GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN MECHANICAL ENGINEERING
Semester – V

Subject Code **: 2351901**
Subject Name **: Thermal Engineering**

Sr. No.	Subject Content	Hrs.
1.	**Boilers:** 1.1 Concepts, functions, features and classification. 1.2 Detail study of fluidized bed combustion, packaged and oil fired boilers. 1.3 Boiler mounting and accessories. 1.4 Boiler draught system. 1.5 Boiler performances testing and heat balance sheet. 1.6 Application and maintenance of boiler. 1.7 Inspection and safety precautions in boiler house.(As per IBR)	5
2.	**Steam Prime-Movers:** 2.1 Concept of steam prime mover. 2.2 Brief description about heat engine. 2.3 Steam turbine - concept and classification. 2.4 Steam nozzles-types, working and applications. 2.5 Impulse and reaction turbines(constructional and materials details.) 2.6 Compounding of impulse steam turbine.	5
3.	**Steam Condensers and Cooling Towers:** 3.1 Classification and working of condensers. 3.2 Classification and working of cooling towers.	2
4.	**Air Compressors:** 4.1 Concepts, functions and classification. 4.2 Working of reciprocating air compressor and rotary air compressor. 4.3 Single stage, multistage and inter-cooling in compressors. 4.4 Power required and efficiency of reciprocating air Compressors-single and two stage.	5
5.	**Internal Combustion (I. C.) Engines:** 5.1 Concepts and classification. 5.2 I.C. engines parts and their functions. 5.3 Working of two stroke and four stroke cycle Spark Ignition (SI) and Compression Ignition (CI) engines. 5.4 Valve timing of I.C. engine and its explanation on PV diagram. 5.5 Various systems of I.C.engines. 5.6 Carburetion, fuel pump and fuel injectors including Multi Point	10

	Fuel Injectors(MPFI). 5.7 Scavenging and Turbocharger. 5.8 Performance testing on I.C. engine and its heat balance sheet. Familiarization with IS testing. 5.9 Concept of octane and cetane numbers.	
6.	**Echo-Friendly Fuels:** 6.1 Alternatives fuel-types, properties, compositions, advantages, disadvantages and implementation issues.(This includes mainly Compressed Natural Gas(CNG), Liquefied Petroleum Gas(LPG), and Biodiesel).National and International emission norms. 6.2 Systems required for CNG and LPG supply in vehicle. 6.3 Compatibility needs-vaporizer for fuel compatibility, piping and allied needs.	3
7.	**Gas Turbines:** 7.1 Classification, working and application of gas turbine. 7.2 Fuels for gas turbine.	2
8.	**Refrigeration and Air-Conditioning:** 8.1 Introduction , working on PV and TS diagrams and applications of Vapour Compression Refrigeration System (VCRS)and Vapour Absorption Refrigeration System(VARS). 8.2 Working of components of vapour compression refrigeration system. Calculation of Coefficient Of Performance and Refrigeration Effect. 8.3 Properties and applications of commonly used refrigerants including R22,R134a and R717(Ammonia). 8.4 Air conditioning- types and its applications. 8.5 Psychrometry and various Air conditioning processes on Psychrometric charts. 8.6 Window/Split air conditioners.	5
9.	**Heat Transfer:** 9.1 Various mode of heat transfer. 9.2 Conduction heat transfer, Fourier's law, thermal conductivity and heat transfer through composite wall and cylinders. 9.3 Convection heat transfer, Newton's law of convection, Free and force convection, coefficient of convection. 9.4 Radiation heat transfer, Stefan and Boltzmann's law, Black body concept, emissivity, refractivity, absorptivity. 9.5 Over all heat transfer coefficient. 9.6 Heat exchanger : introduction, types and applications	5

Reference Books:

1. Thermal Engineering, P.L.Ballaney.
2. Thermal Engineering, A. S. Sarao.
3. Heat Engines, A.R.Basu & T.P.Mukherjee.
4. Heat Engines, Pandya and Shah.
5. Heat Engineering, Vasandani and Kumar.
6. Elements of Heat Engines, Patel and Karamchandani, Vol. I, II, III.
7. An introduction to Energy conversion, Kadambi and Manoharprasad Vol. I, II, III.
8. Thermodynamics and Heat power Engg, Mathur and Mehta.
9. Heat Engines, D. A. Wrangham.
10. Refrigeration and Air conditioning, Domkundwar.