



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Automobile Engineering

Course / Subject Code: DI03002031

Course / Subject Name: Automobile Transmission & Mechanism

w. e. f. Academic Year:	2024-25
Semester:	3 rd
Category of the Course:	PCC

Prerequisite:	NIL
Rationale:	The power developed by automobile engines is transmitted to the wheels through many parts & mechanisms such as clutch, gear Box, propeller shaft and differential. The entire system is called power transmission mechanism in automobiles. It is therefore essential for automobile engineers to acquire knowledge of vehicle layout, transmission systems, suspension systems and stability control systems of automobiles. This course is helpful for learners to understand fundamentals of transmission system, identifying and locating components of automotive transmission system. This course is pre-requisite for maintenance and service-II.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Identify various layouts of Chassis-Frame and related power train system.	R & U
02	Explain the construction and working of the power train system.	R & U
03	Describe need and working of driveline components and various axle assemblies.	U & A
04	Explain the construction and operation of direction and stability control system.	R & U
05	Explain construction and operation of comfort and stability systems.	R & U

*Revised Bloom's Taxonomy (RBT)

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Automobile Engineering

Course / Subject Code: DI03002031

Course / Subject Name: Automobile Transmission & Mechanism

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to the Automobile Transmission System 1.1 Necessity of power transmission system of automobile vehicle. 1.2 Classification of power transmission layout based on: (a) Engine location. (b) Power output of axle. 1.3 Advantages and disadvantages of various power transmission systems. 1.4 Introduction of Chassis. (a) Classification of chassis. (b) Bus/Truck chassis. (c) Ladder chassis (d) Frame less chassis. 1.5 Introduction of Frame. (a) Classification of Frame. -Conventional, semi-integral and integral type, sub frame. (b) Various types of cross section are used in frame channel, box and tubular section. (c) Load acting on frame. (d) Material for frame. 1.6 Differentiate chassis and frame.	8	18%
2.	Power Transmission- (Clutch and Gearbox) 2.1.Necessity and requirement of clutch and gearbox. 2.2.Construction and functions of different types of clutches. - Single plate clutch, multiplate clutch and centrifugal clutch. 2.3.Construction detail of clutch plate and clutch lining materials. 2.4.Working of clutch actuating mechanism. - Mechanical, vacuum and hydraulic. 2.5.Principal, construction and working of fluid coupling. 2.6.Construction and functions of sliding mesh, constant mesh, synchromesh gearbox. 2.7.Working of gear shifting mechanism. 2.8.Torque converter and overdrive- construction & working.	10	22%



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Automobile Engineering

Course / Subject Code: DI03002031

Course / Subject Name: Automobile Transmission & Mechanism

	2.9.Construction and working of transfer case. 2.10 List the various types and grade, rating of lubricating oil used for gear box.		
3.	Driveline and Axles (Front and Rear Axles) 3.1.Propeller shaft necessity (requirements), construction, function and its types. 3.2.Universal Joint necessity, construction, function and its types. 3.3.Final drive necessity, construction, function and its types. 3.4.Differential necessity, construction and working. 3.5.Types of front axle. 3.6.Rear axle function and its types. 3.7 Different types of axles mounting.	9	20%
4.	Direction and stability control systems of vehicles (Steering and Braking systems) 4.1.Necessity of steering geometry. 4.2.Describe Steering terminology: kingpin inclination, camber, caster, toe-in and toe-out. 4.3.Types of steering linkages and steering gears. 4.4.Effect of under & over steering, steering lock and turning circle radius. 4.5.Construction and working of power steering systems. - Hydraulic, electrical & electronics controlled. 4.6.Necessity and working principle of braking system. 4.7.Types of brakes- its Construction and working, Braking Mechanism, 4.8.Friction material and its characteristic 4.9.Properties of brake fluid.	9	20%
5.	Comfort and stability systems of vehicles (Suspension system, Wheel and Tyers) 5.1 Necessity of suspension system in vehicle. 5.2 Types of springs use in suspension system. 5.3 Construction and functions of various types of suspension system. 5.4 Construction and functions of shock absorber. 5.5 Various types of wheel rims and its features. 5.6 Concept of tyre aspect ratio 5.7 Construction and application of wired spoke, disc and alloy wheels	9	20%



