

Climatic Profile of Nanded and Parbhani Cities

3.0 Introduction

Climate is the nothing but the fundamental things of metrological parameters like temperature, rainfall, humidity, wind velocity or speed etc. So, this chapter is specially focused on the rainfall and temperature of the two cities namely Parbhani and Nanded. From the Marathwada is the central part of Maharashtra state. Therefore the details of this are explained in details.

3.1 Statistical analysis of temperature of Parbhani

The daily minimum and maximum temperature of Parbhani recorded by IMD Pune for period 1969-2010 was collected from Indian

metrological Department, Pune since this study consist of annual, seasonal, monthly, daily analysis of maximum, minimum, mean temperature. We calculated annual mean maximum, minimum, mean temperature. Daily mean temperature was calculated by taking arithmetic mean of daily Maximum and minimum temperature. Diurnal temperature was calculated by subtracting minimum temperature from the maximum temperature.

Monthly Mean temperature was calculated by taking arithmetic mean of daily temperature of that particular month. Likewise, seasonal mean temperature was also calculated by averaging daily temperature of that season. From the monthly values, annual (January-December) and seasonal (winter: January, February; summer: March May; monsoon: June-September; post monsoon: October. November December) time series of all parameters under study viz. mean maximum temperature (Tmax), mean minimum temperature (Tmin), mean temperature (Tmean), are prepared.

The monthly, seasonal and annual mean and coefficient of variation (COV), kurtosis coefficient and skewness coefficient of Tmax, Tmin, Tmean for entire period of study (1969-2010) are computed and given in their respective Table Similarly, mean, COV of each month and season to the annual mean. There was some missing data and for missing values we have taken arithmetic average of last three values.

3.2 Descriptive statistics of annual temperature of Parbhani and Nanded

The basic statistical parameter related to annual Tmax (ATmax), annual minimum temperature (ATmin), annual mean temperature (ATmean) of Parbhani and Nanded station has been given in annexure 3.1, 3.2, 3.3 and 3.4. And explained below

3.2.1 Annual Maximum Temperature (ATmax)

The mean of ATmax of Parbhani was 33.8°C. From annexure 3.1 it can be understood that the maximum mean annual Tmax observed in the year 1972 was 34.50°C. The minimum annual mean minimum temperature was observed in the year 1990 was 32.50°C. Maximum coefficient of variation (COV) observed in 1973 which was 16.131 for the year 1973 which showed that Tmax was more variable in the year 1973. Minimum COV was observed in the year 2009 and was 10.823 this showed that Tmax was more stable in the year 2009.

For Nanded the mean of ATmax was 34.10°C. The maximum of ATmax was observed in the year 1972 and it was 35.10°C. The minimum of ATmax was observed in the year 2007 was 31.50°C. Maximum COV observed in 1973 which was 15.728% for the year 1973 which showed that ATmax was more variable in the year 1973. Minimum COV was observed in the year 2009 and was 10.823 this showed that ATmax was more stable in the year 2009.

3.2.2 Annual Minimum Temperature (ATmin)

The average ATmin of Parbhani was 20.3°C and. From annexure 3.2 it can be told that the maximum mean ATmin witnessed in the year 1980 was 21.20°C. The minimum of ATmin was observed in the year 2009 and it was 18.20°C. Maximum COV observed in 2005 which was 27.354% for the year 2005 which showed that ATmin was more variable in the year 2005. Minimum COV was observed in the year 1982 and was 17.999 was showed that ATmin was more stable in the year 1982.

For Nanded the average of ATmin was 19.40°C. The maximum of ATmin observed in the year 2003 was 21.10°C. The minimum of ATmin was observed in the year 1984 and it was 15.80°C. Maximum COV observed in 1983 which was 32.464% for the year 2005 which showed that Tmin was more variable in the year 1983. Minimum COV was

observed in the year 1983 and was 19.715% was showed that Tmin was more stable in the year 1983.

