TEACHING PLAN: MECHANICAL VIBRATION

SCHOOL OF ENGINEERING AND TECHNOLOGY		**ACADEMIC SESSION: 2022-23**		**FOR STUDENTS' BATCH:2020-2024**	
1	**Course code**	**PCC-ME 310**			
2	**Course Title**	**Automobile Engineering**			
3	**Credits**	**3**			
4	**Learning Hours**	**Contact Hours: 12** **Practical Teaching: 0** **Project, Tutorial, and Assessment: 10** **Total hours: 22**			
5	**Course Objective**	i. To study the basics of principles of actual automobile systems. ii. To study the importance and features of different systems like the axle, differential, brakes, Steering, suspension, balancing, etc. iii. To study the working of various Automobile Systems			
6	**Course Outcomes**	The student will be able to CO1:Identify the different parts of the automobile CO2: Explain the working of various parts like engine, transmission, clutch, Brakes CO3: Describe how the steering and the suspension systems operate. CO4: Understand the environmental implications of automobile emissions CO5: Develop a strong base for understanding future developments in the automobile industry			
7	**Outline syllabus:** Introduction to Automobiles, Clutches, Power Transmission, Suspension Systems, Steering System, Automotive Brakes, Tyres & Wheels				
7.01	**Paper Code**	**Unit**	**Introduction**	**Reference number**	**Teaching methods**
	PCC-ME-311	(I)	Introduction to Automobiles: Classification, Components, Requirements of Automobile Body; Vehicle Frame, Separate Body & Frame, Unitized Body, Car Body Styles, Bus Body & Commercial Vehicle Body Types; Front Engine Rear Drive & Front Engine Front Drive Vehicles, Four Wheel Drive Vehicles, Safety considerations; Safety features of the latest vehicle; Future trends in automobiles.	Automobile Engineering by Sudhir Kumar Saxena laxmi publication Pvt ltd. Page no: 1-26	Whiteboard, PPT slides, Tutorials
		(II)	Clutches: Requirement of Clutches – Principle of Friction Clutch – Wet Type & Dry Types; Cone Clutch, Single Plate	Automobile Engineering by Sudhir Kumar	Whiteboard, PPT slides, Tutorials

			Clutch, Diaphragm Spring Clutch, Multi-plate Clutch, Centrifugal Clutches, Electromagnetic Clutch, Over Running Clutch; Clutch Linkages. Power Transmission: Requirements of the transmission system; General Arrangement of Power Transmission system; Object of the Gear Box; Different types of Gear Boxes; Sliding Mesh, Constant Mesh, Synchromesh Gear Boxes; Epi-cyclic Gear Box, Freewheel Unit. Overdrive unit-Principle of Overdrive, Advantage of Overdrive, Transaxle, Transfer cases.	Saxena Laxmipublication Pvt ltd. Page no: 80-93	
		(III)	Drive Lines, Universal Joint, Differential and Drive Axles: Effect of driving thrust and torque reactions; Hotchkiss Drive, Torque Tube Drive, and radius Rods; Propeller Shaft, Universal Joints, Slip Joint; Constant Velocity Universal Joints; Front Wheel Drive; Principle, Function, Construction & Operation of Differential; Rear Axles, Types of load coming on Rear Axles, Full Floating, Three-quarter Floating, and Semi Floating Rear Axles. Suspension Systems: Need of Suspension System, Types of Suspension; factors influencing ride comfort, Suspension Spring; Constructional details and characteristics of leaf springs.	Automobile Engineering by Sudhir Kumar Saxena laxmi publication Pvt ltd. Page no: 115-127, 179-204,1-9	Whiteboard, PPT slides, Tutorials
		(IV)	Steering System: Front Wheel geometry & Wheel alignment viz. Caster, Camber, Kingpin Inclination, Toe-in/Toe-out; Conditions for true rolling motions of Wheels during steering, Different types of Steering Gear Boxes; Steering linkages and layout; Power steering – Rack & Pinion Power Steering Gear, Electronics steering.	Automobile Engineering by Sudhir Kumar Saxena laxmi publication Pvt ltd. Page no: 163-179	Whiteboard, PPT slides, Tutorials
		(V)	Automotive Brakes, Tyres & Wheels: Classification of Brakes; Principle and constructional details of Drum Brakes, Disc Brakes; Brake actuating systems; Mechanical, Hydraulic	Automobile Engineering by Sudhir Kumar Saxena laxmi publication Pvt ltd. Page no: 137-152	Whiteboard, PPT slides, Tutorials

