BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE-PILANI - HYDERABAD CAMPUS

SECOND SEMESTER 2023 - 2024

(COURSE HANDOUT PART II)

Date: 09/1/2024

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 F484

Course Title: AUTOMOTIVE TECHNOLOGY

Instructor-in-charge: Prof. 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 E dition, 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

		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	25	15/03 - 4.00 - 5.30PM	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	17/05 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