

***Computation Of  
Evapotranspiration***

## CHAPTER 7

### COMPUTATION OF EVAPOTRANSPIRATION

*Using the valuable informations on meteorological parameters, reference crop evapotranspiration is estimated by various prediction methods. Comparative analysis on estimated ETo for five stations under study is covered in this chapter.*

#### 7.1 PREDICTION METHODS

In chapter 3, several prediction methods are narrated under para 3.4.4. It can be seen from the recommended empirical relationships that in each method, ETo is based on meteorological parameters and some constants. Table 5.1 shows various required meteorological parameters. The methods selected for comparison and verification are Penman, Blaney-Criddle, Radiation, Pan evaporation, Hargreaves, Jensen-Haise and Thornthwaite. The FAO recommended Penman, Blaney-Criddle,

Radiation and Pan evaporation methods for its world wide applicability and therefore these four methods are selected. Hargreaves method is selected because it is based on several world wide lysimeter experiments and found that the equation closely predicts measured ET. Many researchers evaluated that the Jensen-Haise method is one of the best method in group of methods using solar radiation plus temperature. Jensen-Haise equation is the result of about 3000 measurements of ET over 35 year period and hence selected. Thornthwaite developed temperature based equation for temperate continental climate and the region under study is also in the tropical area. Hence an attempt is done to find its validity for this region. The estimates of ETo based on Penman method are usually made by following the well developed computational procedure of Doorenbos and Pruitt which is popularly known as modified Penman method. Its advantage lies in the fact that it has a world wide applicability besides a reasonable degree of accuracy. The disadvantage of this method lies in the fact that, computational procedure is quite elaborate for routine field level use. Other prediction methods requires less data and they are easy for local use. However empirical relationships, other than Penman, are developed for a particular region considering single or two parameters. It is therefore necessary to calibrate and compare these methods using data of the region under consideration.

## 7.2 ESTIMATION OF ETo

7.2.1 Weekly average values of meteorological parameters, calculated for all five stations, are given in annexures 6.1 to 6.36 and table 6.1 to 6.6. Computer programmes for calculating reference crop evapotranspiration are prepared for Penman, Blaney-Criddle, Radiation and Pan evaporation methods. Programmes for all four methods are given vide annexures 7.1 to 7.4. ETo by remaining three methods namely Hargreaves, Jensen-Haise and Thornthwaite was calculated using LOTUS package. The data required to fit in the various equations is converted from the observed data and used to solve the equations. Weekly average values of ETo are calculated for each station by all the seven methods and the output are given in annexures 7.5 to 7.8. Weekly averages of ETo worked out for all five stations by seven different methods are shown in table 7.1 to 7.7.

Above tables shows weekly average values of ETo worked out by each method for five stations. Average ETo of five station for each method is also given in each table. Looking to the results, it seems that, the average ETo values calculated by Thornthwaite method are not comensurating with the ETo values calculated by other methods. Therefore finally Thornthwaite method is not considered for regional average.

7.2.2 Stationwise average ETo values for different methods are tabulated. Table 7.8 to 7.12 shows the values of ETo for each stations by all methods except Thornthwaite for further analysis. Average of six methods for a particular station is

given at the end of each table. A table 13 is prepared abstracting the stationwise average for the regions under consideration. Regional average ETo values are given in the table representing average of five regions. These average regional ETo values given in table 13 represents average of six methods for five regions.

