



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
JANUARY 2014 SESSION**

SUBJECT CODE : FVD35102
SUBJECT TITLE : NGV INSTALLATION AND MAINTENANCE
LEVEL : DIPLOMA
TIME / DURATION : 2 HOURS
DATE :

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
2. This question paper is printed on one sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of **TWO (2) sections**. Section A and B. Answer all questions in Section A. For Section B, answer two (2) questions only.
7. Answer all questions in English

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- a) Describe the Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG).
(2 marks)
- b) Explain the methods of Diesel-powered vehicles can operate on natural gas.
(3 marks)
- c) Explain the benefits of natural gas as a vehicle fuel.
(5 marks)
- d) Clearly explain the methods of gasoline-powered vehicles can operate on natural gas.
(5 marks)
- e) Write down the main components of CNG Sequential System.
(5 marks)

Question 2

- a) Define the related equipment that needs to be used to perform engine cooling system test and write down the process of performing the task.
(5 marks)

b) According to MS 1096:1997 Standard, all NGV cylinders must be installed in suitable location at the vehicle. List down FIVE criteria to confirm that the cylinders are installed in the safe location.

(5 marks)

c) Write down **THREE (3)** main tests in order to verify the NGV system that has been installed is functioning properly.

(3 marks)

d) Define the equipment's that need to be used to check or verify that the NGV systems are running in high fuel consumption.

(2 marks)

e. Explain the function of petrol solenoid in NGV mixer fuel system.

(2 marks)

f. Determine the main purpose of emulator that is fixed in sequential NGV system.

(3 marks)

Question 3

a) By referring to table 1 below, determine either the engine is suitable to convert to NGV system or not. Include your answer with simple calculation and explanation.

(5 marks)

Table 1. Typical engine compression test result

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
98 psi	90 psi	85 psi	95 psi

- b) Explain clearly the procedures (step by step) on how to set/adjust the power screw that fitted at the NGV reducer/regulator (open-loop system).

(5 marks)

- c) Explain the complete process of adjusting the NGV Ignition Timing on a bi-fuel vehicle which is not installed with a Spark Advancer Module.

(5 marks)

- d) Name the related Statutory Authorities in Malaysia in respect of approval of NGV fuel systems components and installation

(5 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions only.

Please use the answer booklet provided.

Question 1

- a) After performing the “Pre-conversion Test”, the result of Brake Performance test for a vehicle that needs to convert into NGV system is stated as below:

Table 2: Results of brake test on model XYZ

BRAKE	FRONT		REAR	
	Left	Right	Left	Right
Rolling resistance (N)	203	150	66	102
Ovalization (%)	15	0	9	11
Side Slip (m/km)	-7		-7	
Weight (kg)	381	395	215	221

Based on table 2 above:

- i) Write a simple report about the “Ovalization” regarding to brake performance and the impact to the respective vehicle.
(6 marks)
- ii) Determine either the engine is suitable to convert to NGV system or not. Explain to support the answer.
(4 marks)
- b) The gasoline vehicle that is converted to NGV system will be subjected to loss-power between 12 – 15 % when the vehicle is running on a bi-fuel system. Explain why these phenomena happen.
(10 marks)

Question 2

In order to run the vehicle in “bi-fuel system” the four cylinder engine was overhauled and the engine was installed with the cylinder head that has combustion chamber volume (CV) of 3.78cu.inch while the previous cylinder head have 4.52cu.inch of combustion chamber volume (CV).

Table 3. typical engine specification

Description	Value
Bore	4.1 inch
Stroke	3.48 inch
Thickness of compress gasket	0.02 inch
Deck clearance volume (DV)	zero

Compression ratio = $\frac{PV + DV + GV + CV}{DV + GV + CV}$
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- a) By referring to information in table 3 and formula above calculate the engine compression ratio of the engine before and after changing the cylinder head.

(10 marks)

- b) Based on the result in question 5(a), write the conclusion about the engine in terms of the suitability of the engine to run with the “bi-fuel system”.

(10 marks)

Question 3

- a) Draw a flow-chart of the NGV installation procedures from receiving to the handing over the vehicle to the customer.

(11 marks)

b) Give **THREE (3)** probable causes for each of the following:

i) engine rough idle on NGV.

(3 marks)

ii) engine cannot be started on both NGV and petrol.

(3 marks)

iii) engine loss power on NGV more than normal.

(3 marks)

END OF QUESTION