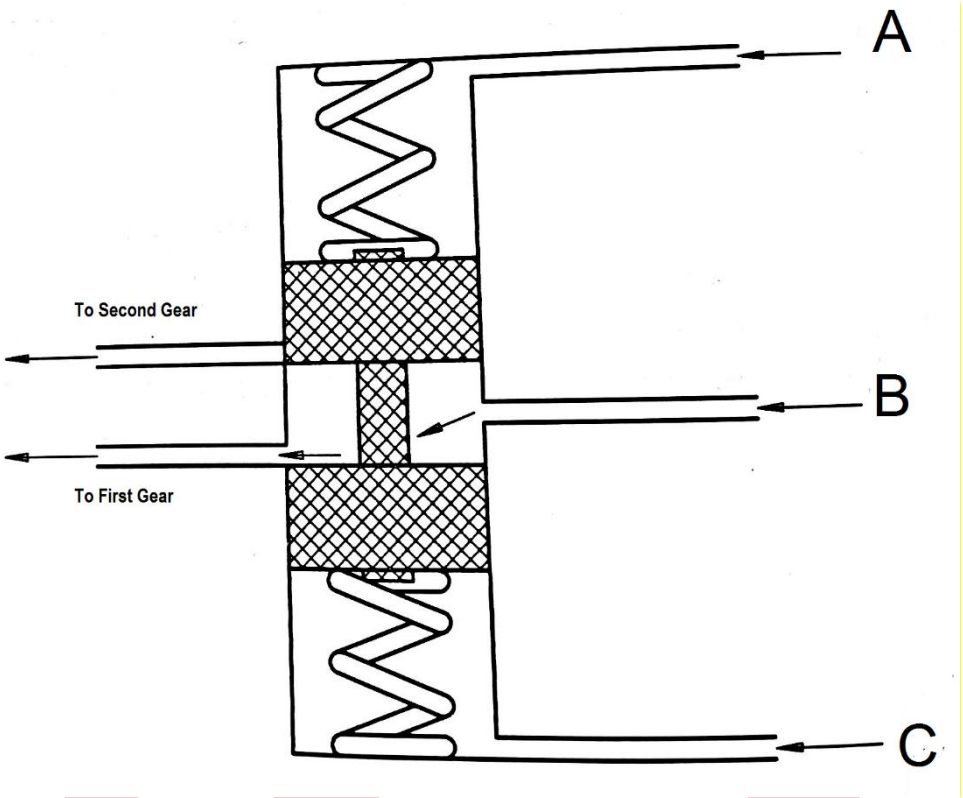

FIGURE 3

3.2.1 Identify and name the pressure in lines **(A–C).** (3)

3.2.2 Explain in detail the operation of the sift control valves used in automatic gear boxes shown in figure 3. (8)

[20]

QUESTION 4

4.1 Give THREE differences in construction between a limited slip differential and a convention differential (4)

4.2 Name THREE mechanical defects that may cause heavy steering, in a vehicle equipped with power steering. (3)

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4.3 FIGURE 4 shows a sectioned view of an overdrive unit.

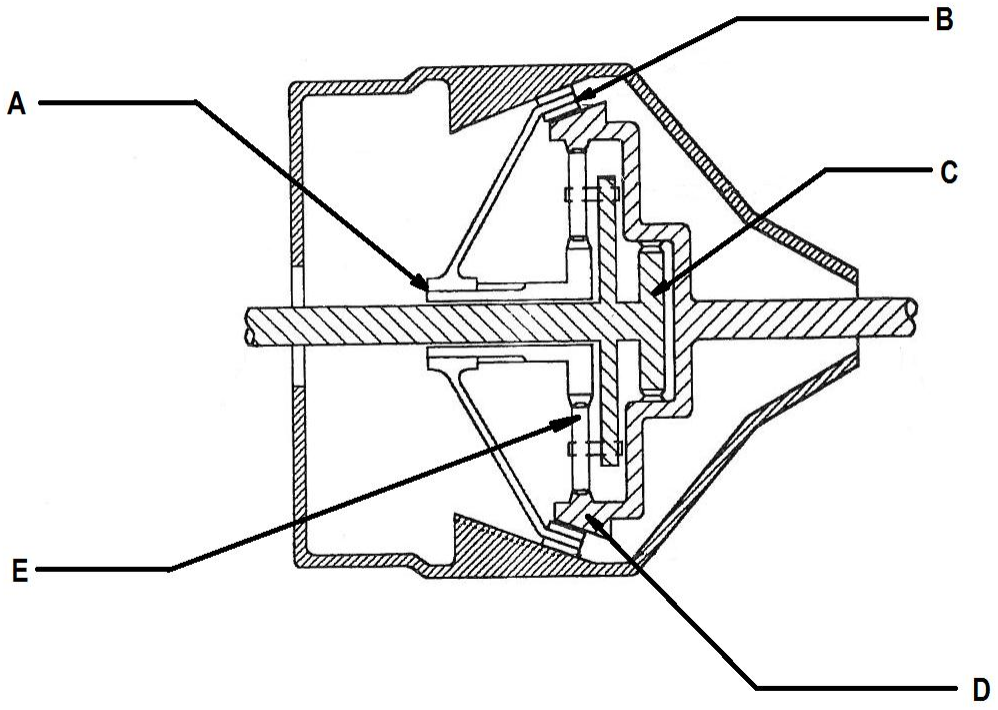

FIGURE 4

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

4.3.2 Explain how the overdrive mechanism in figure 4 is activated during operation. (2)

4.3.3 Describe the power flow through the overdrive unit while engaged. (2)

4.4 Explain in detail, how a technician should conduct a pressure test on a power assisted steering system. (4)
[20]

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QUESTION 5

5.1 Describe the operating principle of a manually operated differential lock mechanism. (4)

5.2 List THREE important details that must be must be recorded in an accident register if an injury or accident occurs in the work place. (3)

5.3 Name the FOUR departments that will receive a copy of the job card, in a workshop, where the five-part job card is used. (4)

5.4 List THREE important factors that must be consider when selecting a site for a new service station. (3)

5.5 List THREE types of additional diagnostic service tools, required in an automotive repair workshop that will be required to ensure that faults are diagnosed accurately. (3)

5.6 State THREE reasons why tool stocktaking must be scheduled regularly, to ensure the success of a repair workshop. (3)

[20]

TOTAL: 100

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