BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
AUGS/ AGSR Division

SECOND SEMESTER 2020-21
COURSE HANDOUT (PART II)

Date: 17.01.2020

In addition to part I (General Handout for all courses appended to the Time table) this portion gives further specific details regarding the course.

Course No : **ME F441**
Course Title : **Automotive Vehicles**
Instructor-in-Charge : **Dr. Saket Verma**

1. Course Description:

Automotive vehicle systems, vehicle performance; internal combustion engines; analysis and design of vehicle components. Experimental or theoretical investigation of problems selected from the field of automotive vehicles. Brief description of electric and hybrid electric vehicles.

2. Scope and Objective of the Course:

This course has been designed to make the students familiar with the fundamentals of automotive vehicles. It deals with the principle of operation and performance of internal combustion engines, along with working, analysis and design of various components of automotive vehicles. In addition to that current development and future scope of automotive vehicles will also be discussed.

3. Text Books (T.B.):

1. Joseph Heitner, Automotive Mechanics – Principles and Practice, - Affiliated East West Press, 2nd edition, 1980.
2. N. K. Giri, Automotive Mechanics, Khanna Publishers, 1996.

4. Reference Books (R.B.):

1. J.B. Heywood, Internal Combustion Engine Fundamentals. Mc Graw Hill Book Co. New York. 1988.
2. V. Ganeshan, Internal Combustion Engines, Tata McGraw-Hill, 2nd edition, 2003.
3. Kripal Singh, Automobile Engineering, - Vol. I & II, Standard Publishers & Distributors, 1995.
4. Stan C. Alternative propulsion for automobiles. Springer; 2017

5. Course Plan:

Learning Objectives	No of Lecture Hour	Reference Chap./Sec.# (Book)
Introduction and Overview	**2**	**Class notes**
Thermodynamics of Prime Movers: Ideal air standard cycles, fuel-air cycles and actual cycle; ignition and combustion in spark ignition and diesel engines; construction of I.C. engines	**4**	**T.B. 1: Chapter 3, R.B. 1: Chapter 1, R.B. 2: Chapter 1-5**
Engine Design and Operating Parameters: Important engine characteristics; geometrical properties; brake torque, power and efficiencies, design and performance data.	**2**	**R.B. 1: Chapter 2, R.B. 2: Chapter 17**
The Air and Fuel System: Carburetion, engine mixture requirements, simple carburetor. calculation of air fuel ratio, fuel injection system in petrol and diesel engines	**4**	**T.B. 1: Chapter 8, T.B. 2: Chapter 3,**

		R.B. 2: Chapter 8-10
The Power Train: Flywheel**,** friction clutches, torque converters, transmissions and driveline, types of driving shafts and joints,	**7**	**T.B. 1: Chapter 14-20, T.B. 2: Chapter 5-6,**
The Cooling System: Variation of temperature distribution, theory of engine heat transfer and correlations, parameters affecting engine heat transfer, air-cooled systems, types of water-cooling systems radiators, fans	**3**	**T.B. 1: Chapter 10, T.B. 2: Chapter 2, R.B. 2: Chapter 14**
The Lubrication Systems: Causes of engine friction, function of lubrication, mechanism of lubrication, journal bearing lubrication, types of lubrication systems, lubrication of engine components.	**2**	**T.B. 1: Chapter 6, R.B. 2: Chapter 13**
The Braking System: Braking dynamics, brake system components, analysis of drum and disk brakes.	**2**	**T.B. 1: Chapter 21, T.B. 2: Chapter 8,**
The Suspension System: Suspension system components, suspension types and design	**2**	**T.B. 2: Chapter 4**
Engine Emissions and Control: Exhaust system, emissions from IC engines, emission norms, emission control strategies.	**4**	**T.B. 2: Chapter 13, R.B. 1: Chapter 11**
Advances in Automotive Vehicles: Modern IC engines and advances, hybrid electric vehicles, electric vehicles, fuel cell vehicles.	**6**	**R.B. 4: Chapter 4-5 Class notes**

6. Evaluation Scheme:

Component	**Duration (Minutes)**	**Weightage (%)**	**Date & Time**	**Nature of component (Close Book/ Open Book)**
Mid-Semester Test	90	30	TBA	Open Book
Projects and Seminars	-	20	Dates to be announced in the class	Open Book
Quiz	15	10	TBA	Open Book
Comprehensive Examination	120	40	11/05 FN	Open Book

7. Chamber Consultation Hour: Will be announced by instructor in the class.

8. Notices: Notices will be displayed in Nalanda. The students should also check their mails regularly.

9. Make-up Policy: Make-up will be given only to the genuine cases for Mid Semester and Comprehensive exams only. The request application for make-up test must reach the Instructor-in-charge one day before the commencement of scheduled test (documentary proof is essential).

10. Quizzes: There will be two quizzes. One based on the syllabus before Mid Semester and other based on the syllabus after Mid Semester. **No makeup in any circumstance for the objective quizzes**.

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