

ATF 123 - Fuels and Combustion

(02 credits – 50 marks)

Learning Objectives:

The course should enable students:

1. To gain knowledge about the characteristics of Conventional and Alternate fuels
2. Understand the performance characteristics of SI and CI engines.
3. Understand, describe and differentiate between TBI and MPFI systems

Learning Outcomes:

After completion of the course, students are expected to be able to:

1. Understand stages of combustion in SI and CI engines
2. Compare the performance characteristics of SI and CI engines.
3. Carried out performance tests under different varying conditions

Course Content:

Module –I: Conventional Fuels

05 hrs

Introduction, Types of Fuels – Solid, Gaseous and Liquid fuels, Chemical structure of petroleum, Petroleum refining process, Important qualities of SI and CI engine fuels, Rating of SI and CI engine fuels

Module –II: Alternate fuels

05 hrs

Introduction, Possible alternatives to solid fuels and liquid fuels, Surface-Ignition Alcohol CI engines, Spark assisted Diesel engines, Vegetable oils, Biodiesels, Gaseous fuels, Hydrogen engines, Dual fuel operation, Other possible fuels

Module –III: Combustion in SI Engines

07 hrs

Introduction, Homogeneous mixture, Heterogeneous mixture, Stages of Combustion in SI Engines, Flame Front Propagation, Factors influencing flame speed, Rate of pressure rise, Abnormal combustion, Phenomenon of knock/detonation in SI engines, Effects of engine variables on knock, Combustion chambers for SI engines.

Module –IV: Combustion in CI Engines

07 hrs

Introduction, Stages of Combustion in CI Engines, Factors affecting the delay period, diesel knock, Phenomenon of knock in CI engines, Effects of engine variables on knock, Combustion chambers for CI engines.

Module –V: Assignments / seminars / case studies on Module -I to Module - IV

06 hrs

References:

1. Combustion Engineering – Gary L. Borman, Kenneth W. Ragland, McGraw Hill, 1998
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2. Principles of Combustion – Kenneth K. Kuo, John Wiley & Sons, 2nd edition, (2005),
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3. Fundamentals and Technology of Combustion, Mahallawy-Habik, *Elsevier Science* (2002).
ISBN 10: 0080441068 ISBN 13: 9780080441061.
4. Fuels & Combustion – S. P. Sharma & Chander Mohan, Tata McGraw Hill, (1987)
ISBN: 0070466773 9780070466777
5. Fuels & Combustion – Samir Sarkar, Universities Press, 3rd edition (2010), ISBN
1439825416, 9781439825419
6. A Course in Internal Combustion engine, Mathur-Sharma, Dhanpat Rai Publication
(2010), ISBN-10: 8189928465, ISBN-13: 978-8189928469
7. Internal Combustion Engines, Ganesan.V, Tata McGraw Hill Publishing Co., New York,
4th Edition (2012), ISBN-0-07-049457-6.
8. Internal Combustion Engines, K.K. Ramalingam, SCITECH, 2nd edition (2011), ISBN
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