BITS PILANI, DUBAI CAMPUS
INSTRUCTION DIVISION
FIRST SEMESTER 2015 – 2016

Course Handout (Part – II)

Date: 02.09.2015

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

Course No. : ME F441 **(3 0 3)**
Course Title : Automotive Vehicles
Course Instructors : Dr. R. Udayakumar
Instructor-in-charge : Dr. R. Udayakumar

Scope and objective of the course:
This course has been designed to make the students familiar with the 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.

Course Pre/Co- requisite (if any)**& Catalogue / Bulletin Description:** *Given in the* Bulletin *2014 – 2015*

Study Material:
Text book(s) [TB]
i. Joseph Heitner, Automotive Mechanics – Principles and Practice, - Affiliated East West Press, 2nd edition, 1980.
ii. N. K. Giri, Automotive Mechanics, Khanna Publishers, 1996.

Reference book(s) [RB]:
a. V. Ganeshan, Internal Combustion Engines, Tata McGraw-Hill
b. Kripal Singh, Automobile Engineering, - Vol. I & II, Standard Publishers & Distributors.

Course plan:

S.No.	Learning Objectives	Topics to be covered	No: of Lectures	Reference to Text
01	Fuel-air cycles and actual cycle	Variable specific heats. Dissociation. Valve-timing diagram. Time loss factor. Heat loss factor. Exhaust blow down.	2	3TB1, 4&5RBa
02	Construction of I.C. engines	Piston. Piston rings. Cylinder. Crank. Connecting rod. Gaskets. Cylinder head.	1	3TB1, 2TB2
03	Combustion in S.I. engines	Flame front propagation. Factors influencing the flame speed. Rate of pressure rise. Knocking in SI engines.	2	12RBa
04	Combustion in C.I. engines	Delay period. Factors influencing the delay period. Knocking in CI engines. Effect of variables on knocking.	2	12RBa
05	Measurement and Testing	Tests for friction Power, Indicated Power, Brake Power, Fuel Consumption, Air Consumption,	2	16RBa
05	Carburetors	Carburetion. Engine mixture requirements. Simple carburetor. Calculation of air fuel ratio.	2	8TB1, 3TB2
06	Fuel injection system	Air injection system. Solid injection system. Injection pumps. Types of nozzles.	1	9RBa

07	Performance Parameters and Characteristics	Engine Power, Engine Efficiencies, Engine Performance characteristic, Variables affecting performance characteristics	2	17RBa
08	Supercharging & Turbocharging	Supercharger, Supercharging methods for SI and CI engines, Turbocharging, Supercharged Engine Performance Evaluation	1	19RBa
09	Clutch	Driving system and Plate clutch (uniform pressure and uniform wear).	2	14TB1, 5TB2
10	Gear box	Epicyclic or planetary gear (algebraic method and tabular method).	2	15TB1, 5TB2
11	Differential and rear axle	Differential. Rear axle. Axle shaft. Axle housing.	2	20TB1, 6TB2
12	Brakes	Theory of band brake, block brake, and band and block brake. Internal expansion brake.	4	21TB1, 8TB2
13	Steering systems	Ackerman steering gear. Devis steering gear. Turning circle radii.	2	22TB1, 7TB2
14	Propeller shaft	Types of driving shafts. Mechanics of Hotchkiss and torque tube drives.	2	20TB1, 6TB2
15	Universal joint	Slip joint. Hook's joint.	2	20TB1, 6TB2
16	Suspension System	Suspension system	3	4TB2
17	Tyres	Tyre construction and manufacturing, tyre design consideration	2	4TB2
18	Cooling systems	Need. Variation of gas temperature. Piston temperature distribution. Parameters affecting engine heat transfer. Air-cooled systems.	2	10TB1, 2TB2, 14RBa
19	Lubrication systems	Causes of engine friction. Function of lubrication. Mechanism of lubrication. Journal bearing lubrication.	2	6TB1, 13RBa
20	Emission Control	Emission sources, emission control norms	2	13TB2
		Total	42	

Evaluation Scheme:

EC No	Evaluation Components	Duration	Weightage	Date & Time	Venue
1	Test-I (Closed book)	50 minutes	25%	04-10-15 Su2	To be announced
2	Quiz-1 (Closed book)	20 minutes	8%	26-10-15 M6	
3	Test - 2 (Open Book)	50 minutes	20%	17-11-15 T2	
4	Quiz - 2 / Seminar (Closed book)	20 minutes	7%	To be announced	
5	Compre Exam (Closed book)	3 hours.	40%	30-12-15 AN	

Learning outcomes:

1.At the end of the course, the students would be to explain the complete working of the automobile with all its subsystems.

2. The students would be able to design the gear boxes, clutches and the other transmission elements from the fundamentals.

3.The students would be able to design the suspension system for the automobile from the fundamentals.

4.The students would be able to list all the major emissions from the automobile and explain the hazards of such emissions and the various methods to control such emissions.

Mid-Sem Grading:
Mid-Sem grading will be displayed after two evaluation components. (Refer Academic calendar for schedule).
Note: A student will be likely to get "NC", if he / she doesn't appear / appear for the sake of appearing for the evaluation components / scoring zero in pre-compre total.
Makeup and Attendance policies:

Make-ups: are not given as a routine. It is solely dependent upon the genuineness of the circumstances under which a student fails to appear in a scheduled evaluation component. In such circumstances, prior permission should be obtained from the Instructor-in-Charge (I/C).Students with less than 60% of attendance will not be allowed to avail the make-ups. The decision of the I/C in the above matter will be final.
Attendance: Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course. A student should have a minimum of 60% of attendance in a course to be eligible to appear for the Comprehensive Examination in that course. For the students under the purview of Academic Counseling Board (ACB), the Board shall prescribe the minimum attendance requirement on a case-to-case basis. Attendance in the course will be a deciding factor in judging the seriousness of a student which may be directly / indirectly related to grading.
General timings for consultation:
The chamber consultation hour is Th3, during which the student can contact the instructor for consultation.
General instructions:
Students should come prepared for classes and carry the prescribed text book(s) or material(s) as advised by the Course Faculty to the class.
Notices:
All notices concerning the course will be displayed on the respective Notice Boards.

Instructor-in-Charge
ME F311

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