

**UNIT I****Chapter 1 : Internal Combustion Engines 1-1 to 1-48**

**Syllabus : 1.1 Power cycles:** Engine terminology, working of 4 stroke engines, carnot cycle, otto cycle, diesel cycle, dual cycle, actual indicator diagrams for 4 stroke engines.

**1.2 Basic of IC Engines :** Working and comparison of four stroke and two stroke cycle engines and SI and CI Engines.

**1.3 IC Engines auxiliaries:** Valve timing diagrams, VVT-I engines – concept and arrangement, supercharging-objectives & advantages, Turbocharging, Variable Geometry Turbochargers, MPFI layout, various sensors, rotary and inline fuel injection pump, piezoelectric injectors, EGR layout viscous coupling for fan . Common rail direct injection diesel engines (CRDI) controlled by electronic control unit.

Diagnostic tools used for fault finding of two wheelers.

List of Methods to reduce pollution in diesel engines as prescribed in BS6

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**2.2 Combustion in IC engines,** Octane Number (RON, MON) and Knock Resistance.

**2.3 Exhaust emissions & control :** Polluting emissions in IC engines, effects on environment, measurement of exhaust emissions, effect of air-fuel ratio on exhaust emissions (with graph), Euro IV and Euro VI norms for M & N1 vehicles, catalytic converter, SCR.

**2.4 Engine Control Unit (ECU) :** working and diagnosis procedure .

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**3.1 Reciprocating compressors** – applications, working of single stage and two stage compressors with PV diagrams Intercooling.

**3.2 Testing of reciprocating air compressor :** Pressure ratio, compressor capacity, FAD, volumetric efficiency, isothermal efficiency, numerical. Methods of energy saving.

**3.3 Rotary compressors:** Screw, centrifugal, Lobe type, vane type compressors and Axial Flow compressors. Comparison of rotary with reciprocating .

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## UNIT IV

### Chapter 4 : Gas Turbines And Jet Propulsion

**4-1 to 4-13**

#### Syllabus :

- 4.1 Types of gas Turbines:** Constant pressure open cycle and closed cycle gas turbines, Brayton cycle, applications, Aero derivative and heavy frame engine
- 4.2 Jet propulsion:** Turbojet, Turboprop engines.
- 4.3 Rocket propulsion:** liquid and solid propellant systems.

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## UNIT V

### Chapter 5 : Refrigeration and Air Conditioning

**5-1 to 5-42**

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- 5.1 Refrigeration :** Unit of refrigeration, EER, SEER, Carnot cycle, vapor compression cycle, sub cooling and superheating, components of vapor compression systems, refrigerant properties, concepts of GWP & ODP, TEWI, LCCP.
- 5.2 Applications :** Specification, Working and construction of Domestic refrigerator, water cooler, ice plant and cold storage.
- 5.3 Air-conditioning :** Definition, classification – comfort air conditioning, industrial air conditioning, applications.
- 5.4 Psychrometry :** properties of air, psychrometric processes, psychrometric chart.
- 5.5 Applications :** Specification, Working and construction of Window, split air-conditioner, central air-conditioning.

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