



ZIMBABWE

MINISTRY OF HIGHER AND TERTIARY EDUCATION

HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)

NATIONAL CERTIFICATE

IN

MOTOR VEHICLE MECHANICS

SUBJECT: Motor Vehicle Technology PAPER NO: 346/S01

NOVEMBER 2011 EXAMINATION

REQUIREMENTS

Pen, Pencil, Drawing Instruments.

INSTRUCTIONS TO CANDIDATE

1. Section A: Answer ALL questions. (20 marks)
2. Section B: Answer ALL questions. (20 marks)
3. Section C: Answer SIX questions. (60 marks)

This paper consists of 8 printed pages.

SECTION A

QUESTION 1

- a) What is the purpose of a pressure limiting valve.? (1 mark)
- b) Explain why cylinder liners are made from material different from the block. (2 marks)
- c) State the purpose of an emulsion tube fitted on same carburettors? (2 marks)
- d) Explain how lubricant on clutch linings causes judder. (1 mark)
- e) Give two reasons why back leakage is necessary in a diesel injector. (2 marks)
- f) Differentiate between brazing and gas welding? (2 marks)
- g) Explain why universal joints are sometimes used in pairs on a propeller shaft. (2 marks)
- h) Explain the effect of advanced ignition timing on dwell angle. (1 mark)
- i) Give the function of oil additives. (1 mark)
- j) Which metal has the greatest strength to weight ratio. (1 mark)
- k) State the device which prevents the simultaneous selection of gears in a gear box. (1 mark)
- l) Give two advantages of petrol fuel injection over carburettor system? (2 marks)
- m) State any information given on the tyre side walls. (1 mark)
- n) What determines the firing order of a petrol engine? (1 mark)

SECTION B

QUESTION 2

- a) Briefly explain the operation of a third differential unit fitted on some four wheel drive vehicle. (1 mark)
- b) What is self servo action on brakes? (2 marks)
- c) Why is it necessary to reduce positive caster on heavy vehicle? (2 marks)
- d) What clutch problems can result from a seized spigot bearing? (1 mark)
- e) Why is interior heating intricate on rear engine rear wheel drive vehicles? (2 marks)
- f) Define the term "included angle". (1 mark)
- g) State the stresses subjected to a drive shaft on a semi-floating hub. (2 marks)
- h) State one advantage of an overhead camshaft. (1 mark)
- i) What component absorbs road shock on a vehicle? (1 mark)
- j) The neutral axis of a chassis frame is _____. (1 mark)
- k) What prevents axial movement of a rear axle fitted with coil springs? (1 mark)
- l) State the injection pressure range of the following:
- Direct injection
 - Indirect injection
- (2 marks)
- m) Give two reasons why an ignition coil is filled with oil. (3 marks)

