

ME691: Engine Management

PG/Open Elective

Credits: 3-0-0-9

Course Summary:

Diesel Engine management: cylinder charge control systems, principles of diesel fuel injection, mixture distribution, diesel fuel injection systems, governors and control systems, discrete cylinder systems, single plunger fuel injection pumps, unit injector systems, and unit pump systems, common rail systems, injection nozzles, minimizing emissions inside the engine, electronic diesel control (EDC), electronic control unit (ECU); Gasoline Engine Management: cylinder charge control systems, manifold fuel injection, gasoline direct injection, operation of gasoline engine on natural gas, ignition system, inductive ignition systems, different types of sensors such as temperature sensors, engine speed sensors, hall effect phase sensors, hot film air mass sensors, piezo-electric knock sensor, high pressure sensor, lambda sensor, Electronic control unit, operating conditions, design and data processing.

ME 691: Lecture Wise Breakup

S. No.	Topic
1	Introduction
2	Diesel Engine management: cylinder charge control systems
3	Basic principle of diesel fuel injection
4	Mixture distribution
5	Fuel injection parameters
6	Various designs and overview of diesel fuel injection systems-I
7	Various designs and overview of diesel fuel injection systems-II
8	Fuel supply system to the low pressure stage
9	Governors and control system for in-line fuel injection pumps-I
10	Governors and control system for in-line fuel injection pumps-II
11	Distributor fuel injection pump system –I
12	Distributor fuel injection pump system-II
13	Helix and port controlled distributor injection pumps-I
14	Helix and port controlled distributor injection pumps-II
15	Overview of discrete cylinder systems
16	Single plunger fuel injection pumps
17	Unit injector system, and unit pump system-I
18	Unit injector system, and unit pump system-II
19	Common rail system
20	Injection nozzles
21	Minimizing emissions inside the engine
22	Electronic diesel control (EDC)
23	Electronic control unit (ECU)
24	Gasoline Engine Management: cylinder charge control system
25	Fuels supply, manifold fuel injection
26	Gasoline direct injection
27	Operation of gasoline engine on natural gas

28	Ignition system
29	Inductive ignition system
30	Ignition coils, spark plugs
31	Sensors: Basics and introduction, Temperature sensors
32	Hall Effect phase sensors, Engine speed sensors
33	Hot film air mass sensors
34	Piezo-electric knock sensor
35	Micro-mechanical pressure sensor
36	High pressure sensor
37	Two-step lambda sensor
38	Electronic control unit, operating conditions, design and data processing-I
39	Electronic control unit, operating conditions, design and data processing-II
40	Electronic control unit, operating conditions, design and data processing-III

Recommended Text Books:

1. Internal Combustion engine fundamentals: J B Heywood, Mc-Graw Hill Publications, 1989.
2. Gasoline Engine Management: Robert Bosch GMBH, 2005.
3. Diesel Engine Management: Robert Bosch GMBH, 2005.
4. Advanced Engine Technology: Heinz Heisler ISBN 0340568224, SAE Publications, 2004.
5. Engine Combustion Instrumentation and Diagnostics: Hua Zhao, Nicolas Ladammatos, SAE International 2001
6. Internal Combustion Engine Handbook (Basics, Components, Systems, and Perspectives), Richard Van Basshuysen and Fred Schafer, SAE International, 2004.
7. Automotive Mechanics, William H Crousem Donald L Anglin, Tata McGraw Hill, 2007