

University of Ruhuna- Faculty of Technology

Bachelor of Engineering Technology

Level 2 (Semester 2) Examination, September 2020

Course Unit: ENT 2242 Basic Automobile Engineering

Time Allowed 2 hours

Answer all four (04) questions.

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Q1)

- a) Classify internal combustion engines according to the working cycle and fuel ignition method. (2 Marks)
- b) In an internal combustion engine piston rings play a major role in its operation. State the main types of engine piston rings with their functions. (5 Marks)
- c) Valve timing diagram of a 4-Stroke internal combustion is shown in Figure Q1.c. Briefly explain the operation of the valves throughout the cycle with the help of the diagram giving reasons for such operations. (8 Marks)
- d) Compare 4-Stroke and 2-Stroke operating cycles of internal combustion engines by stating five major differences between them. (10 Marks)

Q2)

- a) Write the meaning of the following terms associated with an internal combustion engine.
i. Indicated Power
ii. Brake Power
iii. Frictional Power (3 Marks)
- b) Briefly explain the procedure of the “*Morse Test*” which is used to measure frictional power of an internal combustion engine. (4 Marks)
- c) A four-cylinder petrol engine has an output of 51.5 kW break power(bp) at 2000 rpm. A *Morse Test* was carried out and the brake torque readings were 176.3,169.5,166.8 and 173.6 Nm respectively. For normal running at this speed break specific fuel consumption is 0.37 kg/kWh. The Lower Heating Value (LHV) of the fuel is 43900 kJ/kg. Calculate the mechanical efficiency and the brake thermal efficiency of the engine. (10 Marks)
- d) Define following engine performance parameters for an internal combustion engine and state their importance as an engine performance factor.
i. Brake Specific Fuel Consumption

- ii. Brake Mean Effective Pressure
- iii. Volumetric Efficiency
- iv. Mean Effective Pressure

(8 Marks)

Q3)

- a) Briefly describe the working principle of an elementary carburetor system used in spark ignition (SI) engines by drawing a clear sketch.

(10 Marks)

b)

- i. Identify five main drawbacks of elementary carburetors.

(5 Marks)

- ii. Briefly explain one additional system to be added to the elementary carburetors to overcome one of the above-mentioned drawbacks in Q3.b). i.

(4 Marks)

- c) Solid fuel injection is major classification in fuel injection systems. State the main four solid fuel injection systems and briefly explain one of them.

(6 Marks)

Q4)

- a) Briefly explain why cooling is necessary for internal combustion systems.

(2 Marks)

- b) Briefly explain the situations where air cooling is preferred over water-cooling systems in internal combustion engines.

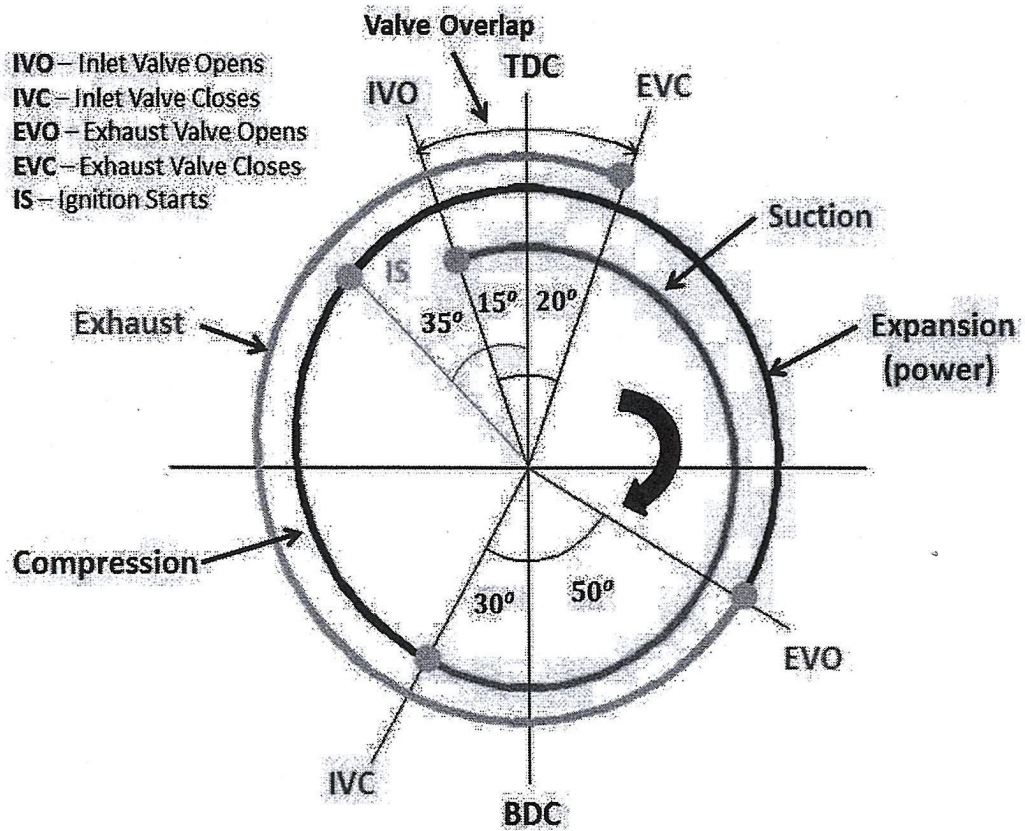
(3 Marks)

- c) Lubrication systems of an internal combustion engine is mainly used to reduce the friction. State five other additional purposes of a lubrication system and briefly explain each of them.

(10 Marks)

- d) Briefly explain the wet sump pressure feed lubrication system by drawing a clear sketch.

(10 Marks)



Valve Timing Diagram of 4 Stroke Petrol Engine

Figure Q1.c