3.2.3 Annual Mean Temperature (ATmean)

The average annual mean of mean temperature of Parbhani was 27°C. From annexure 3.3 it can be seen that the minimum mean annual ATmean observed in the year 1972 was 34.50°C. The minimum annual mean minimum temperature was observed in the year 1990 was 32.50°C. Maximum COV observed in 1973 which was 16.13% for the year 1973 which showed that ATmean was more variable in the year 1973. Minimum COV was observed in the year 2009 and was 10.823 this showed that ATmean was more stable in the year 2009.

For Nanded the mean of ATmean was 26.80°C. From annexure 3.3 it can be seen that the maximum of ATmean was observed in the year 2003 was 27.70°C. The minimum ATmean was observed in the year 1984 and it was 24.60°C. Maximum COV observed in 1983 which was 18.348% for the year 1983 which showed that ATmin was more variable in the year 1983. Minimum COV was observed in the year 2006 and was 12.239% this showed that ATmin was more stable in the year 2006.

Most of ATmax, ATmin, and ATmean showed negative kurtosis coefficient representing that a distribution was flatter than the normal distribution. The skewness coefficient for most of the ATmax, ATmin, ATmean are positive signifying that the lower Tmin happens frequently whereas higher value occurs seldom. For some ATmin skewness coefficient was equal to zero or nearly zero indicating that the data follows a normal distribution.

3.3 Descriptive Statistics of Seasonal Maximum Temperature of Parbhani and Nanded

The basic statistical parameter related to winter maximum temperature (WTmax), summer maximum temperature (STmax),

Monsoon maximum temperature (MTmax), Post Monsoon maximum temperature (PMTmax) of Parbhani and Nanded station has been given in annexures 3.4, 3.5, 3.6 and 3.7 and explained as below.

3.3.1 Winter maximum Temperature (WTmax)

The mean of WTmax for Parbhani was 31.6°C. From annexure 3.4 it can be seen that the minimum of WTmax observed in the year 1995 and it was 29.50°C. The maximum of WTmax was detected in the year 1973 was 33.50°C. The COV of WTmax was 2.830. Maximum COV observed in 1981 which was 11.772% which showed that WTmax was more variable in the year 1981. Minimum COV for WTmax was observed in the year 1979 and was 5.217% this showed that Tmax was more stable in the year 1979.

For Nanded the mean of WTmax for Parbhani was 32°C. From annexure 3.4 it can be seen that the maximum of WTmax was observed in the year 2006 and it was 34.20°C. The minimum of WTmax was detected in the year 1984 was 28.40°C. The COV of WTmax was 3.3911 Maximum COV observed in 1981 which was 13.053% which showed that WTmax was more variable in the year 1981. Minimum COV for winter Tmax was observed in the year 1986 and was 4.150% this showed that Tmax was more stable in the year 1986.

Most of the WTmax, STmax, MTmax, and PMTmax have negative kurtosis coefficient showing that a distribution was flatter than the normal distribution. The skewness coefficient for most of the winter means Tmax are positive, indicating that the lesser Tmax happens frequently whereas higher value happens rarely. For some Tmin skewness coefficient was equal to zero or nearly zero indicating that the data follows a normal distribution.

3.3.2 Summer Maximum Temperature (STmax)

The seasonal mean of STmax for Parbhani was 39.8°C. From annexure 3.5 it can be seen that the minimum of STmax witnessed in the

year 1995 was 37.80°C. The maximum of STmax was detected in the year 2010 and it was 41.80°C. The COV of STmax was 2.301%. Maximum COV observed in 1989 which was 10.682% which showed that STmax was more variable in the year 1989. Minimum COV for STmax was observed in the year 1972 and was 4.842% this showed that STmax was more stable in the year 1972.

For Nanded the mean of STmax was 39.70°C. The maximum of WTmax was observed in the year 1973 and it was 41.90°C. The minimum of WTmax was detected in the year 2007 and it was 36.30°C. The COV of WTmax was 2.1829. Maximum COV observed in 1984 which was 16.021 % which showed that WTmax was more variable in the year 1984. Minimum COV for WTmax was observed in the year 1972 and was 4.630% this showed that WTmax was more stable in the year 1972.

