

# GUJARAT TECHNOLOGICAL UNIVERSITY

## AUTOMOBILE ENGINEERING AUTOMOBILE TRANSMISSION SUBJECT CODE: 2150207 B.E. 5<sup>th</sup> SEMESTER

**Type of course:** Fundamental and advanced.

**Prerequisite:** Automobile Engines

**Rationale:** The course aims to impart basic skills and understanding of automobile transmission systems basic components their working principle, classification and performance characteristics.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
		PA	ALA		ESE	OEP				
3	0	0	3	70	20	10	0	0	0	100

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
1	<b>Introduction</b> Need for Transmission system, Tractive Effort and Resistances to Motion of a vehicle, Requirements and Classification of Transmission systems, Single, Two and Four Wheel drive systems, Multi axle drives, Chain, Shaft and Electric drives, Location of transmission system, Different transmissions in scooter, car, MUVs and transport vehicles of Indian make.	5	12
2	<b>Clutch</b> Principle of operation, Constructional details, calculation of torque capacity, axial force. Different types of clutches, Operation of single plate helical spring, diaphragm type, and multiplate clutch, Centrifugal and Automatic Clutch, Dry and Wet type of clutch, Friction lining materials. Over-running clutch. Modes of operating a clutch – mechanical, hydraulic and electric, clutch maintenance.	7	16
3	<b>Gear box</b> Objective of the Gear Box, Determination of gear ratios for vehicles, Performance characteristics in different speeds, Different types of gear boxes – sliding, constant and synchromesh type, Planetary gear box, Need for double declutching and working of synchronizing unit. Power and economy modes in gearbox, Transfer box, Transaxles, Overdrives. Gear shifting mechanisms, mechanical link and wire types, Gear box maintenance.	10	24
4	<b>Hydrodynamic drive</b> Fluid coupling, Principle of operation, Constructional details, Torque capacity, Performance characteristics, Reduction of drag torque, Torque converter-Principle of operation, constructional details, performance characteristics, Converter coupling – Construction - Free wheel – Characteristic performance	5	12

5	<b>Hydrostatic drive</b> Hydrostatic drive – principle, types, advantages, limitations - Comparison of hydrostatic drive with hydrodynamic drive - Construction and working of typical Janny hydrostatic drive.	5	12
6	<b>Electric drive</b> Electric drive, Principle of early and modified Ward Leonard Control system, Advantage & limitations, Performance characteristics, Study of drive system in an electric and hybrid vehicle.	5	12
7	<b>Automatic transmission applications</b> Chevrolet "Turbo glide" Transmission, Power glide Transmission Toyota "ECT-i" Automatic Transmission with Intelligent Electronic controls system, Hydraulic Actuation system.	5	12

Suggested specification table with marks (Theory)

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
10	16	15	14	15

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

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

### REFERENCE BOOKS

1. Crouse. W.H., Anglin., D.L., Automotive Transmission and Power Trains construct, McGraw-Hill.
2. CDX Automotive, Fundamentals of Automotive Technology: Principles and Practice, Jones & Bartlett Publishers, 2013.
3. Judge.A.W., Modern Transmission systems , Chapman and Hall Ltd.
4. Kirpal Singh, Automobile Engineering Vol-1
5. P S Gill, Automobile Engineering Vol-II, S K Kataria & Sons, 2014
6. Newton Steeds & Garrot, Motor Vehicles, SAE International and Butterworth Heinemann, 2001.
7. SAE Transactions 900550 & 930910.

### Course Outcome:

After learning the course the students should be able to:

Understand the basic working principles of basic elements of automobile transmission system, Classification, Construction of clutch, gear box. Understanding of Constructional details, comparison of different types of drives such as hydrodynamic, hydrostatic, electric and automatic drives.

### List of Open Source Software/learning website:

1. <http://nptel.ac.in/>
2. [www.learnerstv.com](http://www.learnerstv.com)
3. <http://auto.howstuffworks.com/>
4. [nptel.iitk.ac.in/](http://nptel.iitk.ac.in/)

**ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should be submitted to GTU.