SECTION C

QUESTION 2

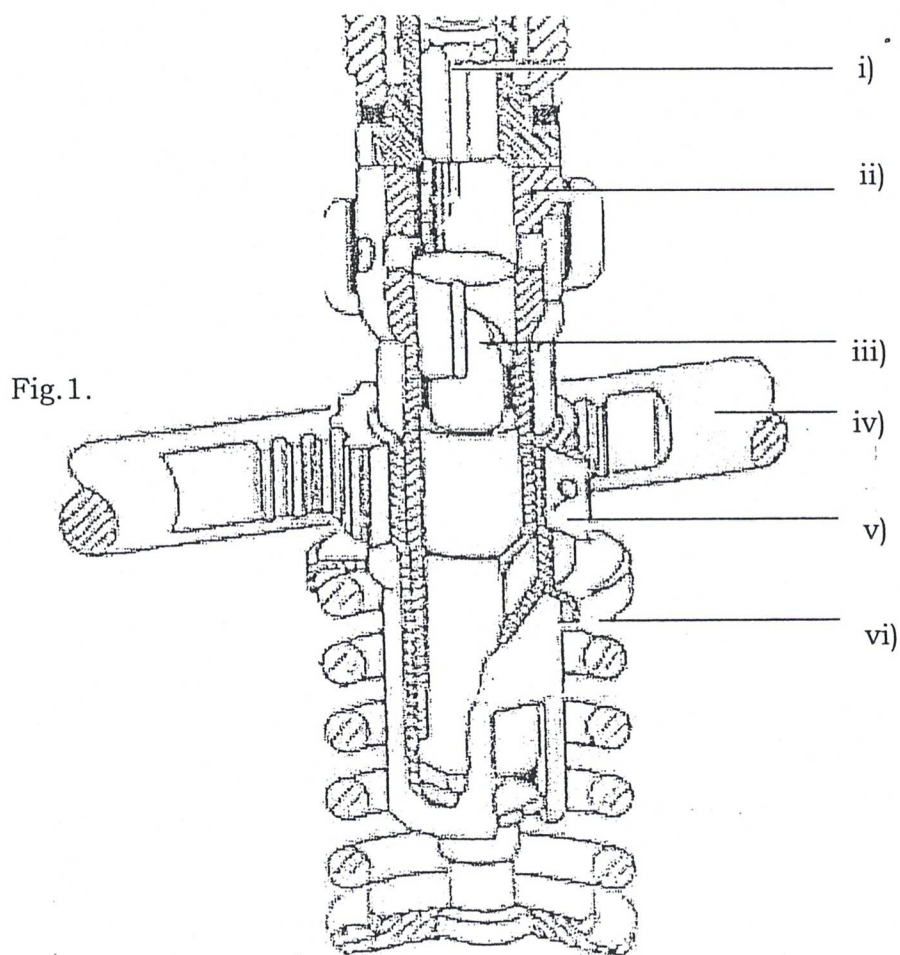
- a) Justify the use of water in liquid cooling systems. (3 marks)
- b) What are the limitations of using water only in a cooling system? (1 mark)
- c) How are the limitations maintained in b) overcome? (2 marks)
- d) What controls the minimum temperature of an engine? (1 mark)
- e) Explain why the size of the radiator does not affect the minimum temperature of collant. (2 marks)

QUESTION 4

- a) Draw the diagram of a Simple carburettor and label the following: (5 marks)
 - i) Needle and seat
 - ii) Float
 - iii) Floot chamber
 - iv) Main jet
 - v) Venturi
 - vi) Atmospheric pressure vent (3 marks)
- b) Explain why a Simple carburettor cannot be used on modern engines. (2 marks)

QUESTION 5

Refer to Fig. 1.



- a) Name the component (1 mark)
- b) Label i) to iv) (3 marks)
- c) What is the function of component iv)? (2 marks)
- d) State the operation which involves the adjustment of plunger height? (2 marks)
- e) State the operation carried out to adjust output? (2 marks)
- f) Why is it not necessary to carry out phasing on a DPA pump? (2 marks)

QUESTION 6

- a) Draw a diagram to illustrate the following:
 - i) Camber (2 marks)
 - ii) Caster (2 marks)
- b) Explain the function of i) and ii) mentioned in question 6(a). (2 marks)
- c) Give the maximum values for i) and ii) mentioned in 6(a) and briefly explain why. (3 marks)
- d) What is KPI? (1 mark)

QUESTION 7

Refer to Fig. And answer the following questions.

