Programme Name/s : **Automobile Engineering.**
Programme Code : **AE**
Semester : **Third**
Course Title : **AUTOMOBILE TRANSMISSION SYSTEMS**
Course Code : **313314**

I. RATIONALE

This course provides knowledge about the various components of Automotive power transmission. It will help the students during inspection, installation, operation and maintenance of transmission system of automobile. Therefore, this course has been developed provide the relevant knowledge and associated skills

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Inspect automobile power transmission system components.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Select vehicle layout and chassis for specific purpose.
- CO2 - Identify Clutch system of an automobile
- CO3 - Dismantle/ Assemble different automobile transmission system components
- CO4 - Maintain automobile transmission system components
- CO5 - Select wheels and tyres for given automobiles.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical							
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
313314	AUTOMOBILE TRANSMISSION SYSTEMS	ATS	DSC	3	-	2	1	6	3	3	30	70	100	40	25	10	25#	10	25	10	175

Total IKS Hrs for Sem. : 0 Hrs
Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination
Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 List different types of vehicle layout TLO 1.2 Classify vehicle layout TLO 1.3 Draw different types of vehicle layout TLO 1.4 Classify chassis frame TLO 1.5 Select the relevant frame for the given capacity of vehicle with justification	**Unit - I Vehicle Structure** 1.1 Vehicle layout and its types: (a) Introduction of related terms- an automobile, Chassis, Body, Vehicle layout (b) Types of vehicles (c) Classification of vehicle layout with respect to- i) Location of engine, ii) No of live axles, iii) Arrangement of Engine, Passenger and Luggage section, iv) Application (d) Layout of the front engine rear wheel drive vehicle- Location and functions of major components of transmission system 1.2 Chassis Frames: Necessity of frame. (a) Loads acting on frame. (b) Types of frames- conventional (ladder and x-member type), semi integral and integral types. Sub frames. (c) Frame sections-channel, box and tubular sections. (d) Materials for frames.	Model Demonstration Lecture Using Chalk-Board

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
2	TLO 2.1 State principle of Clutch of automobile TLO 2.2 Explain the construction and working of different types of clutch used in automobile with neat sketch TLO 2.3 List different types of cutch operating mechanisms. TLO 2.4 State functions of different clutch components. TLO 2.5 Select relevent clutch for given application with justification	**Unit - II Automobile Clutches** 2.1 Necessity ,Requirements of Clutch, Principle of friction Clutch, 2.2 Types of Clutch - construction and working of Single plate Clutch (Coil and Diaphragm), Multi plate clutch , Centrifugal Clutch 2.3 Clutch Operating Mechanism -Mechanical operation, Electro magnetic Operation, Hydraulic Operation, Clutch by wire. 2.4 Constructions of Clutch Components- Clutch Plate, Pressure Plate, Release lever, Straps , springs and throw-out bearings 2.5 Types of Materials used for clutch facing, desirable properties of clutch material	Model Demonstration Lecture Using Chalk-Board
3	TLO 3.1 State functions of Gear box TLO 3.2 Explain construction and working of different types of Gearbox with neat sketch TLO 3.3 Draw constructional details of gear shift and Gear selector Mechanism TLO 3.4 Explain working of automatic transmission system with neat sketch TLO 3.5 State the necessity of CVT . TLO 3.6 List different faults occurred in the gearbox with their causes and remedies	**Unit - III Automobile Gear Box** 3.1 Necessity of Gear box in Automobile Transmission System, Functions of Gear box, 3.2 Types of Gear box, Construction and Working - a) Sliding mesh Gearbox, b) Constant mesh Gearbox, c) Synchro- mesh Gear box 3.3 Construction and working of 1. Gear shift Mechanism, 2. Gear selector Operating Mechanism 3.4 Automatic Transmission- necessity of automatic transmission, Construction and working of a) Torque Converter b) Overdrive c) dual clutch system 3.5 Continuously Variable Transmission (CVT) - Principle, construction and working , advantages and disadvantages 3.6 Transfer case- Purpose , Construction and working	Model Demonstration Video Demonstrations Lecture Using Chalk-Board

