FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Automobile Engineering)**

Semester: **III**

Course Code: **202010301**

Course Title: **Automobile Systems-I**

Course Group: **Professional Core Course**

Course Objectives: The course aims to impart basic skills and understanding of automobile transmission and driveline systems with basic components their working principle, classification, performance characteristics.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	50 / 18	25 /9	50 / 17	25 / 9	150 / 53

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Automobile Basics:** History, Components, Classification, Vehicle Layouts: Front engine & front wheel drive, front engine & rear wheel drive, rear engine & rear wheel drive and four wheel drive	05
2	**Clutch:** Requirements, Principle, Type of dry friction clutches: Single plate (helical spring & diaphragm type), Multi plate, Cone, Semi-Centrifugal, Centrifugal clutches, Clutch operations: Mechanical, electromagnetic, hydraulic, Comparison of dry and wet type clutch, Friction lining material, Clutch Components, Fluid flywheel.	06
3	**Manual Transmission:** Functions, Necessity and types of transmission system, Objective of the Gear Box, Gear ratios, Types of gear boxes: Sliding mesh, Constant mesh, Synchromesh, Double declutching, Gear selector mechanism, Transfer case.	07

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4	**Semi-automatic and Automatic transmission:** Epicyclic gear box, Freewheel unit, Torque converter, Overdrives, Continuously variable transmission & its types, Types of Automated manual transmission, Comparison of various transmissions, Automatic transmission applications: Turbo glide Transmission, Power glide Transmission, Automatic Transmission with Intelligent Electronic controls system, Hydraulic Actuation system.	**10**
5	**Hydrostatic drive:** Principle, Types, Advantages, Limitations, Comparison of hydrostatic drive with hydrodynamic drive, Construction and working of typical Janny hydrostatic drive.	**05**
6	**Propeller shaft and final drive:** Propeller shaft, Half shafts, Universal joints, Constant Velocity joints, Final drive & its types: Bevel, Hypoid, Worm and worm wheel, Driveline arrangement: Rear-wheel drive and front-wheel drive layouts, Front-wheel drive shafts.	**06**
7	**Differential and rear axles:** Differential, Rear axle, Types of drive as torque tube and hotchkiss drive, Fully or semi-floating and three-quarter floating axle, Rear axle casings, Tandem axle drive for heavy vehicles, Drive lines for public service vehicles.	**06**

List of Practicals / Tutorials:Click or tap here to enter text.

1	Demonstration of different vehicle layouts.
2	Demonstration of different types of clutch.
3	Dismantling and assembling of the manual transmission.
4	Demonstration of semi-automatic transmission.
5	Demonstration of hydrodynamic drive.
6	Demonstration of applications for automatic transmissions.
7	To study about hydrostatics drive.
8	Demonstration of propeller shaft and final drive.
9	Dismantling and assembling differential and rear axle.
10	Demonstration of tandem axle drive for heavy vehicles.

Reference Books:

1	Vehicle and Engine Technology by Heinz Heizler, SAE Publications.
2	Light and Heavy Vehicle Technology, M.J. Nunney, Elsevier.
3	Crouse. W.H., Anglin., D.L., Automotive Transmission and Power Trains construct, McGraw-Hill.
4	Newton Steeds & Garrot, Motor Vehicles, SAE International and Butterworth Heinemann.
5	Automotive mechanics by W. Crouse, TMH.
6	Automobile Engineering Vol-I & II by Dr. K.M. Gupta.
7	Automobile Engineering, Vol-I & II by Dr. Kirpal Singh.

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8	Automobile engineering by GBS Narang.
9	P S Gill, Automobile Engineering Vol-II, S K Kataria & Sons.
10	Automobile Mechanics by N K Giri.

Supplementary learning Material:	
1	NPTEL Resources

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment

Internal Evaluation :

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
25%	25%	25%	20%	5%	0%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the various vehicle layouts.	**10**
CO-2	Understand the functions of different types of clutches.	**30**
CO-3	Understand types of manual gear boxes.	**20**
CO-4	Understand constructional details, comparison of different types of drives such as hydrostatic and hydrodynamics drives.	**15**
CO-5	Understand the driveline system.	**25**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2027

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