FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Automobile Engineering)**

Semester: **VII**

Course Code: **202010705**

Course Title: **Automotive Combustion Engine Technology**

Course Group: **Professional Elective Course-III**

Course Objectives: The course focuses at imparting knowledge and process of advanced combustion processes in internal combustion engine. Students examine the combustion process and characteristics of different type of internal combustion engine like spark ignition, diesel, stratified, GDI, HCCI etc.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	0	3	50/18	--/--	50/17	--/--	100/35

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Overview of gasoline direct injection engines:** Engine Introduction, overview of direct injection gasoline engines, potential and technologies for high efficiency direct injection gasoline engine, high pressure fuel injection system, exhaust emissions and after treatment devices, advanced emission norms & technologies. i.e.(EURO, BHARAT STAGE)	8
2	**Stratified charge combustion in direct injection gasoline engines :** Introduction, thermodynamics and combustion process, production engines with stratified gasoline direct injection	8

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3	**Turbocharged direct injection spark ignition engine:** Ideal Introduction, historical background, turbo charging for high specific output, problems and challenges associated with turbo charging spark ignition engines, advantages of combining direct injection and turbo charging in spark ignition engines, challenges of applying direct injection to a turbocharged spark ignition engine.	**10**
4	**Direct injection gasoline engines with auto ignition combustion:** Flow Introduction, principle of auto ignition combustion in the gasoline engines, approaches to auto ignition combustion operation in gasoline engines, operation and control of direct injection gasoline engines with auto ignition combustion.	**10**
5	**Homogenous Charge Compression Ignition (HCCI) Engines:** Introduction, HCCI combustion fundamentals, Gasoline HCCI engine, Diesel HCCI combustion engines, operational limits and emissions.	**9**

Reference Books:

1	Internal Combustion Engine by John B. Heywood, Tata McGraw-Hill Edition, New Delhi
2	Internal Combustion Engine by V.Ganeshan, Tata McGraw-Hill Edition, New Delhi
3	Advanced Direct Injection Combustion Engine Technologies and Development. Vol.1 ,By Hua Zhao, Wood head Publishing Limited, Oxford, Cambridge, New Delhi
4	HCCI and CAI Engines for Automotive Industry by By Hua Zhao, Wood head Publishing Limited, Oxford, Cambridge, New Delhi
5	Vehicle and Engine Technology by Heinz Heisler, SAI (Engineering Society of Advancing Mobility, Land Sea Air and Space

Supplementary learning Material:	
1	NPTEL Resources

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz

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Internal Evaluation :

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
25%	25%	30%	5%	10%	5%	

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the working of gasoline direct injection engine.	**18**
CO-2	Understand the working principle of stratified charge combustion in gasoline direct injection engine.	**18**
CO-3	Understand the working principle of turbocharged direct S.I. engine.	**22**
CO-4	Understand the direct gasoline engines with auto ignition combustion.	**22**
CO-5	Understand the HCCI engine and its combustion process	**20**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2027

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