



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: August 2018

Module Number: ME 5214

Module Name: Advanced Automobile Engineering

[Three Hours]

[Answer all questions, fifty marks for all questions]

All assumptions must be stated clearly. Sketches and diagrams are to be provided where required. Symbols stated herein denote standard parameters.

- Q1. a) With the help of neatly drawn sketch, derive the equation for Acceleration (A) of an automobile piston. [3.0 Marks]
- b) The inertia forces should be limited which created by reciprocating masses of the piston complex, acting in a crank mechanism. Discuss the above statement. [2.0 Marks]
- c) Briefly discuss the concept of hybridization with the aid of suitable sketches. [2.0 Marks]
- d) What are the different architectures of hybrid vehicles available in the world? [3.0 Marks]
- Q2. a) How is Morse test utilized to find out the indicated power and the mechanical efficiency of an engine? Specify under what conditions (assumptions) the Morse test should be carried out. [4.0 Marks]
- b) The Morse test of a petrol engine provided the following results:
B.P. with all cylinders working = 75.7 kW
B.P. with No.1 cylinder cut out = 51.5 kW
B.P. with No.2 cylinder cut out = 51.8 kW
B.P. with No.3 cylinder cut out = 53.4 kW
B.P. with No.4 cylinder cut out = 53.7 kW
Calculate the Friction Power, Indicated Power and Mechanical Efficiency of the engine. [6.0 Marks]
- Q3) a) What is the function of a gear box (transmission) in an automobile? [2.0 Marks]
- b) Describe various types of gear boxes used in automotive vehicles. [4.0 Marks]
- c) With the neat sketches, explain the construction and working phenomena of a sliding mesh gear box. [4.0 Marks]

- Q4) a) Exhaust gases from automobiles may affect to the environment in various way. Describes them with suitable examples (how those gases generate, effects to environment and human being, etc.) [5.0 Marks]
- b) What is catalytic convertor? What are the types of catalytic convertor? How it is affected to the environmental pollution? Discuss with suitable data. [5.0 Marks]
- Q5) a) Indicated Specific Fuel Consumption and Brake Specific Fuel Consumption can be used for checking performances of a vehicle. Define the above terms clearly. [2.0 Marks]
- b) Determine the quantity of fuel to be injected per cycle per cylinder for a 6-cylinder 4-Stroke diesel engine having brake specific fuel consumption of 250 g per kW-hr and developing 90 kW at 2600 rpm. Take specific gravity of fuel as 0.84. [3.0 Marks]
- c) A 2-Stroke C.I. engine delivers 5500 kW while using 1250 kW to overcome friction losses. It consumes 2400 kg of fuel per-hour at an Air/Fuel ratio of 20 to 1. The heating (calorific) value of fuel is 42000 kJ/kg.

Find the,

- (i) Indicated power.
- (ii) Mechanical Efficiency.
- (iii) Air Consumption per hour.
- (iv) Indicated Thermal Efficiency.
- (v) Brake Thermal Efficiency.

[5.0 Marks]