# BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI- HYDERABAD CAMPUS

FIRST SEMESTER 2022-2023

Course Handout (Part II)

29/08/2022

In addition to part-I (general handout for all courses in the time table) this handout provides the specific details regarding the course.

# Course No.: ME F242

**Course Title: IC Engines Instructor-in-charge: Mrinal K. Jagirdar**

## Course Description:

Working cycles and operation of two strokes, four stroke SI and CI engine cycles. Ignition, combustion, alternative fuels, emission and their control.

## Scope and Objective:

This course has been designed to make the students familiar with the working principles of an internal combustion engines. It deals with the principle of operations, fuels, combustion and performance of an internal combustion engines; along with working analysis and design of various systems.

## Text Books:

V. Ganeshan, *Internal Combustion Engines*, Tata McGraw-Hill, 4th Edition, 2012

## Reference Books:

M. L. Mathur and R. P. Sharma, A course in Internal Combustion Engines, Dhanpath Rai and Sons.

A. R. Rogowski, Elements of I. C. Engines, Tata McGraw-Hill.

**Course Plan:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Lect**  **No.** | **Learning Objectives** | **Topics to be covered** | **Chapter in the Text Book** |
| 1-3 | Introduction to IC  Engines | Working principle, classification and  performance parameters of an IC Engines | Ch 1 |
| 4-6 | Air standard cycles and  their analysis | Auto, Diesel and Dual cycle. | Ch 2 |
| 7-9 | Fuel-air cycles and  their analysis | Variable specific heats, Dissociation,  Comparison of air standard and fuel air cycle | Ch 4 |
| 10-  11 | Actual cycle and their  analysis | Valve-timing diagram, Time loss factor, Heat  loss factor, Exhaust blow down | Ch 5 |
| 12 | Conventional and | Conventional fuel, Liquid fuels, Possible | Ch 6 & 7 |

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| --- | --- | --- | --- |
|  | Alternative Fuels | alternative fuels |  |
| 13-  14 | Carburetion | Carburetion, Engine mixture requirements,  Simple carburetor, Calculation of air fuel ratio | Ch 8 |
| 15-  16 | Mechanical and Electronic injection  system | Classification, Fuel feed Pump, Injector, Nozzle, MPFI and ECU | Ch 9 & 10 |
| 17-  18 | Ignition | Battery ignition system, Magneto ignition  system, Modern ignition systems | Ch 11 |
| 19-  20 | Engine friction and  lubrication | Mechanical friction. Lubrication, Properties  of lubricant | Ch 13 |
| 21-  22 | Heat rejection and  cooling | Temperature distribution, Liquid and Air  cooling system | Ch 14 |
| 23 | Engine Emissions and  their control | Hydrocarbon and other emissions, Converter | Ch 15 |
| 24-  25 | Measurement and Testing, Performance parameters and  characteristics | Measurement of IP, BP, etc, Efficiency and heat balance sheet | Ch 16 & 17 |
| 26 | Supercharging | Supercharger, Supercharging methods | Ch 19 |
| 27-  28 | To know the engines | All the systems of an IC engines | Lab Visit |

**Evaluation Scheme:**

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| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Evaluation**  **Component** | **Duration** | **Weightage**  **(%)** | **Date, Time and**  **Venue** | **Nature of**  **Component** |
| 01 | Mid Semester Test | 90 min | 30 | TBA | Closed Book |
| 02 | Class Test | 50 min | 10 | lecture hour | Open Book |
| 03 | Assignment | - | 20 | - | Open Book |
| 04 | Compre. | 3 hours | 40 | TBA | Closed Book |

**Chamber Consultation Hours:**

To be announced in the class.

## Notices:

All notices related to this course will be put on the CMS/Mechanical Engineering Group Notice Board.

## Make-up Policy:

Make-up will be given to extremely genuine student, but prior permission is required. No make-up will be given for the surprise tests. Surprise tests may be conducted in either lecture hour or tutorial/common hour.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

***Instructor-in-charge***

**ME F242**