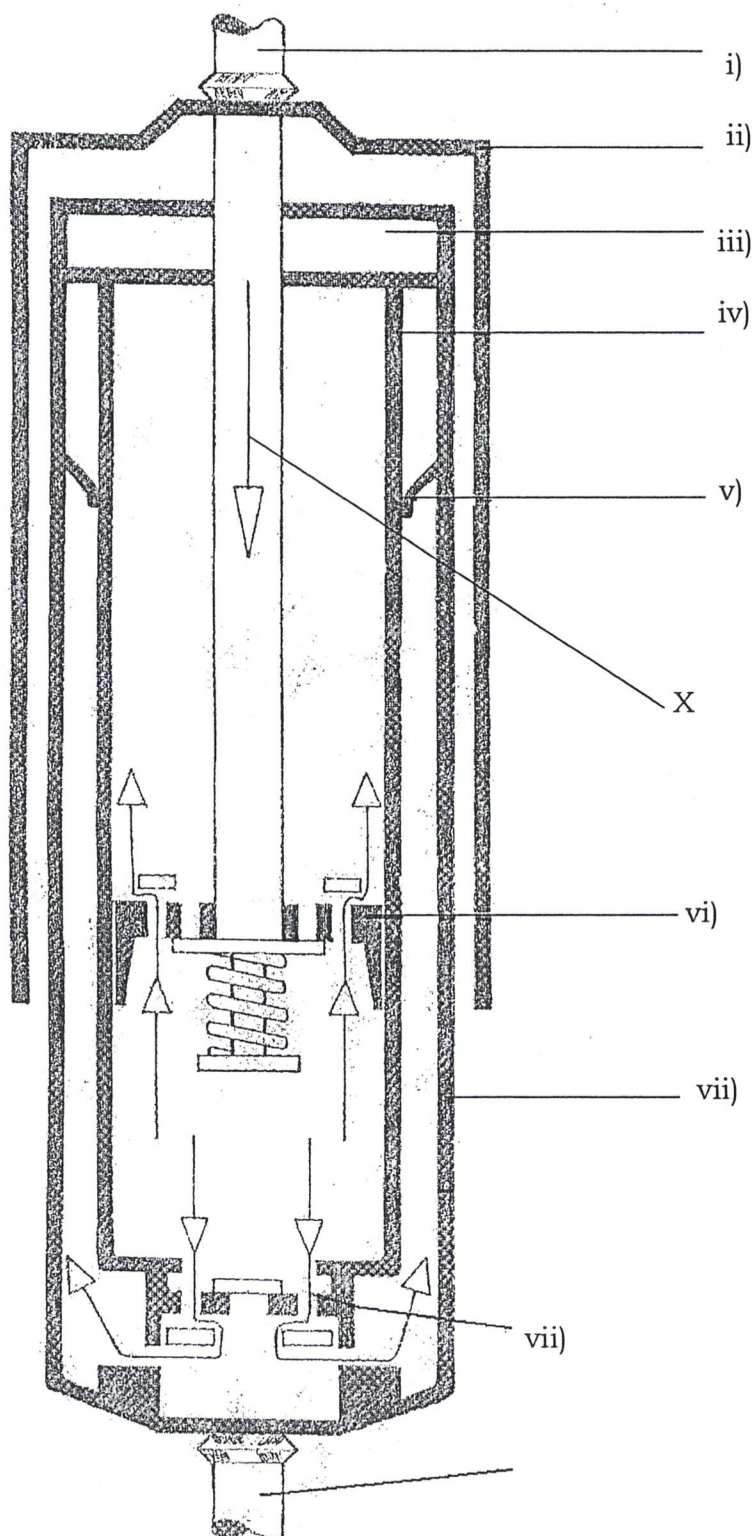


Fig. 2.

- a) State the purpose of the component.
- b) Label parts i) to viii)
- c) Define the terms “single acting” and double acting with respect to Fig. 1.
- d) What does arrow X indicate?
- e) State the disadvantages of the indirect acting type.

QUESTION 8

A four stroke SI engine has an exhaust valve lead of 40° and a lag of 10° . The inlet valve closes 20° . After TDC ignition occurs 120 before the end of compression and has an overlap of 20° .

- a) Draw a well labelled valve timing diagram. (6 marks)
- b) Calculate the inlet valve opening period. (1 mark)
- c) State any two operations that require valve overlap. (3 marks)

QUESTION 9

- a) With the aid of sketches, explain the operation of a check valve used on some brake master cylinder. (6 marks)
- b) What are the advantages of a tandem master cylinder? (1 mark)
- c) Define the term “brake fade” and state its causes. (3 marks)

QUESTION 10

- a) Differentiate between integral chassis and separate chassis. (4 marks)
- b) Define the following:
 - i) Twisting
 - ii) Lozengeing(4 marks)

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