Course Code	Course Name	Credits
MEDLO7033	**Vehicle Systems**	**03**

Objectives:

1. To study basic and advanced vehicle systems
2. To study basic and advanced vehicle electrical systems
3. To study different chassis structures components.
4. To familiarize with the latest technological developments in automotive technology

Outcomes: Learner will be able to

1. Understand the working of different Vehicle Systems and Subsystems.
2. Understand the working of different Vehicle Electrical systems and subsystems.
3. Understand different Vehicle Body systems and layouts.
4. Illustrate working, functions of different vehicle mechanical, electrical, and chassis systems.
5. Understand the effect of aerodynamics on the functioning of a vehicle.
6. Comprehend the different technological advances in vehicle systems.

Module	Details	**Hours**
1.	**Power Flow Layout:** FE FWD,FE RWD,RE FWD,RE RWD, Underfloor Engine **Clutches:** Necessity of clutch in a automobile, Working and Construction of Single plate, Multi plate, Centrifugal, Semi Centrifugal, electromagnetic clutches, Fluid Flywheel **Transmission**: Purpose and Elements of Gear Box, Characteristic Curves, Types- Sliding mesh, Constant Mesh, Synchromesh, Planetary Gear set, Torque Converter, Semi-Automatic and Automatic **Drive Line**:	**08**

	UV joint, CV joint, Propeller Shaft construction and arrangement, Elements of drive line,2WD,4WD,Part time and Full time 2WD and 4WD.	
2.	**Final Drive** Types of Final drive; spiral, bevel, Hypoid and worm drives. **Differential** Necessity of differential, Working of differential, Conventional and non-slip differential. **Axles** : Types of live axles; semi, three quarter and full floating axles. Types of Front Stub Axles; Elliot, Reverse Elliot, Lamoine and Reverse Lamoine **Steering**: Requirement, Types of Steering Gear Box, Steering Geometry, Wheel Alignment and Wheel balancing, Power Steering **Brakes**: Principle, Types; Hydraulic, Air, Electric, Exhaust, Regeneration ,Brake lining materials, ABS, EBD	**08**
3.	**Suspension**: Requirement and Types-Independent, Dependent, Air. Types of Shock absorbers ,Leaf spring types **Wheels and Tyres**: Tyre requirement, tire characteristics, Constructional detail, , tyre dimensions and specifications, Types of wheels and Hubs	**06**
4.	**AUTOMOTIVE ELECTRICAL SYSTEMS** **Batteries**: Construction, Types: Lead Acid, Alkaline,Nickel Metal Hydride, Lithium Ion, Battery Ratings, Battery Charging **Starting:**	**08**

	Requirement, Starter Motor Drives, cold cranking Amperes **Charging:** Requirement, Principle and Construction of Dynamo and Alternator **Ignition:** Mechanical and Electronic Ignition and Electronic Engine Control **Lighting and Wiring:** Types of Lamps, Gauges, Cable Sizes, Color Codes, Multiplex Wiring systems **Accessories:** Electric Horn, Wipers, Fuel Pumps, Power operated windows, Fuel Gauges, OBD systems	
5.	**Body Engineering:** Chassis types and Structure types-Open, Semi Integral and Integral, Loads acting on chassis, Basic Dimensions and Visibility **Vehicle Aerodynamics :** Aerodynamic drag: Aerodynamic lift and Pitching moments, Side force, Yawing & Rolling moments.	**06**
6.	**Recent Technological Developments in Automobile:** Telematics, Intelligent Vehicles systems,V2V and V2I communication. Scope of AI in Automobile Vehicle	**03**

Assessment:

Internal Assessment for 20 marks:

Consisting **Two Compulsory Class Tests**

First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination:

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total **six questions, each carrying 20 marks.**
2. **Question 1** will be **compulsory** and should **cover maximum contents of the curriculum.**
3. **Remaining questions will be mixed in nature** (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only **Four questions need to be solved**.

Text Books:

1. Automobile Engineering, Kirpal Singh, Vol I & II, Standard publishers Distributors ,Delhi
2. J Powloski, "Vehicle Body Engineering", Business Books Ltd., London
3. Automobile Mechanics, N. K. Giri, 8thEdition, Khanna Publishers
4. P. L. Kohli, "Automotive Chassis & Body", Papyrus Publishing House, New Delhi.
5. Tom Denton,Automobile Electrical and Electronics System,Elsevier Third Edition,2003

Reference Books :

1. John Fenton, "Vehicle Body Layout & Analysis", Hutchinson, London.
2. Bosch Automotive HandBook, 6thEdition, SAE Publications
3. Automotive Mechanics by William H. Crouse and Donald L. Anglin, 10th Edition, McGraw Hill

Links for online NPTEL/SWAYAM courses:

1. https://nptel.ac.in/courses/107106088
2. https://nptel.ac.in/courses/107103084
3. https://nptel.ac.in/courses/113106082