

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1.1 Ignition point values in °CA before TDC	4
1.2 Mean Pressure vs. Spark-over duration	4
1.3 Mean Pressure vs. Ignition voltage demand	5
1.4 Fuel-Air ratio vs. Quenching distance for different HC	7
1.5 Analysis of gases inside the cylinder	8
1.6 Analysis of gases inside the cylinder (partial throttle)	9
1.7 Air-Fuel ratio vs. Trend of pollution	11
1.8 Correlation between Air-Fuel ratio and CO %	11
1.9 Diluent in intake mixture vs. NO <sub>x</sub> concentration	15
1.10 % EGR vs. Exhaust NO <sub>x</sub>	16
1.11 Smog formation mechanism	18
1.12 Smog intensity as a function of Hydro carbon and Oxides of Nitrogen	19
1.13 Smog Formation by two- and four-stroke engines as a function of Nitrogen dioxide and Hydro carbon	19
1.14 Smog formation in various environmental areas as a function of HC and NO <sub>x</sub>	20
1.15 Possible smog reduction trends as a function of NO <sub>x</sub> and HC	21
3.1 Experimental Setup	52
3.2 Schematic diagram of the experimental concept	54
3.3 Orifice Plates	56
3.4 Air and Gas flow rates with Orifice meter	57

3.5	Photographic View of the Exhaust Gas Analyzer	59
3.6	Photographic View of the Exhaust Gas Pipe	59
4.1	Brake Power vs. Brake Thermal Efficiency 5 % Uncooled EGR	65
4.2	Brake Power vs. Brake Thermal Efficiency 5 % Cooled EGR	66
4.3	Brake Power vs. Brake Thermal Efficiency 10 % Uncooled EGR	67
4.4	Brake Power vs. Brake Thermal Efficiency 10 % Cooled EGR	68
4.5	Brake Power vs. Brake Thermal Efficiency 15 % Uncooled EGR	70
4.6	Brake Power vs. Brake Thermal Efficiency 15 % Cooled EGR	71
4.7	Brake Power vs. Brake Thermal Efficiency 6 mm Orifice and Cooled EGR	72
4.8	Brake Power vs. Specific Fuel Consumption 5 % Uncooled EGR	75
4.9	Brake Power vs. Specific Fuel Consumption 5 % Cooled EGR	76
4.10	Brake Power vs. Specific Fuel Consumption 10 % Uncooled EGR	77
4.11	Brake Power vs. Specific Fuel Consumption 10 % Cooled EGR	78
4.12	Brake Power vs. Specific Fuel Consumption 15 % Uncooled EGR	80
4.13	Brake Power vs. Specific Fuel Consumption 15 % Cooled EGR	81
4.14	Brake Power vs. Specific Fuel Consumption 6 mm Orifice and Cooled EGR	83

4.15	Brake Power vs. Mass Flow Rate 10 % cooled EGR	85
4.16	Brake Power vs. Mass Flow Rate 6 mm orifice	87
4.17	Brake Power vs. Scavenging Efficiency 6 mm orifice	89
4.18	Brake Power vs. Trapping Efficiency 6 mm orifice	90
4.19	EGR Rate vs. CO Emission for uncooled EGR	92
4.20	EGR Rate vs. CO Emission cooled EGR	93
4.21	EGR Rate vs. CO <sub>2</sub> Emission uncooled EGR	96
4.22	EGR Rate vs. CO <sub>2</sub> Emission cooled EGR	97
4.23	EGR Rate vs. HC Emission uncooled EGR	100
4.24	EGR Rate vs. HC Emission cooled EGR	102
4.25	EGR Rate vs. NO <sub>x</sub> Emission uncooled EGR	105
4.26	EGR Rate vs. NO <sub>x</sub> Emission cooled EGR	106