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May, 2019

M.Tech (Mechanical Engineering) - 1st Semester

(Reappear)

IC Engine Combustion & Pollution (MME-105)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Use of scientific calculator is allowed.*

PART–A

1. (a) What do you understand from Chemical equilibrium? (1.5)

(b) What is the effect of ambient temperature on the combustion stability? (1.5)

(c) What is premixed flame? (1.5)

(d) What is flammability limit for SI engine? (1.5)

(e) What is the difference between lower heating value (LHV) and higher heating value (HHV)? (1.5)

(f) What do you understand from detonation velocity? (1.5)

(g) Name the gases which can be identified with the help of Orsat Apparatus? (1.5)

(h) What is pollution? (1.5)

(i) What is adiabatic flame temperature? What is its importance in combustion phenomena evaluation? (1.5)

(j) Which type of flame (laminar or turbulent) is most suitable for internal combustion engine? Explain. (1.5)

PART–B

2. What is octane and cetane rating of the fuel? How the rating of the fuels is performed? Explain with suitable examples. (15)

3. Name the factors responsible for controlling the combustion chemistry in an internal combustion engine. Discuss these factors while considering inter-relationship of different factors along with suitable examples and data. (15)

4. What are different types of fuel obtained from petroleum? Discuss physical and chemical properties of different fuels obtained from petroleum in detail. (15)

5. Compare the construction and working of two-stroke and four-stroke internal combustion engines operating on Diesel and Gasoline fuels. Insert suitable diagrams wherever required. (15)

6. Explain the phenomena of combustion for solid, liquid and gaseous fuels with neat and clean diagrams. Which type of fuel has maximum combustion efficiency? Also explain the concept of combustion quality. (15)

7. What is infrared analyzer? Explain the working principal of infrared analyzer. How it can be used for analyzing pollution emission from internal combustion engines? Insert suitable diagrams and data wherever required. (15)