The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: **Automobile Technology - DMX4532/MEX4232**
Academic Year	: 2017/18
Date	: 12th February 2019
Time	:.13:30-16:30
Duration	: 3 hours

READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE ANSWERING THE QUESTION PAPER

Instructions.: This question paper consists of seven (07) questions. You are required to answer any six (06) questions. All questions carry equal marks.

Question 01

a) Explain what a naturally aspirated engine is.

b) By means of sketches explain the difference between turbo charging and super charging of engines.

c) Compare the operating condition of a turbo charged engine in relation to a naturally aspirated engine.

Question 02

a) A typical automotive air-conditioning system is shown in figure Q2. Name the components from 1 to 7 and identify their location (within, or outside the passenger cabin).

b) Explain the operating principle of the automotive air-conditioning system shown in Figure Q2.

c) Give three reasons for a noisy air-conditioning system and suggest remedial actions.

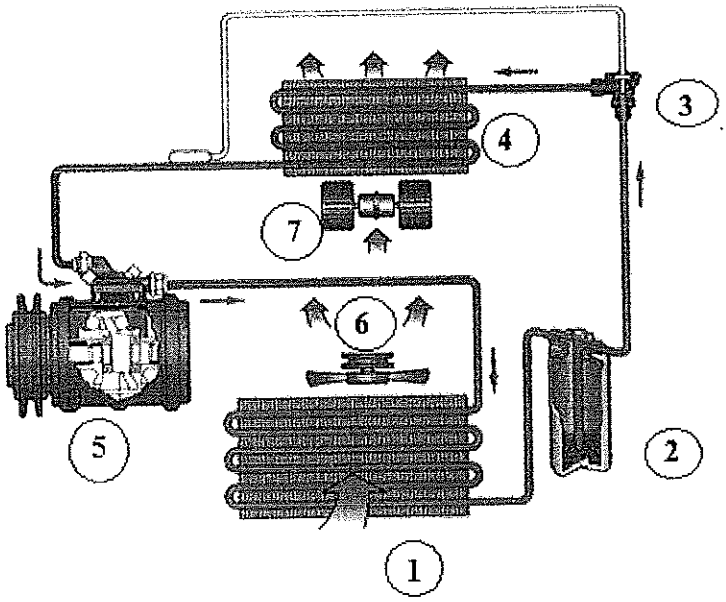

Figure Q2 – Diagram of a typical Automotive air-conditioning system

Question 03

a) Draw a valve timing diagram for a single cylinder four stroke spark ignition engine and explain the sequence of valve opening and closing.

b) A friend of yours complains to you that his vehicle revs at start-up/acceleration, but the vehicle speed increases unusually slow, or not at all. With the above symptom you strongly suspect a slippage of the clutch. Explain how you systematically diagnose the problem of the clutch failure and narrow your diagnosis down to detect the exact cause for it.

Question 04

i) Identify the components (designated as a to f) of the sub-unit of an engine shown in Figure Q4.

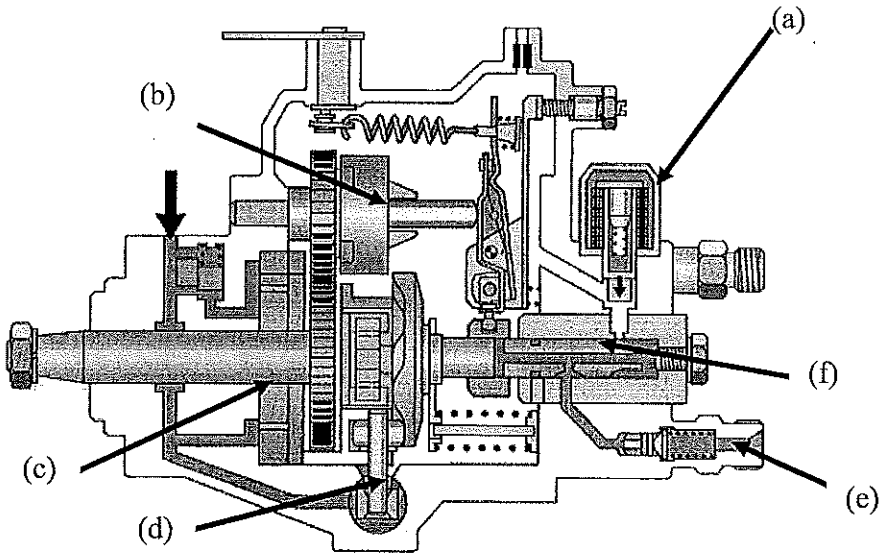

Figure Q4

ii) Referring to these components in figure Q4, explain the operating principle of the sub unit.

Question 05

A four cylinder four stroke engine was tested on an engine dynamometer. During the test, it was observed that the engine consumed 2.127 kg of fuel per second and developed a torque, 65.25 Nm at 4200 rev/min. A morse test is carried out for the engine and the cylinders are cut off in the order of 1, 2, 3, 4 with corresponding brake torque of 45, 48, 46.5 and 44 Nm, respectively at 4200 rev/min.

Calculate the following.

i. Indicated power
ii. Specific fuel consumption in kg/kWh
iii. Mechanical efficiency
iv. Indicated Mean Effective Pressure (IMEP)

Question 06

a) Diagnose the possible cause/s for the behavior of a vehicle, given the following symptoms.

"The engine does not start now and then. When you turn the ignition key "ON" you never know what the next result is. Even if the starter motor turns, sometimes the engine does not start. If I am lucky enough to be parked on a downhill, I can start the engine with a light push without much trouble. It seems to have plenty of power from the battery, (lights, etc. all work)".

b) A three-cylinder engine running on octane 98 fuel has its bore diameter of 87 mm and a stroke length of 112 mm. Calculate the following parameters.

i) total displacement of the engine in liters

ii) compression ratio of the engine if the clearance volume is 8% of the swept volume.

Question 07

a) Explain dwell angle with respect to automotive ignition system.

b) Explain why it is necessary to change ignition timing under different load and speed conditions

c) Explain how the ignition timing is varied by means of a vacuum advance mechanism

d) What are the main functions of a distributor in an ignition system?

(Use neatly drawn sketches, wherever relevant to explain your answers clearly.)