

MME: Automotive Power Transmission System

Programme: B.Tech./MME

Year: 3rdSemester: 6th

Course Code:

Credits: 3

Hours: 30 lec. +10 labs

Course Context and Overview (100 words):

The objective of the course is to provide basic knowledge of Automotive Power Transmission. The course covers various types of power transmission system; clutch, gear boxes, electric drives, hydrostatic and hydrodynamic drives. The labs are also integrated with this course to understand function of the drives in actual.

Prerequisites Courses: Kinematics and Dynamics and Machine Design

Nil

Course outcomes (COs):

On completion of this course, the students will have
CO1: Able to understand the fundamentals, principle of operation and performance of various clutches and gear boxes.
C02: Gain the knowledge about electric drives
C03 : Conceive various types of gear boxes used for Automotive transmission
C04: Able to understand the principle of operation of various hydrostatic and hydrodynamic drives

Course Topics:

Topics	Lecture Hours
UNIT - I	
1. Topic <u>Clutch and Gear Box</u>	
Requirements of transmission system and role of clutch in driving system, Types of clutches and construction and working of single plate, multi plate and cone clutch, Construction and working of centrifugal and semi centrifugal clutch and its operating characteristics, Deriving the equation for torque capacity of a single plate clutch, Problems involving torque capacity and axial force of single plate clutch, Objective and need for a gear box in an automobile and types of gear boxes - working of sliding mesh and constant mesh gear box, Construction and working of synchromesh gear box and principle of synchronizers, Problems in gear box involving gear ratios and various gradients and total	8

resistance calculation, differentials	
UNIT – II Topic <u>Electric Drives</u> Introduction to Electric drive and Layout of Electric drive. Principle of Early Ward Leonard control system of electric drive. Principle of Modified Ward Leonard control system of electric drive, Advantages, limitations and performance characteristics of electric drive,	7
UNIT - III Topic <u>Automatic Transmission Applications</u> Layout of automatic transmission system, Turbo glide transmission construction and working, Power glide transmission – construction, Power glide transmission – working, ECT- intelligent transmission working principle	8
UNIT – IV Topic <u>Hydrodynamic and Hydrostatic Drives</u> Introduction to fluid coupling, Fluid coupling - Construction and principle of operation, Drag torque and various drag reducing devices, Performance characteristics of fluid coupling, Problems on design and torque capacity of fluid coupling, Torque converter and converter coupling - construction and principle of operation, Performance characteristic of multistage and poly phase torque converters. Introduction to hydrostatic drives, Working principle and types of hydro static drives, Advantages and limitations of Hydrostatic drive, Comparison of hydrostatic drive with hydro dynamic drive, . Construction and working of Janny Hydrostatic drive	7

Textbook references (IEEE format):

1. CDX Automotive, "Fundamentals of Automotive Technology, Principles and practice", 1st Edition, Jones & Barlett Publishers, 2013.
2. Newton Steeds & Garrot, "Motor Vehicles", SAE International and Butterworth Heinemann, 2001.
3. Harald Naunheimer , Bernd Bertsche , Joachim Ryborz , Wolfgang Novak "Automotive Transmission: Fundamentals, Selection, Design and Application", 2nd Edition, Springer, 2011.

References Books:

1. Heldt P.M, "Torque converters", Chilton Book Co., 1992.
2. Judge.A.W.Modern Transmission Systems, Chapman and Hall Ltd., 1990.
3. Crouse W.H, Anglin D.L, "Automotive Transmission and Power Train construction", McGraw Hill, 1976.

Additional Resources (NPTEL, Web resources etc.): NPTEL, MIT Open courseware etc.

Attendance: 70% Compulsory to present in exam.

Evaluation Methods:

Item	Weightage
Quiz/Assignments/Project	25%
Midterm Examination	25%
Final Examination	50%

List of Experiments:

Experiment Name	Lab Hours
<ol style="list-style-type: none"> 1. Simulation of clutch in IPG Car Maker and study the vehicle performance 2. Simulation of power train in IPG car Maker and study the vehicle performance 3. Study of function of differential gear on its actual model 4. Study of function of clutch on its actual model 5. Study of function of power train on its actual model 6. Study of function of Automatic transmission on its actual model 7. Power train development and its performance study in Matlab/Simulink Simscape (4 hrs) 8. Hydrostatic drives development and its performance study in Matlab/Simulink 9. Hydrodynamic drives development and its performance study in Matlab/Simulink 10. Simulation of electric drives in IPG car Maker and study the vehicle performance 11. Simulation of power train in AVL cruise and study the vehicle performance 	2

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