**TABLE 7.1**  
**ET<sub>o</sub> BY PENMAN METHOD**  
**Rate in mm/day**

| WEEKS | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|-------|-----------|-------|----------|--------|----------|---------|
| 1     | 3.66      | 3.90  | 4.39     | 4.36   | 4.68     | 4.20    |
| 2     | 3.96      | 3.86  | 4.45     | 4.41   | 4.93     | 4.32    |
| 3     | 3.73      | 3.90  | 4.55     | 4.31   | 4.74     | 4.25    |
| 4     | 3.87      | 3.96  | 4.73     | 4.53   | 4.91     | 4.40    |
| 5     | 4.00      | 4.31  | 4.99     | 5.02   | 5.55     | 4.77    |
| 6     | 4.46      | 4.78  | 5.14     | 5.44   | 5.96     | 5.16    |
| 7     | 4.72      | 4.83  | 5.26     | 5.28   | 5.91     | 5.20    |
| 8     | 4.98      | 5.10  | 5.86     | 5.72   | 6.44     | 5.62    |
| 9     | 5.20      | 5.64  | 6.11     | 6.41   | 6.87     | 6.05    |
| 10    | 6.01      | 6.12  | 6.65     | 6.97   | 7.91     | 6.73    |
| 11    | 6.49      | 6.25  | 6.94     | 7.10   | 8.01     | 6.96    |
| 12    | 6.30      | 6.41  | 7.10     | 7.26   | 8.25     | 7.06    |
| 13    | 6.60      | 6.58  | 7.76     | 7.21   | 8.55     | 7.34    |
| 14    | 7.37      | 7.14  | 7.70     | 7.63   | 9.05     | 7.78    |
| 15    | 7.58      | 7.35  | 7.73     | 8.29   | 8.28     | 7.85    |
| 16    | 8.00      | 7.61  | 7.81     | 8.80   | 8.23     | 8.09    |
| 17    | 8.36      | 7.71  | 8.19     | 9.13   | 8.21     | 8.32    |
| 18    | 8.58      | 8.21  | 8.49     | 9.26   | 8.03     | 8.51    |
| 19    | 8.87      | 8.23  | 8.86     | 9.97   | 8.50     | 8.89    |
| 20    | 9.03      | 8.50  | 9.13     | 10.21  | 8.47     | 9.07    |
| 21    | 9.18      | 8.57  | 8.98     | 10.15  | 8.24     | 9.02    |
| 22    | 8.99      | 8.46  | 8.32     | 9.59   | 8.43     | 8.76    |
| 23    | 9.33      | 7.94  | 8.57     | 9.22   | 7.19     | 8.45    |
| 24    | 8.93      | 7.20  | 7.58     | 8.06   | 6.41     | 7.64    |
| 25    | 8.06      | 6.50  | 7.03     | 7.35   | 5.34     | 6.86    |
| 26    | 7.57      | 5.70  | 6.30     | 6.54   | 4.96     | 6.21    |
| 27    | 7.65      | 5.67  | 5.89     | 7.11   | 5.69     | 6.40    |
| 28    | 7.52      | 5.70  | 5.96     | 6.35   | 4.79     | 6.06    |
| 29    | 6.34      | 5.02  | 5.23     | 6.06   | 3.63     | 5.26    |
| 30    | 5.86      | 5.07  | 5.07     | 5.58   | 3.52     | 5.02    |
| 31    | 5.67      | 4.71  | 4.42     | 5.45   | 3.59     | 4.77    |
| 32    | 5.37      | 3.96  | 4.15     | 5.14   | 3.70     | 4.46    |
| 33    | 4.84      | 4.39  | 4.78     | 4.30   | 3.43     | 4.35    |
| 34    | 4.31      | 4.54  | 4.61     | 5.01   | 3.84     | 4.46    |
| 35    | 5.18      | 5.10  | 4.73     | 5.81   | 4.69     | 5.10    |
| 36    | 5.89      | 5.39  | 5.29     | 5.86   | 4.74     | 5.43    |
| 37    | 5.97      | 5.50  | 5.36     | 5.50   | 5.25     | 5.52    |
| 38    | 6.30      | 5.86  | 5.72     | 6.17   | 5.33     | 5.88    |
| 39    | 6.21      | 5.83  | 5.85     | 6.23   | 5.47     | 5.92    |
| 40    | 5.34      | 5.59  | 5.73     | 6.17   | 5.41     | 5.65    |
| 41    | 5.67      | 5.49  | 5.71     | 6.07   | 5.87     | 5.76    |
| 42    | 5.79      | 5.61  | 6.08     | 6.17   | 6.04     | 5.94    |
| 43    | 5.35      | 5.54  | 5.72     | 6.06   | 6.11     | 5.76    |
| 44    | 4.83      | 5.07  | 5.36     | 5.75   | 5.95     | 5.39    |
| 45    | 4.07      | 4.69  | 4.98     | 5.33   | 5.10     | 4.83    |
| 46    | 4.09      | 4.47  | 4.56     | 5.15   | 5.00     | 4.65    |
| 47    | 4.05      | 4.39  | 4.69     | 4.93   | 4.56     | 4.52    |
| 48    | 3.92      | 4.25  | 4.43     | 4.78   | 4.65     | 4.41    |
| 49    | 3.59      | 4.01  | 4.15     | 4.65   | 4.29     | 4.14    |
| 50    | 3.53      | 3.74  | 4.06     | 4.50   | 4.28     | 4.02    |
| 51    | 3.51      | 3.78  | 4.11     | 4.28   | 4.11     | 3.96    |
| 52    | 3.56      | 3.65  | 4.08     | 4.07   | 4.19     | 3.91    |