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
4	TLO 4.1 Explain constructional feature of propeller shaft and universal joint TLO 4.2 Classify rear axle drive TLO 4.3 Explain working principle of differential with neat sketch TLO 4.4 State the necessity of rear axle TLO 4.5 List different faults occurred in the drive line with their causes and remedies	**Unit - IV Drive Line** 4.1 A) Propeller shaft - Necessity and Types. Constructional details of Hollow and solid propeller shaft. B) Universal Joint – Functions, Types, Construction and Operation of simple Hooke's joint, Constant velocity joints – Inboard Tripod Joint and outboard Rezappa joint. C) Function and construction of Slip Joint 4.2 Types of rear axle drives – construction, working and applications of Torque tube drive and Hotchkiss drive. 4.3 Final drive and Differential - a. Necessity, types, construction and working of final drive . b. Necessity, types, construction and working of differential. 4.4 Rear Axle- a. Necessity of Rear Axle. b. Loads acting on the rear axle c. Types of rear axles- semi floating, Three quarter floating and full floating type. d. Rear axle casing- split and banjo type 4.5 Front wheel drive shaft- construction and working	Lecture Using Chalk-Board Demonstration
5	TLO 5.1 Compare different types of automobile wheels TLO 5.2 List desirable properties for Tyre material TLO 5.3 Explain construction of different types of Tyre with neat sketch TLO 5.4 Select suitable tyre for given vehicle according to application by using tyre coding system TLO 5.5 List different causes of tyre wear wear with justification	**Unit - V Wheels and Tyres** 5.1 Wheels and rims-Requirements for Automobile Wheels, Types of Wheels- construction and comparison of Disc wheel, wire wheel, Cast wheel, types of rims 5.2 Tyre- Functions, Desirable Tyre characteristics , Tyre Materials, 5.3 Types of Tyres - Constructional details of a) Tubed tyre b) Tubeless tyres. c) Radial ply tyre , d) Cross ply, e) Belted bias tyre, Comparison between tubed and tubeless tyre, types of treads 5.4 A) Selection of Tyre on the basis of Ply rating, Aspect ratio, Load index, speed rating, B) Tyre Designation and tyre coding system 5.5 Tyre life and factors influencing on it.	Model Demonstration Lecture Using Chalk-Board

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Use appropriate hand tools and measuring devices in given situation	1	* Use of Hand tools and measuring devices available in the Laboratory	2	CO1 CO4
LLO 2.1 Draw layout of given automobile Chassis LLO 2.2 Identify different components of given automobile Chassis	2	* Observation of Automobile Chassis	2	CO1

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 3.1 Identify differnt components of Single plate clutch LLO 3.2 Measure various parameters of given single plate clutch	3	*Single Plate dry type Clutch dismantling and assembly	2	CO2
LLO 4.1 Dismantle Multi plate clutch. LLO 4.2 Measure different parameters of given multi plate clutch	4	Multi plate clutch dismantling and assembly	2	CO2
LLO 5.1 Dismantle and assemble Synchromesh gear box. LLO 5.2 Calculate gear ratio of given gear box LLO 5.3 Name different components of Syncromesh gear box.	5	*Synchromesh Gear Box dismantle and assembly	4	CO3 CO4
LLO 6.1 Dismantle and assemble Vario Drive LLO 6.2 List different components of Vario Drive	6	Vario Drive of Two wheeler Dismantling and Assembly	2	CO3 CO4
LLO 7.1 Identify different parts of Torque converter LLO 7.2 Dismantle and assemble given Torque converter	7	*Dismantling and assembly of Torque converter	4	CO3 CO4
LLO 8.1 Identify different components of CVT LLO 8.2 Calculate drive ratio of CVT	8	Dismantling and Assembly of CVT	2	CO3 CO4
LLO 9.1 Identify different components of Propeller shaft Universal joint assembly LLO 9.2 Dismantle propeller shaft Universal joint assembly	9	*Dismantling and assembly of Propeller shaft - Universal Joint assembly	2	CO4
LLO 10.1 Identify different parts of Differential LLO 10.2 Calculate differential gear ratio .	10	*Disentailing and assembly of Differential	4	CO3
LLO 11.1 Identify different components of rear axle assembly	11	Disentailing and Assembly of Rear axle assembly	2	CO4
LLO 12.1 Identify different components of Wheel assembly	12	*Dismantling and Assembly of a Wheel assembly.	2	CO5
LLO 13.1 Interpret designation of given tyre according to tyre code LLO 13.2 Identify differnt parts of Tyre	13	Automobile Tyre designation	2	CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- Compare clutches used in a two wheeler, four wheeler and moped.- Collect clutch of two and four wheeler vehicle, Observe ,Compare and Write a report.
- Observe transmission system of your bike - read service manual, Type of Transmission, purpose of transmission, .maintenance procedure as per manufacturers catalog, Write report
- Collect information catalog of tires from different manufacturers and compare on the basis of material used, aspect ratio, speed rating and load rating, prepare report

Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Vehicles -Two Wheeler, Three wheeler, Four wheeler vehicle.	1,2,3,4
2	Cut – section working model of Single Plate dry type clutch.	2
3	Cut – section working model of simple Pulley based vario-drive used in mopeds.	3
4	Cut – section working model of four wheeler transmission system.	4
5	Cut – section working model of Sequential automatic transmission system.	5,6,7
6	Cut – section working model of Final drive and differential	8,9,10
7	Four wheeler chassis – Front Engine Rear wheel drive/Four wheel drive	All
8	Four wheeler chassis – Front Engine Front wheel drive	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Vehicle Structure	CO1	8	4	4	4	12
2	II	Automobile Clutches	CO2	8	2	6	4	12
3	III	Automobile Gear Box	CO3	11	4	6	8	18
4	IV	Drive Line	CO3,CO4	12	4	6	10	20
5	V	Wheels and Tyres	CO5	6	2	2	4	8
Grand Total				**45**	**16**	**24**	**30**	**70**

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Term work, Laboratory work

Summative Assessment (Assessment of Learning)

- End semester practical Examination

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	-	-	3	2	2	3			
CO2	2	-	-	3	2	2	3			
CO3	2	-	-	3	2	2	3			
CO4	2		-	3	2	2	3			
CO5		3	-	2	2	2	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Dr.Kripal Singh	Automobile Engineering Vol.1	Standard Publisher Distributers, New Delhi Edition 3 ISBN Number-978-81-8014-196-6
2	S.K.Gupta	A Text book of Automobile Engineering	S.Chand and Co.Pvt.Ltd., New Delhi Edition 13 ISBN Number- 978-93-83746-91-0
3	A.K.Babu and A.P.Singh	Automobile Engineering	S.Chand and Co.Pvt.Ltd., New Delhi Edition 13 ISBN Number- 81-219-9770-4
4	Narang, G.B.S	Automobile Engineering	Khanna Publishers, New Delhi, Edition 2009, ISBN-13: 1234567144518
5	Schwaller, Anthony E.	Motor Automotive Technology	Delmar Publishers Inc. New Delhi, Edition 2009, ISBN-13: 978-0827351004
6	G.K.Awari,V.S.Kumbhar, R.B.Tirpude	Automobile Systems:Principles and Practice	CRC Press , Taylor and Francis, London Edition 2020 978-0367498429

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://www.youtube.com/watch?v=devo3kdSPQY	Demonstration of clutch working
2	https://www.youtube.com/watch?v=TcYsV063lk8	Multiple clutch
3	https://www.youtube.com/watch?v=Pv7wlv-Oe9s	Sliding mesh gear box demonstartion
4	https://www.youtube.com/watch?v=K2IfBlea9cc	constant mesh gear box
5	https://www.youtube.com/watch?v=z5G2zQ_3xTc	basic working of torque converter
6	https://www.youtube.com/watch?v=Tkdx0Gc-_tc	Torque converter working
7	https://www.youtube.com/watch?v=PEq5_b4LWNY	CVT working
8	https://www.youtube.com/watch?v=nC6fsNXdcMQ	Differential working
9	https://www.youtube.com/watch?v=dLwsoM3WnuQ	components of tyre

Sr.No	Link / Portal	Description

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students