3.3.3 Monsoon Maximum Temperature (MTmax)

The seasonal mean of MTmax for Parbhani was 32.5°C. From annexure 3.6 it can be seen that the minimum temperature of MTmax observed in the year 1995 and it was 29.5°C. The maximum MTmax was detected in the year 1973 was 33.50°C. The COV of MTmax was 2.830. Maximum COV observed in 1981 which was 11.772% which revealed that MTmax was more variable in the year 1981. Minimum COV for MTmax was observed in the year 1979 and was 5.217% this showed that MTmax was more stable in the year 1979.

For Nanded the mean of MTmax was 32.50°C. The maximum of MTmax was observed in the year 1972 and it was 31°C. The minimum of MTmax Temperature was detected in the year 1990. The COV of MTmax was 2.369 %. Maximum COV observed in 1983 it was 13.134% which showed that MTmax was more variable in the year 1983. Minimum COV for MTmax was observed in the year 1990 and was 5.814% this showed that MTmax was more stable in the year 1990.

3.3.4 Post Monsoon maximum Temperature (PMTmax)

The mean of PMTmax for Parbhani was 30.70°C. From annexure 3.7 it can be seen that the minimum of PMTmax was observed in the year 1983 and it was 29.20°C. The maximum of PMTmax temperature was observed in the year 1986 and 2008 and it was 32.20°C. The COV of PMTmax was 2.594%. Maximum COV observed in 1986 which was 10.156% for the year 1986 which showed that PMTmax was more variable in the year 1986. Minimum COV for post monsoon was observed in the year 2009 and was 3.920% this showed that PMTmax was more stable in the year 2009.

The mean of PMTmax for Nanded was 31.20°C. From annexure 3.7 it can be understood that the minimum of PMTmax observed in the year 1975 was 29.90°C. The maximum of PMTmax was observed 34°C in the year 1976. The COV of PMTmax was 2.559%. Maximum COV observed in 2004 it was 14.454% for the year 2004 which showed that PMTmax was more variable in the year 2004. Minimum COV for PMTmax was observed in the year 1990 and was 4.759% this showed that PMTmax was more stable in the year 1990.

Most of the WTmax, STmax, MTmax, and PMTmax have negative kurtosis coefficient demonstrating that a distribution was flatter than the normal distribution. The skewness coefficient for most of the winter means Tmax are positive showing that the lower Tmax occurs frequently whereas higher value happens rarely. For some Tmin skewness coefficient was equal to zero or nearly zero indicating that the data follows a normal distribution.

3.4 Descriptive statistics of seasonal Minimum Temperature of Parbhani and Nanded

The basic statistical parameter related to winter minimum temperature (WTmin), summer minimum temperature (STmin), Monsoon minimum temperature (MTmin), Post Monsoon minimum temperature

(PMTmin) of Parbhani and Nanded station has been given in annexure 3.8, 3.9, 3.10 and 3.11 and explained as below.

3.4.1 Winter Minimum Temperature (WTmin)

The seasonal mean of maximum temperature of winter for Parbhani was 31.6°C. From annexure 3.8 it can be realized that the minimum of winter maximum temperature observed in the year 1995 and it was 29.50°C. The maximum of maximum winter (Tmax) temperature was detected in the year 1973 was 33.50°C. The COV of WTmax was 2.830. Maximum COV observed in 1981 it was 11.772% which showed that WTmax was more variable in the year 1981. Minimum COV for winter Tmax was observed in the year 1979 and was 5.217% this showed that Tmax was more stable in the year 1979.

For Nanded the mean of WTmin was 14.40°C. The minimum of WTmin observed in the year 1983 and it was 11.40°C. The maximum of WTmin was detected in the year 2005 was 16.60°C. The COV of WTmax was 8.997%. Maximum COV observed in 1972 which was 31.551% which showed that WTmax was more variable in the year 1972. Minimum COV for winter Tmax was detected in the year 1988 and was 8.975% this showed that Tmax was more stable in the year 1988.

