No. of Printed Pages : 4 **BIMEE-023**

B. TECH.-VIEP MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2019

BIMEE-023 : COMBUSTION ENGINEERING

Time : 3 Hours *Maximum Marks : 70*

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

1. (a) Explain in detail the combustion process of fuels. Describe in brief the method of oxygen quantity calculation for complete combustion. 7

   (b) What are the basic requirements of a combustion chamber ? Explain. 7

2. (a) What are primary fuels ? List some important primary fuels and their applications. 7

(b) What do you mean by stoichiometric air-fuel (A/F) ratio ?

A fuel has the following composition by weight :

Carbon = 86%, Hydrogen = 11.75% and Oxygen = 2.25%.

Calculate the theoretical air supply per kg of fuel, and the weight of products of combustion per kg of fuel.   7

3. (a) Discuss the reasons for incomplete combustion. Name the major pollutants emitted from exhaust due to incomplete combustion.   7

(b) The following is the ultimately analysis of a sample of petrol by weight :   7

Carbon = 86 percent; Hydrogen = 8 percent, Sulphur = 3 percent; Oxygen = 2 percent; Ash = 1 percent.

For air-fuel ratio of 12 : 1, calculate :

(i) Mixture strength as a percentage rich or weak.

(ii) Volumetric analysis of the dry products of combustion.

4. (a) What do you mean by pre-ignition ? How can it be detected ?   6

   (b) 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.   , 8

5. (a) "Compressed Natural Gas (CNG) is preferable in S.I. engine than C.I. engine." Justify the statement.   7

   (b) Why a S.I. engine fails to operate if the air-fuel ratio is more than 20 : 1, while C.I. engine can operate on air-fuel ratio of even 50 : 1 ? Explain.   7

6. (a) How does the mixture composition in the combustion chamber of a C.I. engine differ from that of a S.I. engine ?   7

   (b) How does flame speed affect combustion ? Explain the various factors that influence the flame speed.   7

7. Write short notes on any *four* of the following :

$$4 \times 3 \frac{1}{2}$$

   (a) Fuel injection

   (b) Crank case dilution

   (c) . Performance number

   (d) Auto-ignition

   (e) Primary zone

   (f) Octane number