BIMEE-023

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2016

BIMEE-023 : COMBUSTION ENGINEERING

Time : 3 hours   *Maximum Marks : 70*

Note : Answer any five questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. (a) What are the different kinds of fuels used in an I.C. engine ? What are the important properties which an S.I. engine fuel possesses ?

    (b) What are the essential requirements to be fulfilled by a fuel injection system for C.I. engines ? What is the most common injection system used in multi-cylinder diesel engines ?   7+7

2. (a) Distinguish clearly between 'Octane Number' and 'Cetane Number'. What is their significance in rating of fuels for S.I. and C.I. engines ?

(b) State the relative advantages and disadvantages of battery and magneto-ignition systems. 7+7

3. (a) Explain briefly the combustion phenomenon in S.I. engines. What do you mean by pre-ignition ? How can it be detected ?

   (b) What is the difference between Higher Heating Value (HHV) and Lower Heating Value (LHV) of the fuel ? 7+7

4. (a) Explain the phenomenon of knocking in S.I. engines. What are the different factors which influence the knocking ? Describe the methods used to suppress it.

   (b) What do you mean by stoichiometric air-fuel (A/F) ratio ? Calculate the stoichiometric air-fuel ratio of natural gas (CH_4). 7+7

5. (a) What are the main functions of nozzle ? Explain any one type of nozzle with a neat diagram.

   (b) "While volatility of the fuel is a determining factor in the selection of fuels for S.I. engines, ignition quality of the fuel is the primary deciding factor for C.I. engines." Discuss the statement briefly. 7+7

6. **(a)** Calculate the amount of theoretical air required for the combustion of 1 kg of acetylene (C_2H_2) to CO_2 and H_2O.

(b) A four-cylinder, four-stroke petrol engine of cylinder bore and stroke each equal to 77 mm has a compression ratio of 8·5 : 1. The relative efficiency is 50% when s.f.c. on IP is 0·28 kg/kWh.

Determine :

(i) The C.V. of the petrol in MJ/kg

(ii) The petrol consumption in kg/hr

Given that the i.m.e.p. is 950 kPa when the engine speed is 3000 rpm. Take γ for air = 1·4. 7+7