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Automobile Engineering

Course / Subject Code: DI03002031

Course / Subject Name: Automobile Transmission & Mechanism

	5.8 Constructional details of tube and tubeless tyres. 5.9 Tyre rating and specification. 5.10 Types of tyre tread pattern. 5.11 Tyre rotation procedure. 5.12 Tyre recycling, benefits and ways to dispose.		
	Total	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
42	42	16	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Automobile Mechanics	William Crouse	Tata Mc-Graw Hill Publication ISBN-13:978-0-07-063435-0
2	Automotive Technology	James D Halderman	Pearson Education ISBN-10: 0-13-254261-7 ISBN-13: 978-0-13-254261-6
3	Automobile engineering	R B Gupta	Satya Prakashan, New Delhi ASIN: B077PT44VV ISBN: 9788176848589, 8176848581
4	Automobile engineering	K. M. Gupta	Umesh Publication ISBN: 818811422005
5	Automobile Engineering: Volume 1	Dr. Kirpal Singh	Standard Publishers ISBN-13: 978-8180141966
6	Automobile Engineering	Jain K K Asthana	McGraw Hill Education, New Delhi ISBN: 978-0-07-044529-1



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Automobile Engineering

Course / Subject Code: DI03002031

Course / Subject Name: Automobile Transmission & Mechanism

(b) Open source software and 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/mr29c4x8> for video link
6. <https://tinyurl.com/4azv8h47> for web link

Suggested Course Practical List:

S. No	Practical Outcomes (PrOs)	Unit No.		Approx. Hrs. required
1	Classify various types of chassis & frames and draw different types of layouts for power flow from engine to wheels.	1		2
2	Identify vehicle layout and chassis of given vehicle.	1		2
3	Identify various parts/ components of an automobile clutch and illustrate its working mechanism for given clutch.	2	Any Two	4
4	Identify various parts/ components of an automobile gearbox and illustrate its working mechanism for given gear box.	2		4
5	Draw power flow line diagram for forward and reverse gear of 5+1 synchromesh gear box.	2		4
6	Illustrate working of overdrive and differential.	2,3		4
7	Identify various parts / components of propeller shaft and universal joints and illustrate its working mechanism.	3	Any One	4
8	Identify various parts/ components of axles and illustrate its working mechanism for given axle. (live axle and Dead axles).	3		4
9	Identify various parts/ components of steering system and steering geometry and illustrate its working mechanism for given steering system.	4		4
10	Identify various parts/ components of hydraulic brake system and illustrate its working mechanism.	4	Any one	4
11	Identify various parts/ components of air/vacuum brake system and illustrate its working mechanism.	4		4



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Automobile Engineering

Course / Subject Code: DI03002031

Course / Subject Name: Automobile Transmission & Mechanism

12	Identify various parts/ components of suspension system and illustrate its working mechanism for given suspension system.	5		4
13	Identify various parts/ components of different type of wheels & tyres and compare according to its uses.	5	Any one	2
14	Understanding tyre specifications and tyre size and identify suitable specification on wheels and tyres of a given vehicle.	5		2
Total Hrs.				30

List of Laboratory/Learning Resources Required:

1. Cut section /Demonstration model of powertrain assembly with chassis and frame assembly.
2. Cut section /Demonstration model of different types of clutch assembly
3. Cut section /Demonstration model of different types of gear box units (sliding mesh, constant mesh, synchromesh gearboxes)
4. Cut section /Demonstration model of overdrive and differential assembly.
5. Cut section /Demonstration Model of Propeller shaft and different universal joints.
6. Cut section /Demonstration model of front and rear axle assembly.
7. Cut section /Demonstration model of Steering linkages mechanism (Power steering)
8. Cut section /Demonstration Model of different types of Brake (Drum, Disc, hydraulics and Air brake)
9. Cut section /Demonstration Model of Suspension system (shocks absorber, coil spring, leaf spring, etc.)
10. Cut section /Demonstration Model of different types of wheel and tyre assembly.

Suggested Project List:

1. Prepare charts on different automobile transmission system with construction and working.
2. Comparative study on Rim and tyres (Ply rating) used in vehicle. (Parameter–specification, price, etc. of 2-Wheeler, 3-Wheeler, LMV and HMV.)
3. Prepare Layout/Chart on construction details of different types of tyres.
4. Comparative study on Clutch and clutch mechanism used in vehicle. (Parameter–specification, price, etc.)
5. Comparative study on Gearbox and gear shifting mechanism used in vehicle. (Parameter–specification, price, etc.)



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Automobile Engineering

Course / Subject Code: DI03002031

Course / Subject Name: Automobile Transmission & Mechanism

6. Draw various teeth patterns used in gear box and calculate the gear ratio of gear box.
7. Comparative study on Suspension system in different type's vehicle (Parameter–specification of Car, Truck, Bus etc.)
8. Comparative study on Hydraulic and electrical assisted Power steering (Parameter–specification and its components.
9. Prepare Layout/Model of Hydraulics brake or Power assisted Brake (any one)

Suggested Activities for Students:

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of each activity. They should also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

1. Charts can be prepared.
2. Small report on any topic given by concern faculty.
3. Small groups of students can be formed for assigned work. Assigned work should be such that it covers market survey, team work, presentation, time management, quality development.

* * * * *