

Subject Code: 01AE0502

Subject Name: Automobile Systems and Transmission

B.Tech. III Year – (Sem-5) Automobile Engineering

Type of course: Under Graduate

Prerequisite: Elements of Mechanical Engineering, Internal Combustion Engine, and Fundamental of Machine design

Rationale: Subject is designed to provide knowledge on the various parts of the automobile systems. This course provides skill to study transmission and suspension systems and also to calculate the resistances during motion, power required for acceleration and constant velocity motions, braking force and engine characteristics.

Course Outcome

Students will be able to

1. The student will understand the various Systems of an automobile
2. Determine various parts and types of gear box
3. Determine working of steering and suspension systems

Teaching and Examination Scheme:

Teaching Scheme			Credits	Evaluation Scheme					Total Marks
Theory	Tutorial	Practical		Theory Marks			Practical Marks		
				ESE (E)	IA	CSE	Viva (V)	Term Work (TW)	
4	0	2	5	50	30	20	25	25	150

Sr.No	Contents	Duration	Weightage
1	Introduction 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	05	12

2	Vehicle Classification and Layouts Study various vehicle layouts as front engine and front wheel drive, front engine & rear wheel drive, rear engine & rear wheel drive, Components of transmission system, Four wheel drives	03	07
3	Clutch Principle of operation, Constructional details, axial force, Different types of clutches, Operation of single plate, Multi plate 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	05	12
4	Gear box 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	05	13
5	Drive line and Axles Propellers shaft, Types of drive as torque tube and Hotchkiss drive, Final drive types, Bevel, Hypoid, Worm and worm wheel, Type of drive axles & differential, Fully or semi floating and three-quarter floating, Dead axle	03	04
6	Hydrodynamic drive 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.	04	07
7	Hydrostatic drive Principle, types, advantages, limitations of hydrostatic drive - Comparison between hydrostatic drive and hydrodynamic drive	03	07
8	Brakes Function, Internal expanding brakes, Brake lining material, Properties, Calculation of braking force and shoe geometry, Hydraulic braking system, Brake oil, Bleeding of brakes, Pneumatic braking system, Vacuum brakes, Electrical brakes, Parking brake and braking efficiency	06	10
9	Wheels and Tyres Types of wheel rims, Tread patterns, Types of tyres, Cross ply, Radial & tubeless tyres, Specifications of tyre	03	07
10	Steering and Front Axle Steering requirements, Condition for correct steering, Steering system and linkages, Steering gears, Steering geometry, Ackermann linkages, Wheel alignment, Toe-in, Toeout, Caster, Camber, Under steer and over steer conditions, Power steering, Steering wheel shimmy, Types of front axle, Elliot & reverse elliot type	05	08
11	Suspension System Purpose, Types of suspension system, Front and rear suspension, Coil spring, Leaf spring, Torsion bars, Shock absorbers, Air and rubber suspension, Plastic suspensions, Hydro-pneumatic suspension, Independent suspension	05	13

Distribution of Theory Marks

R Level	U Level	A Level	N Level	E Level
25	25	20	15	15

Legends: **R:** Remembrance; **U:** Understanding; **A:** Application, **N:** Analyze, and **E:** Evaluate

Reference Books:

1. Automotive mechanics by W. Crouse, - TMH.
2. Automobile Engineering Vol-I & II Dr. K.M. Gupta
3. Automobile Engineering, Vol-I Dr. Kripal Singh.
4. Automobile engineering GBS Narang.
5. P S Gill, Automobile Engineering Vol-II, S K Kataria & Sons, 2014
6. Judge.A.W., Modern Transmission systems , Chapman and Hall Ltd.

List of the Experiment

- 1 To study about vehicle layouts
- 2 To study about different types of clutch.
- 3 To study about the performance of vehicle.
- 4 To study about the different types of gear boxes.
- 5 To study about rear axle, final drive and differential.
- 6 To study about Automatic Transmission system.
- 7 To study about different types of tyres and wheels
- 8 To study of different types of automobile brakes.
- 9 To study of steering systems
- 10 To study about different types of suspension system

List of Open Source Software/learning website:

- 1) www.nptel.ac.in
- 2) www.coursera.org