3.4.2 Summer Minimum Temperature (STmin)

The seasonal mean of minimum temperature of summer for Parbhani was 23.7°C. From annexure 3.9 it can be seen that the minimum of minimum summer temperature was observed in the year 2000 was 21.9°C. The maximum of minimum summer (Tmin) temperature was detected in the year 1973 and it was 25.3°C.

The COV of Summer Tmin was 3.0959%. Maximum COV observed in 2000 which was 19.617% which showed that summer Tmin was more variable in the year 2000. Minimum COV for minimum summer (Tmin) temperature was observed in the year 1977 and was 9.776% this showed that Tmax was more stable in the year 1977.

For Nanded the mean of STmin for Parbhani was 22.20°C. From annexure, it can be perceived that the minimum of STmin was observed in the year 1984 and it was 15.70°C. The maximum of STmin was detected in the year 1973 and it was 24.90°C. The COV of STmin was 7.392 % Maximum COV observed in 1986 which was 20.763% which showed that STmin was more variable in the year 1986. Minimum COV for STmin temperature was observed in the year 1982 and was 12.002% this showed that STmin was more stable in the year 1982.

3.4.3 Monsoon Minimum Temperature (MTmin)

The mean of MTmin for Parbhani was 23.1°C. From annexure 3.10 it can be seen that the minimum temperature of MTmin was observed in the year 2009 and it was 18.2°C. The maximum of MTmin was detected in the year 1987 and it was 24°C. The COV of MTmin was 3.7120. Maximum COV observed in 2009 which was 24.380 % it showed that MTmin was more variable in the year 2009. Minimum COV for MTmin was observed in the year 1990 and it was 3.520% this showed that MTmin was more stable in the year 1990.

The mean of MTmin for Nanded was 22.60°C. From annexure 3.11 it can be stated that the minimum of MTmin was observed in the year 1984 and it was 19.60°C. The maximum of MTmin was detected in the year 2002 was 24.50°C. The COV of MTmin was 4.838%. Maximum COV observed in 1984 which was 13.345% which showed that MTmin was more variable in the year 1984. Minimum COV for MTmin was observed in the year 1990 and was 4.068% this showed that MTmin was more stable in the year 1990.

3.4.4 Post Monsoon Minimum Temperature (PMTmin)

The seasonal mean of PMTmin for Parbhani was 16.5°C. From annexure 3.12 it can be understood that the minimum of PMTmin observed in the year 2005 and it was 14.4°C. The maximum of PMTmin temperature was observed in the year 1997 and it was 18.7°C. The

COV of PMTmin temperature was 5.850% Maximum COV observed in 1998 which was 31.817% for the year 1998 it showed that PMTmin was more variable in the year 1986. Minimum COV for PMTmin was observed in the year 1997 and it was 10.413% this showed that PMTmax was more stable in the year 1997.

The mean of PMTmin for Nanded was 15.60°C. The minimum of PMTmin was observed in the year 1983 and it was 11.60°C. The maximum of PMTmin was observed 17.80°C in the year 2003. The COV of PMTmin was 9.564% Maximum COV observed in 1970 which was 41.624% which displayed that PMTmin was more inconstant in the year 1970. Minimum COV for PMTmin was observed in the year 2005 and was 15.440% this revealed that PMTmin was more stable in the year 2005.

Most of the WTmin, STmin, MTmin, and PMTmin Tmax have negative kurtosis coefficient indicating that a distribution was flatter than the normal distribution. The skewness coefficient for most of the winter means Tmax are positive signifying that the lower Tmax happens frequently whereas higher value happens rarely. For some Tmin skewness coefficient was equal to zero or nearly zero indicating that the data follows a normal distribution.

3.5 Descriptive Statistics of Monthly Temperature of Parbhani And Nanded

The basic statistical parameter related to monthly maximum temperature (mTmax) and monthly minimum temperature of Parbhani and Nanded station have been given in annexures for the period 1969 to 2010

3.5.1 Monthly Maximum Temperature (mTmax)

From annexure 3.12A it is clear that for Parbhani maximum of mTmax was recorded in May and April and it was 43.9°C and 42.6°C respectively. Minimum of mTmax was observed in December and it was 27.6°C. Maximum mean of mTmax was found in May and it was 41.6°C. Minimum mean of mTmax was found in December and it was 29.2°C.

