

B.E Semester: V
Automobile Engineering
Subject Name: S.I engine (AE501)

Course Objective:

- To present a problem oriented in depth knowledge of S.I engine.
- To address the underlying concepts and methods behind S.I engine.

Teaching / Examination Scheme:

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs	Hrs	Hrs	Marks	Marks	Marks	Marks	
		AE501	S.I ENGINE	3	0		2	5	4	3	70	

Detailed Syllabus:

Topic no	Details
1.	Engine construction and operation: Constructional details of four stroke petrol engine, working principle, air standard Otto cycle, fuel air cycle, actual cycle, effect of variable specific heat on otto cycle, two stroke engine construction and operation, comparison of four stroke and two stroke engine operation, firing order and its significance. Port Timing, Valve Timing Diagram.
2.	SI engine fuel system: SI engine fuel supply system, fuel pumps, fuel filters and air cleaners, fuel gauges, air fuel requirements, simple carburetor, limitations of single jet carburetor, Carburettor, requirements of an automotive carburettor, starting, idling, acceleration and normal circuits of carburettors. Compensation, maximum power devices, constant choke and constant vacuum carburettors, altitude compensating carburetors. Petrol injection, MPFI System, Determination of air-fuel ratio and numerical problems on air-fuel ratio calculations, CNG
3.	Ignition system: Types and working of battery coil and magneto ignition systems, relative merits and demerits, centrifugal and vacuum advance mechanisms. Types and construction of spark plugs, electronic ignition systems. Transistorized coil ignition system, capacitive discharge

	ignition system.
4.	Cooling and lubrication system: Need for cooling system, coolant, Types of cooling system: air cooling system, liquid cooling system, forced circulation system, pressure cooling system, radiator and radiator cooling capacity, thermostats and temperature indicators. Lubrication system: objects of lubrication, functions of lubricating oil, properties of lubricants, additives in oil, types of lubricants, lubricating parts, lubricating systems and parts.
5.	Combustion and combustion chambers: Combustion in SI engine; stages of combustion, flame propagation, rate of pressure rise, abnormal combustion, detonation, effect of engine variables on ignition lag, spark advance and factors affecting ignition timing, effect of engine variables on knock, knock rating, performance number and highest useful compression ratio. Combustion chambers; different types, combustion chamber design.
6.	Scavenging: Scavenging methods Scavenging pumps, Scavenging pumps
7.	Supercharging: Objects of supercharging, thermodynamic cycle with supercharging, supercharging of SI engines, supercharging limit for SI engine.
8.	Testing & Performance: Performance test of 2-stroke and 4- stroke petrol engine. I.H.P , B.H.P Mechanical efficiency, Brake thermal efficiency . Performance curve i.e. Load v.s. efficiency, Speed v.s. efficiency etc.

Lesson Planning:

Sr.No.	Date/Week	Unit No.	% Weightage	Topic No:
1	1 st , 2 ^{ed} , 3 ^{ed}	Unit 1	20 % .	1,6
2	4 th , 5 th , 6 th	Unit 2	20 %	2
3	7 th , 8 th , 9 th	Unit 3	20 %	3,4
4	10 th , 11 th , 12 th	Unit 4	20 %	5
5	13 th , 14 th , 15 th	Unit 5	20 %	7,8

Instructional Method & Pedagogy:

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- 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.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.
 - Constructional details of four and two stroke petrol engine.
 - Valve and port timing diagram of petrol and diesel engine.
 - Determination of air-fuel ratio of S.I engine fuel system and numerical problems on air-fuel ratio calculations.
 - Demonstration and study of ignition system.
 - Demonstration and study of cooling system.
 - Demonstration and study of lubrication system.
 - Performance test on two stroke petrol engines.
 - Performance test on four stroke petrol engines
 - Heat balance test on automotive multi-cylinder SI engine.
 - Morse test on multi-cylinder SI engine.

Practical / Oral: The candidate shall be examined on the basis of term-work.

Students Learning Outcomes

- The student can identify different areas of automobile petrol engines.
- Can find the applications of all the areas in day to day life.

Recommended Study Materials

Text & Reference Books:

1. Ganesan. V. "Internal Combustion Engineering", Tata McGraw-Hill Publishing Co., New Delhi, 2003.
2. Obert. E.F. "Internal Combustion Engineering and Air Pollution", International book Co., 1988.

3. Mathur D.S., Sharma. R.P. "A course in internal combustion engines", Dhanpatrai publication, 2003.
4. R.K.Rajput "Internal combustion engines", Laxmi publications(p) ltd New delhi.
5. Domkundwar "Internal combustion engines".
6. John B.Heywood, "Internal Combustion Engine Fundamental", McGraw-Hill, 1988
7. R.B.Gupta."Automobile engineering", Satya prakashan,New delhi

