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.

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 Books:

T1. **Sudhir Kumar Saxena**, Automobile Engineering, University Science Press, 1st Edition, 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.

4. Course Plan

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

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

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

7. **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.

8. **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.

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