GUJARAT TECHNOLOGICAL UNIVERSITY

Mechanical Engineering (Thermal Engineering)

M.E Semester: III

Subject Name: **Advanced Internal Combustion Engine**

Sr.No	Course content
1.	**Review of thermodynamic cycles:-** ideal, fuel – air and real cycles. I.C engine Processes :- Suction, compression, Combustion, Expansion, Fuel injection and carburetion, Exhaust, Supercharged & turbocharged engine, cycle simulation.
2.	**Gas exchange processes:-** Flow through valves, phase of the flow, turbulence, analysis of suction and exhaust processes, manifold tuning.
3.	**Alternate fuels for IC engines:-** Fuels & their properties, future fuels like Hydrogen, Bio gas, Alcohols, producer gas, LPG, CNG- fuels rating Coal- gasification & liquefaction, Non edible vegetable oils, non edible wild oil, NH3 as substitute fuel for SI and CI engine, fuel additives. Pros and cons of alternate fuel.
4.	**Combustion in SI and CI engine:-** Combustion of SI and CI engine, Normal and abnormal combustion parameters effecting various phases of combustion, Combustion chambers, construction and design, Battery, magneto electronic- ignition system in SI engine, Volumetric efficiency.
5.	**Recent development in IC engine:-** MPFI, their advantages & limitations, circuit discussion PIV in turbulence measurement, optical methods for flame velocity measurement, new materials for engine components, alternative power plants, improved two stroke engine, hybrid, propulsion system, Fuel efficient IC engines, emission control technology- emission, economics and performance for alternative fuels for IC engines.
6.	**Air–pollution from I.C. Engines:-** S.I. & C.I. Engine Emission effects of pollutants on Human health & Biological sphere. Measurement techniques used to measure pollutants. Control of emission from S.I. & C.I. engines, Noise pollution & its control. Catalytic converters, Pollution law.

Reference Books:

1. Maleev, “I. C. Engines: Theory and Practice”, McGraw -Hill-2000.
2. Heywood, J. B., “Internal Combustion Engine Fundament als”, McGraw Hill International Edition, 2002.
3. Richard, Stone, “Introduction to Internal Combustion Engines”, 2 nd Edn. McMillan Press, 2003.
4. Taylor, C. F., “Internal Combustion Engine in Theory and Practice”, Vol. 1 & 2, M. I. T. Press, Cambridge, USA, 2003.
5. Juvinall, R. C., and Marshek, K. M., “Fundamental of Machine Component Design”, John Wiley & Sons, N.Y., 2001.