



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3150210

Semester – V

Subject Name: Automobile Engines

Type of course: Basics and Fundamental

Prerequisite: Nil

Rationale: Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Engine Construction and Operation: 4-stroke engines constructional details, working principle, Otto cycle, Diesel cycle, valve timing diagrams and actual indicator diagram. 2-stroke engine construction and operation, port timing diagrams, comparison of four stroke and two-stroke engine operation. Firing order and its significance.	08
2	SI Engine Fuel System: Carburettor working principle. Requirements of an automotive carburettor; Starting, idling, acceleration and normal circuits of carburettors, compensation, Maximum power devices, constant choke and constant vacuum carburettors. Fuel feed systems, Mechanical and electrical pumps. MPFI systems for petrol. Properties of SI engine fuels	08
3	CI Engine Fuel System: Fuel Injection System: Requirements, Air and solid injection, function of components, Jerk and distributor type Pumps. Unit injector, Mechanical and Pneumatic governors. Fuel injector-types of injection nozzle, Spray characteristics, injection timing, pump calibration. CRDI systems for diesel. Properties of CI engine fuels.	09
4	Cooling and Lubrication System: Need for cooling system. Types of cooling system, Liquid cooled system, Thermosyphon system, and Pressure cooling system. Properties of coolants. Lubrication system, Mist lubrication system, Wet sump and dry sump lubrication. Properties of lubricants.	05
5	Combustion in IC (SI & CI) engines: Combustion in IC Engines, stages of combustion, flame propagation, rate of pressure rise, abnormal combustion, knocks. Effect of engine variables and knock.	05
6	Supercharging, Turbocharging and Scavenging: Necessity and limitation of supercharging and turbocharging, Charge cooling, Types of supercharging and turbocharging, relative merits, Matching of turbocharger. Theoretical scavenging methods. Scavenging pumps	06



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7	Engine Testing and Performance: Automotive and stationary engine testing, Engine power and efficiencies. Variables affecting engine performance. Methods to improve engine performance. Heat balance. Performance Maps.	04
	Total	45

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Ganesan.V. Internal Combustion Engines, Tata-McGraw Hill Publishing Co., New Delhi, 1994.
2. Heldt.P.M, High Speed Combustion Engines, Oxford IBH Publishing Co., Calcutta, 1985.
3. Obert.E.F, International Combustion Engines Analysis and Practice, International Text Book Co., Scranton, Pennsylvania, 1988.
4. Automotive Engines (McGraw-Hill International Editions: Automotive Technology Series) Paperback – International Edition, September 1, 1994 by William H. Crouse and Donald Anglin.
5. Ellinger.H.E, Automotive Engines, Prentice Hall Publishers, 1992
6. Maleev.V.M, Diesel Engine Operation and Maintenance, McGraw Hill, 1974.
7. Dicksee.C.B, Diesel Engines, Blackie & Son Ltd., London, 1964.

Course Outcomes: Students will be able to: Understanding of the basic working principles of engines, its Construction and Operation, phenomena of Combustion, Engine Testing and Performance and Performance characteristics.



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Sr. No.	CO statement	Marks % weightage
CO-1	Explain types of engine working cycles and their operation.	18
CO-2	Demonstrate fuel supply systems for SI and CI Engines	37
CO-3	Illustrate cooling and lubrication systems of engine	12
CO-4	Identify problem due to abnormal combustion and knocking	11
CO-5	Analyze performance of engines and supercharging	22

Term Work:

The term work shall be based on the topics mentioned above.

List of Experiments:

1. To identify the major components of different automobile engines.
2. To study two stroke cycle engine.
3. To study four stroke CI and SI engine.
4. To study the fuel supply system of SI engine.
5. To study the fuel supply system of CI engine.
6. To study the engine Cooling and lubrication system circuit.
7. To analyze Computerized Exhaust Gas of a petrol engine, & a diesel engine; and, to compare the output value to the prescribed limit set by the Government.
8. To perform the Morse Test on I.C. engine.
9. To perform the Heat Balance Test on petrol / diesel engine.
10. To study the performance characteristics of petrol / diesel engine by using an engine test rig.

Major Equipment:

1. Multi Cylinder Petrol Engine
2. Multi Cylinder Diesel Engine
3. Petrol and Diesel fuel systems
4. Ignition system of petrol/gas engines
5. Cut section models of multi cylinder I.C. engines with drive.

List of Open Source Software/learning website:

1. <http://nptel.ac.in/>
2. www.learnerstv.com
3. <http://auto.howstuffworks.com/>
4. nptel.iitk.ac.in/