BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE-PILANI - HYDERABAD CAMPUS

SECOND SEMESTER 2022 - 2023

(COURSE HANDOUT PART II)

Date: 16/1/2023

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 F484

**Course Title**: AUTOMOTIVE TECHNOLOGY

**Instructor-in-charge**: Dr. Supradeepan K

1. **Course Description:** *Automotive vehicle*: layout, operating systems, components, materials and production processes; *Power unit*: IC engine, working principles, performance, systems and the associated parts; *Mechanical unit*: transmission, drive train, steering, chassis, suspension, brakes, wheels and tyres; *Electric unit*: battery, charging, starter and lighting; *Electronic control unit*: application of electronics and computers, sensors, actuators and on-board diagnostics; *Latest Trends*: advanced combustion systems and hybrid/fuel- cell/electrical power systems, alternate fuels and the emissions.
2. **Scope and Objective:** This is an introductory multi-disciplinary course aimed at providing a comprehensive overview of the operating systems of a modern automobile. It also aims at analyzing the working features of an automobile vehicle with the technologies, materials and processes associated with it.

# Text Book:

* 1. **Sudhir Kumar Saxena**, Automobile Engineering, University Science Press, 1st Edition, 2009
  2. **VAW Hillier**, Fundamentals of Motor Vehicle Technology, Vol 1 & 2, Nelson Thornes, UK, 6th Edition, 2012

# Reference Books:

1. V. Ganesan, Internal Combustion Engines, Tata McGraw-Hill, 3rd Edition, 2007.
2. Kirpal Singh, Automobile Engineering, - Vol. 1 & 2, Standard Publishers & Distributors, 12th Edition, 2011.
3. N. K. Giri, Automobile Mechanics, Khanna Publishers, 8th edition, 2009.

# Course Plan:

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| **Lecture Nos.** | **Learning objectives** | **Topics to be covered** | **Book: Chapter** |
| 1-4 | Introduction | Automobile history, vehicles classification, layout; systems and their functions; components, materials and production processes; latest trends. | TB1: 1 |
| 5-8 | IC Engine Operation | Classification of IC engines, air standard cycles, 2- stroke & 4-stroke engines, SI & CI engines, and engine performance evaluation. | TB1: 2 & 5 |
| 9-10 | Engine Parts & Their Functions | Cylinder block, crankcase, cylinder head, piston, piston rings, piston pin, connecting rod, crankshaft, fly wheel, valves and valve timing. | Lecture Notes |
| 11-12 | Multi-Cylinder Engines | Engine balance, cylinders arrangement, firing order | TB1: 4 |
| 13-14 | Fuel Supply Systems | Air-fuel mixture requirements for SI engines, Carburetion; CI engine fuel injection systems and the latest trends. | RB1: 8 & 9 |

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| 15-16 | Lubrication and Cooling Systems | Engine friction, factors affecting the friction, lubrication systems and their mechanism; Need for cooling system, types, water jackets and radiators. | TB1: 6 |
| 17-20 | Transmission System | Clutch: location, types, construction; Gears: classification, gear ratio; Transmission: types, propeller shaft, universal joint, differential. | TB1: 9 & 11 |
| 21-23 | Brakes, Wheels & Tyres | Brake functions, classification; Wheel types; Tire types, tread and selection. | TB1: 12, 13 &  14 |
| 24-27 | Frame, Suspension & Steering Systems | Frame, chassis layout; Need for suspension system; and Steering functions. | TB1: 15 & 16 |
| 28-31 | Starting, Charging, Ignition & Lighting Systems | Starting motor, battery charging system ignition system, and lighting system. | TB1: 19, 20  &21 |
| 32-34 | Electronic Control Unit | Application of electronics and computers, sensors, actuators and on-board diagnostics. | Lecture Notes |
| 35-37 | Combustion & Advanced Systems | Combustion mechanism in SI and CI engines & their stages, Abnormal combustion; Direct injection spark-ignition engines (DISI), and Indirect injection CI engines. | Lecture Notes |
| 38-40 | Latest trends | Variable valve timing; Hybrid/fuel-cell/electrical vehicles; alternate/renewable/clean fuels and the emissions. | Lecture Notes |

1. **Evaluation Scheme**

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| **Evaluation Component** | **Duration** | **Weightage (%)** | **Date & Time** | **Nature of Component** |
| Mid semester exam | 90 Min | 25 | 16/03 11.30 - 1.00PM | CB |
| Quiz | 15 Min | 10 | Evenly spaced throughout the semester | OB |
| Assignment\*/Project\*/Seminar\* | - | 25 | Evenly spaced throughout the semester | OB |
| Comprehensive Exam | 180 Min | 40 | 15/05 AN | CB |

\* *Shall be decided based on the number of students registered in the course*.

1. **Chamber Consultation Hour**: To be announced in the class room.
2. **Notices**: All notices concerning this course shall be displayed only on the **CMS** students are advised to visit regularly (the institute’s web based course management system) for latest updates.
3. **Make-up Policy**: Make-up shall be given only to the genuine cases with prior confirmation.

**9.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 F484**