**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE – PILANI, HYDERABAD CAMPUS**

**SECOND SEMESTER 2019-2020**

**(COURSE HANDOUT: PART**-**II)**

**Date: 06/01/2020**

In addition to Part-I (a general handout for all courses appended to the time-table), this handout provides the specific details of this course.

**Course No. : ME F484**

**Course Title : AUTOMOTIVE TECHNOLOGY**

**Instructor-in-charge : R. PARAMESHWARAN**

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.

1. **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.

1. **Text Books:**

T1. **Sudhir Kumar Saxena**, Automobile Engineering, University Science Press, 1stEdition, 2009

T2: **VAW Hillier**, Fundamentals of Motor Vehicle Technology, Vol 1 & 2, Nelson Thornes, UK, 6th

Edition, 2012

**Reference Books:**

R1. V. Ganesan, Internal Combustion Engines, Tata McGraw-Hill, 3rd Edition, 2007.

R2. Kirpal Singh, Automobile Engineering, - Vol. 1 & 2, Standard Publishers & Distributors, 12th Edition, 2011.

R3. N. K. Giri, Automobile Mechanics, Khanna Publishers, 8th edition, 2009.

1. **Course Plan**

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| --- | --- | --- | --- |
| **Lecture No.** | **Learning objectives** | **Topics to be covered** | **Chapter in the Text Book** |
| 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 |
| 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 |
| 38-41 | Latest trends | Variable valve timing; Hybrid/fuel-cell/electrical vehicles; alternate/renewable/clean fuels and the emissions. | Lecture Notes |

**5. Evaluation Scheme**

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| --- | --- | --- | --- | --- |
| **Evaluation Component** | **Duration (minute)** | **Weightage (%)** | **Date & Time** | **Nature of**  **Component** |
| Mid Semester Test# | 90 | 20 | 4/3 3.30 - 5.00 PM | CB |
| Assignments (Take Home and In-Class)\*/Project\*/Seminar\* | **---** | 30 | Will be conducted throughout the semester | OB |
| Quiz | 15 | 10 | To be announced in the Class | CB |
| Comprehensive Exam# | 180 | 40 | 08/05 AN | CB |

**NOTE:**

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

1. **Chamber Consultancy Hour:** To be announced in the class room.

1. **Notices:** All notices concerning this course shall be displayed on the CMS (the Institute’s web based course management system). Besides this, students are advised to visit regularly CMS for latest updates.

1. **Make-up Policy:** Make-up shall be given only to the genuine cases with prior confirmation. Request for the make-up tests, duly signed by the students, should reach the under signed well before the scheduled test.

1. **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**