

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE-PILANI - HYDERABAD
CAMPUS
SECOND SEMESTER 2018 - 2019
(COURSE HANDOUT PART II)

Date:
07/01/2019

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.
3. **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.
4. **Course Plan:**

| 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 | TB1: 2 & 5 |

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|-------|---|---|------------------|
| | | engines, and engine performance evaluation. | |
| 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 |
| 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 |

5. Evaluation Scheme

| Evaluation Component | Duration | Weightage (%) | Date & Time | Nature of Component |
|----------------------|----------|---------------|-------------|---------------------|
| Mid semester exam | 90 Min | 20 | 12/3 | CB |

| | | | | |
|-------------------------------------|---------|----|-----------------|----|
| | | | 11.00 -12.30 PM | |
| Quiz | 15 Min | 10 | | CB |
| Assignment* /Project* / Seminar* | - | 30 | | OB |
| Comprehensive Exam | 3 hours | 40 | 03/05 AN | CB |

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

6. **Chamber Consultation Hour:** To be announced in the class room.
7. **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.
8. **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