Appendix IV

Specimen Calculations

The specimen calculations of BTHE, BSFC, BMEP and Volumetric efficiency are given in the appendix. The calculations shown are for the reading corresponding to CR of 18 and fuel as Diesel oil given in Table III.2 in Appendix III.

IV.1 Data

IC Engine set up under Test: Single cylinder, VCR Diesel having power 3.50 kW, Four stroke , Constant Speed, Water Cooled, Diesel Engine,

Speed: 1500 rpm,

Cylinder Bore Diameter: 87.50 mm,

Stroke Length: 110.00 mm,

Connecting Rod Length: 234.00 mm,

Compression Ratio: 18.00,

Swept Volume: 661.45 cc

Brake Power: 3.36 KW

Fuel Flow Rate: 1.04 kg/hr

Air Flow Rate: 28.63 kg/hr

Calorific Value of fuel: 42000 kJ/kg

Density of Air (ρ_a): 1.127 kg/cu m

IV. 2 Brake Mean Effective Pressure

$$BMEP = \frac{BP\ (KW) \times 60}{L \times A \times \left(\frac{N}{n}\right) \times No\ of\ cylinders \times 100}$$

$$= \frac{3.36 \times 60}{0.11 \times \left(\frac{\pi}{4}\right) \times 0.0875^2 \times \left(\frac{1472}{2}\right) \times 100}$$

$$= 4.14\ bar$$

IV.3 Brake Specific Fuel Consumption

$$BSFC = \frac{Fuel\ flow\ in \frac{kg}{hr}}{BP}$$

$$= \frac{1.04}{3.36}$$

$$= 0.31\ \frac{kg}{kWh}$$

IV.4 Brake Thermal Efficiency

$$\eta_{bth} = \frac{BP \times 3600 \times 100}{Fuel\ flow\ in \frac{kg}{hr} \times Calorific\ Value}$$

$$= \frac{3.36 \times 3600 \times 100}{1.04 \times 42000}$$

$$= 28\ \%$$

IV.5 Volumetric efficiency

$$\eta_{vol} = \frac{Airflow\ in\ kg/hr \times 100}{\left(\frac{\pi}{4}\right) \times D^2 \times L \times \left(\frac{N}{n}\right) \times 60 \times No\ of\ cylinders \times \rho_a}$$

$$= \frac{28.63 \times 100}{\left(\frac{\pi}{4}\right) \times 0.0875^2 \times 0.11 \times \left(\frac{1472}{2}\right) \times 60 \times 1 \times 1.127}$$

$$= 87\%$$