



SET A

**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
SEPTEMBER 2013 SESSION**

SUBJECT CODE : FVD 35102 / FVD 30102
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**. This question paper is printed on one side of the paper.
 2. Please write your answers on the answer booklet provided.
 3. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 4. 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.
 5. Answer all questions in English.
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THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

- a. State the differences between wet natural gas and dry natural gas.
(2 marks)
- b. Give three (3) characteristics of NGV that make it becomes a safer fuel than gasoline.
(3 marks)
- c. Explain the advantages of NGV which make it a better fuel compare to gasoline in the following aspects:
- i. Safety.
(2 marks)
 - ii. Economy.
(3 marks)
- d. List down type of NGV system and explain **EACH** of it.
(5 marks)
- e. Write down the main components of CNG Mixer (Venturi) Carburetor System
(5 marks)

Question 2

- a. Define the related vehicle checks that need to be performed in order to verify that the vehicle is suitable for NGV system conversion process.

(5 marks)

- b. According to MS 1096:1997 Standard, all NGV cylinders must be permanently and clearly marked. List FIVE markings that are required by the above Standard.

(5 marks)

- c. Explain the THREE importance of conducting a post-conversion check on vehicles that were installed with NGV system.

(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 gas regulator / reducer in NGV fuel system.

(2 marks)

- f. Determine the main purpose of timing advance processor.

(3 marks)

Question 3

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

(5 marks)

Table 1. Typical engine compression test result

Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
120 psi	90 psi	130 psi	125 psi

- b. Explain clearly the procedures (step by step) on how to detect leakages in NGV fuel 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 questions only

Please use the answer booklet provided

Question 4

- a. After perform the “Pre-conversion Test” the result of Brake Performance test for a vehicle that need 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 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 converted to NGV system will 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 5

In order to run the vehicle in “bi-fuel system” the four cylinder engine was overhaul 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 = $\frac{PV + DV + GV + CV}{DV + GV + CV}$

- 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 6

- 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 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