	Title of the Subject: Emerging Technology in Automobile	Sem:7			Code: UAU731N			Credits: 3					PSO		
													1	**2**	**3**
	Programme Outcomes / **Course Outcomes**	**Engineering knowledge**	**Problem analysis:**	**Design/development of solutions**	**Conduct investigations of complex problems**	**Modern tool usage:**	**The engineer and society:**	**Environment and sustainability:**	**Ethics:**	**Individual and team work**	**Communication:**	**Project management and finance:**	**Life-long learning:**	**Apply engineering basic knowledge with modern computing tools in solving problems of design, production and servicing domains**	**Mould and develop engineers to serve in industries as professionals or entrepreneur**	**Prepare engineers to undertake research and higher learning**
1	Apply the basics of Automotives to emerging technology	2	2	1	1		1						1	2	2	2
2	Ability to analyze and apply concepts of advancements in Brakes, steering and MPFI etc	2	2	1	1		1						1	2	2	2
3	Analyze and demonstrate contemporary technology related to emission control	2	2	1	1		1						1	2	2	2
4	Evaluate and apply vehicle safety techniques and impact	2	2	1	1		1						2	2	2	2

(All branches)

OPEN ELECTIVE
UAU731N: Emerging Technology in Automobiles
3 Credits (L-T-P: 3-0-0)

UNIT – I **10 HOURS**

HYBRID / ELECTRICAL VEHICLES: Fundamentals, need for EVs, types of drives, batteries used for EVs, different electrical motors used for EVs. Charging systems, performance of EVs. Electrical vehicles in India and their specifications. Architecture of electric drive train. Comparison with respect to conventional power train.
FUEL CELLS: Operating principles, types and characteristics.

UNIT – II **10 HOURS**

ENGINE MANAGEMENT SYSTEMS: Introduction, automotive fuel flow systems, electronic petrol and diesel injection systems. MPFI engines; construction, working and applications.
TURBO CHARGING SYSTEMS: Need, utility, application types of turbo charging systems merits limits Introduction alternative fuels for power plant for automobiles.

UNIT – III **10 HOURS**

ADVANCEMENTS IN AUTOMOBILES: Variable compression ratio engine, multi valve engines, electronic power steering, anti-roll bars and OBD. Vehicle safety systems; air bags, ABS,EBD, TCS and ESP.
AERODYNAMICS: Necessity, significance and applications to surface, ambient and aero-transportation systems.
Introduction to guided vehicles, autonomous vehicles and computer aided vehicle navigational system.

UNIT – IV **10 HOURS**

AUTOMOTIVE EMISSIONS AND CONTROL: Automotive emissions; petrol and diesel engine emissions; pollutants, reasons, effects of emissions. Emission norms.
Emission control measures: Catalytic converter; need, working and types. PCV systems, EGR systems, diesel particulate filters.
ALTERNATIVE FUELS: Need, availability, merits and demerits. Alcohol fuels, natural gas, biomass and hydrogen energy.

TOTAL: 40 HOURS

Text books:

1. Electric And Hybrid Vehicles, Gianfranco, Elsevier
2. Engine Emissions Fundamentals And Advances In Control, B P Pundir, Narosa Books
3. I C Engines, M L Mathur, R P Sharma, Dhanpat Rai Publications
4. Automotive Mechanics, W H Crouse, Anglin, Tata Mcgraw Hill