

B.E Semester: 6 Automobile Engineering
Subject Name: Automobile Engines(AE602-N)

A. Course Objective:

<p>The course should enable the students to:</p> <ul style="list-style-type: none"> • Understand the Construction and working of SI and CI Engine • Know about the different auxiliary systems in the engines • Know about the various Engine testing procedures.
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B. Teaching / Examination Scheme:

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	<p>Introduction Basic Nomenclature, Classification of IC Engines, working principle of 2-stroke and 4-stroke SI and CI engines. Air standard, fuel-air and actual cycles for SI and CI engines. Ideal air capacity, volumetric efficiency, ideal and actual induction process, various factor effects on volumetric efficiency. Valve and port timing diagrams.</p>
2	<p>Combustion in SI Engine Combustion initiation, Flame development and propagation, ignition lag, pre-ignition, normal and abnormal combustion-knocking, physical and chemical aspects of knocking, effect of operating parameter and chemical structure on knocking tendency, Octane number, design considerations of combustion chamber, Stratified charge combustion, Concept of lean burning engines.</p>
3	<p>Combustion in CI Engine Introduction, Various stages of combustion, Fundamental of combustion process, Delayed period, diesel knock, C.I. Engine combustion process, Cold starting in CI engine, Vaporization of fuel droplets and spray formation. Comparison of SI and CI Engines on various parameters.</p>
4	<p>Fuel Injection systems for SI Engine Carburetors, Properties of air-fuel mixtures, mixture requirement, Main metering system, Idling system, Economizer system, acceleration pump and cold starting system. Spark plug, fly wheel, DTS-I system. Nozzle lip, venturi depression, calculation of fuel jet and venturi throat diameter for given air fuel ratio, Firing order, Ignition timing, Petrol Injection system, electronic fuel injection, advantage and disadvantage of petrol injection.</p>
5	<p>Fuel Injection systems for CI Engine Fuel pump, types of fuel injector, fly- wheel, types of piston and properties, high pressure pipe,</p>

	Governor- Necessity of governing, various methods of governing. Fuel injection system- Requirement, types of nozzle, atomization, spray penetration and spray direction, multiple point fuel injection system, injection timing, common rail fuel injection system.
6	Engine Testing and Performance: Automotive and stationary, engine testing and related standards. Engine power and efficiencies. Variables affecting engine performance. Methods to improve engine performance. Heat balance. Performance Maps and Drivability Diagnosis.
7	Two Stroke Engine General aspect, construction and working, comparison between two stroke and four stroke engine, intake for two stroke engine, scavenging process, scavenging parameters, scavenging systems, crankcase scavenging Scavenging pumps
8	Supercharging and Turbo Charging Necessity and limitation, Supercharging of SI engine, Supercharging of CI engine, modification of engine for supercharging, Charge cooling, Types of supercharging and turbo charging, relative merits, Matching of turbocharger.
9	Non-Conventional I C Engine Stratified charged engine, Wankel engine, Multi-fuel engine, Sterling engine.

Total hours (Theory):64
Total hours (Practical):32
Total hours:96

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1 st ,2 nd ,3 rd	Unit 1	20%	1,2
2	4 th .5 th ,6 th	Unit 2	20%	3,4
3	7 th , 8 th ,9 th	Unit 3	20%	5
4	10 th .11 th . 12 th	Unit 4	20%	6,7
5	13 th , 14 th ,15 th ,16 th	Unit 5	20%	8,9

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted toequivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overallinternal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for

the concept being taught in lectures. Suggested list of experiment is given below

F. List of Practical:

1	To study combustion in SI Engine.
2	To study combustion in CI Engine.
3	To study Fuel Injection systems for SI Engine.
4	To test various performance parameters on single cylinder SI engine test rig
5	To test various performance parameters on single cylinder CI engine test rig
6	To test various performance parameters on Variable Compression Ratio (VCR) engine
7	To perform Morse test on Multi-cylinder engine
8	To study Fuel Injection systems for CI Engine.
9	To study about superchargers and turbochargers of IC engine.
10	To study about two stroke engine.
11	To study Non-Conventional I C Engine
12	Tutorial based on Automobile Engine.

G. Students Learning Outcomes:

1	The student can identify different areas of Automobile Engines.
2	Can find the applications of all the areas in day to day life.

H. Text Books & Reference Books:

1	J. B. Heywood, Internal Combustion Engine, McGraw Hill, ISBN-0-07-100499-8
2	V. Ganeshan, Internal Combustion Engine, Tata McGraw Hill, 1992
3	M.L. Mathur and R.P. Sharma, A Course in Internal Combustion Engines, Dhanpat Rai and Sons
4	V. Ganeshan, Computer simulation of SI Engine Process, Orient, 1996.
5	Heldt.P.M, High Speed Combustion Engines, Oxford IBH Publishing Co., Calcutta, 1985.
6	Automotive Engines (McGraw-Hill International Editions: Automotive Technology Series) Paperback – International Edition, September 1, 1994 by William H. Crouse and Donald Anglin.