Maximum COV was found in June and it was 4.987%. Minimum COV was found in April and it was 2.463% which mean mTmax was more variable in June and most stable in April.

From annexure 3.12.b it is clear that for Nanded maximum of mTmax was recorded in May and April and it was 44.2°C and 42.7°C respectively. Minimum of mTmax was observed in December and it was 28.7°C. Maximum mean of mTmax was found in May which was 41.2°C. Minimum mean of mTmax was found in December and it was 29.8°C. Maximum COV was found in June and it was 5.752%. Minimum COV was found in April and it was 1.996% it means mTmax was more variable in June and most stable in April.

3.5.2 Monthly Minimum Temperature (mTmin).

From annexure 3.13A it is clear that for Parbhani maximum of mTmin was recorded in May and it was 27.9°C. Minimum of mTmin was observed in December and it was 10.4°C. Maximum mean of mTmin was found in May and it was 26.50°C. Minimum mean of mTmin was found in December and it was 13.30°C. Maximum COV was found in November and it was 11.75%. Minimum COV was found in August which was 1.571% which mean mTmin was more variable in November and most stable in August.

From annexure 3.13B it is clear that for Nanded maximum of mTmin was recorded in May and it was 28.1°C. Minimum of mTmin was observed in December and it was 8.25°C. Maximum mean of mTmin was found in May it was 25°C. Minimum mean of mTmin was observed in December and it was 12.30°C. Maximum COV was observed in December and it was 12.30%. Minimum COV was found in August and it was 4.648% which mean mTmin was more variable in December and most stable in August.

Most of the mTmax and mTmin have negative kurtosis coefficient representing that a distribution was flatter than the normal distribution. The skewness coefficient for most of the winter means Tmax are positive

showing that the lower Tmax occurs frequently whereas higher value happens rarely. For some Tmin skewness coefficient was equal to zero or nearly zero indicating that the data follows a normal distribution.

3.6 Descriptive statistics for daily temperature of Parbhani and Nanded

The basic statistical parameter related to daily maximum temperature (dTmax), daily minimum temperature (dTmin) of Parbhani and Nanded station have been given in annexure for the period 1969 to 2010.

3.6.1 Daily Maximum Temperature (dTmax)

From annexure 3.14A and above statistical analysis of daily maximum temperature of Parbhani it was cleared that maximum mean of daily maximum temperature was observed in 1972 which was 34.50°C. Minimum mean of daily maximum temperature for Parbhani for given periods was observed in 1975 and it was 33.20°C. Maximum COV was detected in 1973 and it was 16.13% which means daily maximum temperature was less stable (more variable) in 1973. Minimum COV was observed in the year 2009 and it was 10.83% which means daily maximum temperature was more stable in 2009.

From annexure 3.14B statistical investigation of dTmax of Nanded it is cleared that maximum mean of dTmax was detected in 1969 which was 35°C. Minimum mean of dTmax for Nanded for given periods was witnessed in 2007 and it was 31.50°C. Maximum COV was detected in 1984 and it was 15.645 % which means dTmax was less stable (more variable) in 1984. Minimum COV was observed in the year 1971 and it was 12.292% which means dTmax was more stable in 1971.

3.6.2 Daily Minimum Temperature (dTmin)

From annexure 3.15A and statistical analysis of daily minimum temperature of Parbhani it was clear that maximum mean of dTmin was observed in 1980 which was 21.20°C. Minimum mean of daily minimum

temperature for Parbhani for given periods was detected in 1971 and it was 4.80°C. Maximum COV was detected in 2005 and it was 27.354% which means daily minimum temperature was less stable (more variable) in 2005. Minimum COV was observed in the year 1982 and it was 17.999% which means dTmin was more stable in 1982.

