UNIVERSITY OF RUHUNA

Faculty of Engineering

Mid -Semester 6 Examination in Engineering: November 2014

Module Number: ME6251   Module Name: Advance Automobile Engineering

[Two Hours]

[Answer **all questions**, each question carries **five** marks]

Q1. Describe the Morse Test as applied to a multi-cylinder C. I. engine and explain how the results of this test may be used to find the mechanical efficiency of the engine. Comment on the assumptions made in this test.

[5 marks]

Q2. A Morse test on a turbocharged 4-cylinder, 4-stroke C. I. engine of bore 38 cm and stroke 50 cm gave the following readings.

Speed = 200 rev/min

Condition	Brake Load (N)
All firing	675.0
No.1 out	462.5
No.2 out	481.5
No.3 out	481.5
No.4 out	462.5
All firing	680.0

The law of break power is,

$$\text{Brake Power.B. P.} = \frac{W.N}{180} , kW$$

where, W − Brake Load in Newton   and   N − Speed in rev/min

Calculate the brake mean effective pressure ($P_{m.e.p}$) in bar and mechanical efficiency with all cylinders firing.

[5 marks]

Q3. **(a)** In order to test the performance of an automobile engine, hundreds of tests are carried out on engines and engines parts. What are the two main classes of different tests carried out?

[1 mark]

(b) Give three (03) main purposes of an I.C. engine testing.

[1.5 marks]

(c) List out the five (05) main objectives of carrying out a Commercial Test in automobiles.

[2.5 marks]

Q4. **(a)** Derive the equations for Stroke (S), Speed (V) and Acceleration (A) of piston acting in an I. C. engine.

[2 marks]

(b) A diesel engine is used in a truck requiring 80 kW of brake power. The mechanical efficiency of the truck engine is 80%. The brake specific fuel consumption of the engine is 258 grams per kW-hr. A design improvement is made which reduces the engine friction by 3.7 kW. Assuming the indicated thermal efficiency remains the same, calculate:

(i)   The new mechanical efficiency.

(ii)   The new brake specific fuel consumption.

(iii) The saving in fuel per hour after design improvement.

[3 marks]