

Branch Name:	Automobile Engineering
Program Code:	ET408
Course Title:	Recent Trends in Automobile
Course Code:	2ET4080404
Pre-requisite Course:	-----

Course Objectives:

1. To understand the supercharger, turbocharger and various advance engine technologies.
2. To understand the automatic transmission system in vehicle.
3. To understand advance vehicle lighting system and driver assist technologies.
4. To understand the green fuels.
5. To understand various crash test carried out on vehicle for safety.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	Advancement in engine system. • Requirement, function and working of engine management system. - Speed density method. - Closed loop lambda control. • Basic principle of force induction system. • Construction detail and working procedure of force induction system. - Supercharger. - Turbocharger, turbolag, wastegate valve, variable geometry turbocharger, twin turbocharger. • Introduction in brief following advance engine technology. - DTSI - TSI - TDI - HCCI Engines – construction and working - VVT-i (Variable Valve Timing intelligent)	05	18
2	Advancement in Transmission system • Introduction and types of automatic transmission system. • Basic working principle and construction details of epicyclic gearbox. • Basic working principle and constructional details of Continuous Variable Transmission (CVT). • Basic working principle and constructional details of the following electronic control based automatic transmission technology: - DSG (Direct Shift Gearbox) - AGS (Auto Gear Shift) with ordinary clutch system. - AGS (Auto Gear Shift) with torque convertor. • Function and working mechanism of following electronic control based modern vehicle braking and control technologies. - Antilock Braking System. - Electronic Brake Force Distribution with Antilock Braking System (EBD + ABS). - Automatic Emergency Braking System (AEB). - Hill Hold and Hill Decent Control system. - Traction control system • Introduction of the vehicle electronic stability control system. • Introduction in brief about run flat tyre.	06	22

3	Advancement in Electrical and Electronics system - Function and working of following modern vehicle starting system - Brushless ACG starter system. (silent/noiseless engine starting system). - Engine keyless (button) start/stop system. - Ideal engine start-stop system. - remote vehicle ignition system (starting system). - Function and working of following advance vehicle lighting system. - HID (High Intensity Discharge) head light. - Automatic head lamps. - LED fog light. - Adaptive LED front head light system. - High beam assist system. - LED turn indicators, backlight warning light system. - Describe working and function of driver assists technology and features available in the modern vehicle.	05	15
4	Green fuels - Describe working and operation of Compress natural Gas based fuel supply system, flex-fuel technology and hydrogen-based fuel-cell technology. - Identify parts and components of Compress natural Gas based fuel supply system, flex-fuel technology and hydrogen based fuel-cell technology and define the purpose of each. - State importance and advantages of adopting low greenhouse gas emission based alternative fuel supply system for SI and CI engine.	07	25
5	Vehicle safety system - State importance of vehicle safety. - Classify vehicle safety and parameter related to vehicle safety. - List various vehicle crash test agencies, vehicle safety standards and safety rating. - Interpret vehicle safety rating and classify vehicle on based of safety rating. - Describe working of vehicle safety system and various components like airbag and seat belt etc. - State importance of ISOFIX for child occupant safety.	05	20

List of Practical:

1. Compare natural aspire engine and turbocharged engine for same cylinder capacity on basis of engine power, torque, fuel efficiency and prepare engine specification list.
2. Interpret working procedure of the gear shift knob and link mechanism used in epicyclic, CVT, DSG and AGS gearbox.
3. Compare working and performance of hydraulic/pneumatic braking system with and without the Anti-Lock Braking (ABS) system.
4. Select any one Indian car manufacturer brand and model, prepare the list of latest features available in the car. Prepare brief report regarding any five features of the car.
5. Describe any one Indian car manufacturer brand and model crash test safety rating according to Global NCAP car crash test data and learn to interpretate test result.
6. Compare advantages and limitations of petrol/diesel, flexfuel and hydrogen-based fuel-cell technologies in-terms of performance, adaptability, affordability, impact on reduction of greenhouse emission gases etc.
7. Draw the layout, installation and working procedure of sequential, indirect and direct CNG fuel supply system.

Reference Books:

1. Automobile Mechanics William Crouse Tata Mc-Graw Hill Publication
2. Automotive Technology James Halderman Pearson Publication
3. Automobile Electrical and Electronic Systems Tom Denton Routledge, 2017,5th edition,
4. Alternative Fuels S. S. Thipse Jaico Publishing House
5. Advanced Vehicle Technology Heinz Heisler Butterworth Heinemann
6. Modern Vehicle Technology James E. Duffy Goodheart-Willcox

List of Open-Source Software/learning website:

1. <https://www.howacarworks.com>
2. <https://swayam.gov.in>
3. <https://auto.howstuffworks.com>
4. <https://nptel.ac.in>
5. <https://tinyurl.com/4w73a254> for video link
6. <https://tinyurl.com/5n93f6xv> for web link

Course Learning Outcomes (CLO):

1. Describe engine management system and various advance engine technology.
2. Describe advance vehicle transmission, braking and control system and technologies.
3. Describe advance vehicle starting, lighting, infotainment, communication and driver assists technologies.
4. Compare working mechanism of Compress Natural Gas (CNG), flex-fuel and hydrogenbased fuel cell.
5. Describe importance of vehicle crash test and safety system.

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M	M	L		M				L			L	M	M	L	
CLO2	L	M	M	L								M	M	L	M	
CLO3	L		L	L	M				M				L		M	
CLO4	M	M	M	M			L		M			L	M	L		
CLO5	M	M	L	L					L				L	M	L	

H: High, M: Medium, L: Low