From annexure 3.15B statistical study of dTmin of Nanded it was clear that maximum mean of dTmin was observed in 1980 which was 21.20°C. Minimum mean of dTmin for Nanded for given periods was witnessed in 1971 and it was 4.80°C. Maximum COV was detected in 2005 and it was 27.354% which means dTmin was less stable (more variable) in 2005. Minimum COV was observed in the year 1982 and it was 17.999% which means dTmin was more stable in 1982.

Daily Maximum temperature (dTmax), daily minimum Temperature (dTmin) of Parbhani and Nanded have negative kurtosis coefficient showing that a distribution was flatter than the normal distribution. The skewness coefficient of daily minimum temperature (Tmin) was negative indicating that the lower daily minimum temperature (Tmin) happens rarely whereas higher value happens frequently.

3.7 Statistic Analysis of Rainfall of Parbhani and Nanded Cities

3.7.1. Descriptive Statistics for Annual Rainfall

The basic statistical parameter related to total annual rainfall of Parbhani and Nanded station has been given in annexure 3.16. The average annual mean rainfall of Parbhani was 947.04 mm. From annexure 3.16 it can be seen that the maximum total annual rainfall was observed in the year 1988 and it was 1783mm. Minimum of annual rainfall was observed in the year 1982 was 440.70 mm. The COV of annual rainfall was 32.399%.

For Nanded the mean of annual rainfall was 924.80 mm. From annexure 3.16 it can be seen that the maximum of total annual rainfall was witnessed in the year 2007 and it was 2620 mm. The minimum of

total rainfall was observed in 1972 and it was 351 mm. The COV of total annual rainfall was 38.748%.

Total annual rainfall of Parbhani and Nanded have positive kurtosis coefficient indicating that a distribution was not flatter than the normal distribution. The skewness coefficient of daily maximum temperature (dTmax) was positive indicating that the lower dTmax happens frequently whereas higher value happens rarely.

3.8 Descriptive Statistics for Seasonal Rainfall

The basic statistical parameter related to Monsoon rainfall (MRF), Post Monsoon rainfall (PMRF) of Parbhani and Nanded station has been given in annexure and explained as below.

3.8.1 Monsoon rainfall (MRF)

The seasonal mean of MRF for Parbhani was 6.50 mm from annexure 3.17 it can be seen that the minimum of summer mean rainfall was observed in 1982 and it was 3.0 mm. The maximum of monsoon mean rainfall was detected in the year 1988 and it was 14.10mm. The COV of monsoon mean rainfall was 38.023%. Maximum COV observed in 2005 it was 359.732% which showed that monsoon rainfall was more variable in the year 2005. Minimum COV for monsoon rainfall was observed in the year 2000 and was 118.804% this showed that Tmax was more stable in the year 2000.

For Nanded the mean of MRF was 6.40 mm from annexure 3.17 it can be seen that the minimum of MRF was observed in 1972 and it was 2.5mm. The maximum of MRF was detected in the year 1983 and it was 11.10 mm. The COV of MRF was 26.836%. Maximum COV observed in 2006 which was 366.502% which showed that MRF was more variable in the year 2006. Minimum COV for MRF was observed in the year 1988 and was 119.663% this showed that MRF was more stable in the year 1988.

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3.8.2 Post Monsoon rainfall (PMRF)

The seasonal mean of mean rainfall of post monsoon for Parbhani was 0.41 mm from annexure 3.18 it can be seen that the minimum of mean post monsoon rainfall was detected for most of the years. The maximum of post monsoon mean rainfall was detected in the year 1987 and it was 2.6 mm. The COV of post monsoon mean rainfall was 136.307%. Maximum COV observed in 1990 and it was 959.166% which showed that post monsoon rainfall was more variable in the year 1990. Minimum COV for monsoon rainfall was observed in the year 2000 and was 225.036% this showed that mean post monsoon rainfall was more stable in the year 2000.

For Nanded the seasonal mean of mean rainfall of post monsoon for Nanded was 1.30 mm from annexure it can be seen that the. The maximum of post monsoon mean rainfall was detected in the year 2007 and it was 16.40 mm. The COV of Post monsoon mean rainfall was 200.597%. Maximum COV observed in 1970 which was 959.166% which showed that post monsoon rainfall was more variable in the year 1970. Minimum COV for post monsoon rainfall was observed in the year 1994 and it was 246.458% this showed that MRF was more stable in the year 1994.

