## **List of Tables**

Table 1.1: The categorization of the wind power density [3]6
Table 2.1: The common continuous distributions that are used to model wind speed
data23
Table 2.2: Summary of research carried out till-date in mixture Modelling26
Table 2.3: Summary of the research up till now on methods employed in parameters
estimation of <i>W.pdf</i> 32
Table 2.4: Comparative assessment of various methods to estimate Weibull parameters on four different criteria
Table 2.5: The different analytical models to predict normalized power curve36
Table 2.6: Types of the commercially available turbine and the analytical models to
express the normalized power
Table 3.1: Different meteorological stations of India
Table 3.2: Numerical values of Weibull parameters for hourly mean wind speed data
for 40 locations in India61
Table 4.1: Description of the stations.
Table 4.2: Comparison of rational formulae for the Modified Energy Pattern Function.
75
Table 4.3: Modified Energy Pattern Factor coefficient for both shape and scale
parameters76
Table 5.1: Mean monthly and annual variation of Weibull parameters, mean wind
speed, and wind power density in Trivandrum at 10 m height104
Table 5.2: Mean monthly and annual variation of Weibull parameters, mean wind
speed, and wind power density in Ahmedabad at 10 m height
Table 5.3: Mean monthly and annual variation of Weibull parameters, mean wind
speed, and wind power density in Calcutta at 10 m height
Table 5.4: Monthly and annually estimated goodness of fit for wind speed and wind
power density in Trivandrum at 10 m height110
Table 5.5: Monthly and annually estimated goodness of fit for wind speed and wind
power density in Ahmedabad at 10 m height
Table 5.6: Monthly and annually estimated goodness of fit for wind speed and wind
power density in Calcutta at 10 m height

Table 5.7: Average output power density and turbine performance index for the three
stations at 30 m hub height.
Table 5.8: Average output power density and turbine performance index for the three
stations at 60 m hub height.
Table 5.9: Characteristics of the commercially available selected wind turbines118
Table 5.10: Average output power density and turbine performance index of the
selected wind turbines for the three stations at 30 m and 60 m hub heights120
Table 6.1: Estimated parameters with mixture Weibull distribution
Table 6.2: Estimated parameters for various probability density functions134
Table 6.3: Measure of goodness of fit for wind speed distribution
Table 6.4: Comparison of various distributions based on percentage error in wind
power density139
Table 7.1: Generalized Extreme Value distribution type and their properties148
Table 7.2: Plotting position formulae used in this study for comparison
Table 7.3: Estimation of design wind speed based on fitting of EVD on month, Sub-
annual and Annual maxima with the goodness of fit for Trivandrum159
Table 7.4: Estimation of design wind speed based on fitting of EVD on month, Sub-
annual and Annual maxima with the goodness of fit for Ahmedabad162
Table 7.5: Estimation of design wind speed based on fitting of EVD on month, Sub-
annual and Annual maxima with the goodness of fit for Calcutta165
Table 7.6: Akaike Information Criteria for GPD and Fréchet distributions167
Table 7.7: Goodness of fit for six different plotting position formulae170
Table 8.1: Estimated parameters for circular probability density function
Table 8.2: Measure of goodness of fit for circular probability density functions182