BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI- HYDERABAD CAMPUS

SECOND SEMESTER 2023-2024

Course Handout (Part II)

09/01/2024

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: K. Ram Chandra Murthy**

**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** | **Reference to Text** |
| 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 Alternative Fuels | Conventional fuel, Liquid fuels, Possible alternative fuels | Ch 6 & 7 |
| 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:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Evaluation Component** | **Duration** | **Weightage (%)** | **Date, Time and Venue** | **Nature of Component** |
| 01 | Mid Semester Test | 90 min | 25 | 15/03 - 9.30 - 11.00AM | Closed Book |
| 02 | Test | 30 min | 30 | Best 4 out of 5 | Open Book |
| 03 | Compre. | 3 hrs | 45 | 16/05 FN | Close Book |

**Chamber Consultation Hours:**

To be announced in the class.

**Notices:**

All notices related to this course will be put on the 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**