Most of the MRF, PMRF of Parbhani and Nanded have positive and high kurtosis coefficient indicating that a distribution was not flat than the normal distribution. The skewness coefficient for most of the post monsoon mean rainfall is positive indicating that the lower rainfall value happens frequently whereas higher value happens rarely.

3.9 Descriptive Statistics for Monthly Rainfall of

The plain statistical parameter related to monthly mean rainfall (mRF) of Parbhani and Nanded station have been given in annexure for the period 1969 to 2010. From annexure 3.19.A and statistical analysis of mRF of Parbhani it was clear that maximum mean of mRF was observed in July and it was 4.864 mm while minimum mean of mRF was

detected in the February and it was 0.50 mm. The maximum mRF for the given period was observed for August in the year 1988 and it was 17.80mm, while minimum mRF was observed in the January (1995) and February (1984) and it was 2.77 mm.

The maximum COV of mRF was witnessed in December and it was 324.48% which means that mean monthly rainfall was less stable in the December. Minimum COV was observed in June that means mRF was more stable in June. From annexure 3.19B and statistical examination of mRF of Nanded it was clear that maximum mean of mean monthly rainfall was observed in August and it was 7.50 mm, while minimum mean mRF was detected in the January and it was 0.10 mm. The maximum mRF for the given period was observed in July in the year 2005 and it was 21.10 mm. while minimum monthly rainfall was observed in the January (1995) and February (1984) and it was 2.77mm.

The maximum COV of mean monthly rainfall was observed in December and it was 324.48% which means that mean monthly rainfall was less stable in the December. Minimum COV was observed in June it means mean monthly rainfall was more stable in June. mRF of Parbhani and Nanded have positive kurtosis coefficient indicating that a distribution was not flat than the normal distribution. The skewness coefficient of mRF was positive indicating that the lower mRF of Parbhani happens frequently whereas higher value happens rarely.

3.10 Descriptive Statistics for Daily Rainfall

The elementary numerical parameter related to daily rainfall (dRF) of Parbhani station have been given in annexure 3.20A for the period 1969 to 2010. From annexure 3.20A and statistical analysis of daily rainfall of Parbhani it can be concluded that maximum of mean of dRF of Parbhani was detected in 1988 and it was 4.90 mm. the minimum mean for dRF of was detected in 1982 and it was 1.20 mm.

Maximum dRF was ensued in the year 1989 and it was 254.40 and minimum rainfall was occurred in 2000 which was 38.20 mm.

maximum COV was observed for 1994 and it was 539.62% it means that daily rainfall was less stable in 1994. Minimum COV was observed in 2000 and it was 207.92% it means daily rainfall was more stable in 2000.

For Nanded maximum mean of dRF of Nanded was detected in 2007 and it was 7.20 mm. the minimum mean for dRF of was detected in 1972 and it was 1.00 mm. Maximum rainfall was occurred in the year 2007 and it was 300 mm and minimum rainfall was occurred in 1972 in which was 37.80 mm. maximum COV was observed for 2006 and it was 629.92% it means that dRF was less stable in 2006. Minimum COV was observed in 1988 and it was 215.98 % it means dRF was more stable in 1988.

Daily rainfall (dRF) of Parbhani and Nanded have positive kurtosis coefficient signifying that a distribution was not flat than the normal distribution. The skewness coefficient of dRF was positive indicating that the lower dRF of Parbhani and Nanded happens frequently whereas higher value happens rarely.

3.11 Resume

The present chapter is mainly deals with descriptive statistical analysis and nature of temperature and rainfall of Parbhani and Nanded. The chapter includes introduction, statistical investigation and techniques etc. This chapter enclosed 3rd objective to analyze the available climatic data with proper statistical methods and geographical models)

In addition to these, arrangement of text been discussed in brief. Subsequently such for this, the trends of annual, seasonal, monthly and daily trends, extreme of temperature are discussed in fourth chapter