8	**Course Evaluation**	
8.10	**CA: 20%**	
8.1	**Attendance**	10%
8.12	**Homework**	10%
8.13	**Quizzes**	-

8.14	**Projects**	-
8.15	**Presentation**	-
8.16	**Any other**	-
8.2	**MTE(IA)**	20%
8.3	**End-term examination: 60%**	
9	**Text Books & References**	
9.1	**Text books**	1. Automobile Engineering by Anil Chhikara, Satya Prakashan, New Delhi. 2. Automobile Engineering by Dr.Kirpal Singh, standard Publishers Distributors. 3.Automobile Engineering by D.S.Kumar, S.K.Kataria and Sons, New DelhiMechanicalEngineering 4. Automobile Engineering by Sudhir Kumar Saxena laxmi publication Pvt ltd.
9.2	**References**	1. Rajput, R. K. A text book of automobile engineering. Firewall Media, 2008. 2. Kumar, D. S., and M. Nalla Mohamed. "Automobile engineering." New Delhi: SK Kataria& Sons (2015). 3.Tripathi, Kartikeya. "A novel approach for enhancement of automobile clutch engagement quality using mechatronics based automated clutch system." Journal of The Institution of Engineers (India): Series C 94.1 (2013): 9-20. 4. Breuer, Bert J., and Karlheinz Bill. Brake technology handbook. Vol. 375. SAE Technical Paper, 2008.
9.3	**Video References**	https://nptel.ac.in/courses/107106088

Mapping of Outcomes v. Topics

Course Outcome	**Program Outcome**												**PSO**			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	2	2	2	3	2	1	2	2	2	3	3	3	3	2
CO2	3	3	3	3	2	2	3	1	2	2	3	3	3	3	3	2
CO3	3	3	3	3	2	2	2	1	2	2	2	3	3	3	3	2
CO4	2	3	3	2	2	2	3	2	2	3	3	3	3	3	3	2
CO5	3	3	3	3	2	2	3	1	2	2	3	3	3	3	3	2

QUESTION BANK

1. Define Automobile. Give the typical specifications of an automobile
2. Sate the difference between carburettor and fuel injector
3. What are the advantages of diesel engines in cars?

4. Why petrol engines are preferred for two wheelers?
5. Why not diesel engines are not preferred in commercial?
6. State the advantage of Uni body construction over Body on frame.
7. State the advantage of front engine rear wheel drive.
8. Differentiate between front wheel drive and rear wheel drive.
9. Where and why four-wheel drives is used?
10. Define chassis, frame, body and suspension
11. What is chassis? How its design is related to vehicle aerodynamics?
12. List of the forces acting on a chassis frame
13. What are the functions of frame?
14. Why is the frame narrow at front?
15. What are the stresses to which the frame members are subjected to?
16. What are the types of frames?
17. State the requirements of bodies for various types of vehicles.
18. Differentiate between Coupe and Sedan car body types.
19. Name the different kind of resistances to vehicle motion
20. State the factors that affect the rolling resistance of a vehicle.
21. What is the need for gearbox in an automobile?
22. State the function of a clutch.
23. What is the material used for construction of piston and piston ring.
24. State the function of flywheel.
25. Differentiate between BoF vs UNI body construction of a Vehicle.
26. Explain integral and semi-integral type vehicle body construction.
27. Explain with suitable reasons for usage of front engine rear wheel drive for most of the Vehicle layout
28. Explain about all wheel drive with suitable sketch
29. Draw a simple sketch of a solid frame with front engine and rear drive. Locate major components of the engine on the frame.
30. What are the different loads acting on chassis and explain briefly?
31. Discuss the factors that affect the resistances to vehicle motion