**TABLE - 7.2**  
**ET<sub>o</sub> BY BLANEY CRIDDLE METHOD**

Rate in mm/day

| WEEKS | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|-------|-----------|-------|----------|--------|----------|---------|
| 1     | 3.60      | 3.60  | 3.78     | 3.43   | 4.17     | 3.72    |
| 2     | 3.87      | 3.55  | 3.87     | 3.37   | 4.40     | 3.81    |
| 3     | 3.73      | 3.63  | 4.18     | 3.42   | 4.38     | 3.87    |
| 4     | 3.89      | 3.73  | 4.19     | 3.65   | 4.55     | 4.00    |
| 5     | 3.95      | 4.00  | 4.23     | 3.93   | 4.74     | 4.17    |
| 6     | 4.33      | 4.44  | 4.27     | 4.10   | 5.02     | 4.43    |
| 7     | 4.60      | 4.58  | 4.44     | 4.03   | 5.03     | 4.54    |
| 8     | 4.85      | 4.89  | 4.97     | 4.39   | 5.51     | 4.92    |
| 9     | 4.89      | 5.13  | 4.91     | 4.80   | 5.49     | 5.04    |
| 10    | 5.60      | 5.52  | 5.21     | 5.09   | 6.12     | 5.51    |
| 11    | 6.26      | 5.77  | 5.83     | 5.41   | 6.44     | 5.94    |
| 12    | 6.32      | 5.91  | 6.09     | 5.45   | 6.43     | 6.04    |
| 13    | 6.56      | 6.18  | 7.49     | 5.50   | 6.77     | 6.50    |
| 14    | 6.76      | 6.39  | 6.24     | 5.83   | 6.89     | 6.42    |
| 15    | 7.76      | 7.12  | 6.79     | 6.99   | 7.37     | 7.21    |
| 16    | 8.06      | 7.29  | 6.75     | 7.57   | 7.56     | 7.45    |
| 17    | 8.48      | 7.31  | 7.15     | 7.92   | 7.46     | 7.66    |
| 18    | 8.19      | 7.52  | 7.28     | 7.71   | 6.90     | 7.52    |
| 19    | 8.80      | 7.74  | 7.86     | 8.58   | 7.88     | 8.17    |
| 20    | 8.89      | 8.06  | 8.09     | 9.04   | 7.56     | 8.33    |
| 21    | 9.00      | 8.09  | 7.91     | 8.97   | 7.12     | 8.22    |
| 22    | 8.49      | 7.70  | 7.15     | 8.35   | 7.23     | 7.78    |
| 23    | 8.74      | 7.12  | 7.45     | 8.24   | 6.23     | 7.56    |
| 24    | 8.26      | 6.49  | 6.64     | 7.16   | 5.63     | 6.84    |
| 25    | 7.29      | 5.77  | 6.08     | 6.58   | 4.85     | 6.11    |
| 26    | 6.76      | 5.10  | 5.40     | 5.76   | 4.42     | 5.49    |
| 27    | 6.14      | 4.54  | 4.26     | 5.28   | 4.13     | 4.87    |
| 28    | 6.03      | 4.64  | 4.48     | 4.51   | 4.08     | 4.75    |
| 29    | 4.99      | 3.81  | 3.76     | 4.33   | 2.61     | 3.90    |
| 30    | 4.50      | 3.76  | 3.47     | 3.78   | 2.64     | 3.63    |
| 31    | 4.31      | 3.55  | 3.48     | 3.87   | 2.69     | 3.58    |
| 32    | 3.90      | 2.99  | 3.11     | 3.33   | 2.78     | 3.22    |
| 33    | 3.59      | 3.24  | 3.22     | 3.18   | 2.55     | 3.16    |
| 34    | 3.75      | 3.25  | 3.15     | 3.33   | 2.88     | 3.27    |
| 35    | 4.23      | 3.91  | 3.39     | 4.20   | 3.67     | 3.88    |
| 36    | 4.94      | 4.61  | 4.07     | 4.63   | 3.90     | 4.43    |
| 37    | 5.01      | 4.49  | 4.13     | 4.64   | 4.26     | 4.51    |
| 38    | 5.62      | 4.81  | 4.45     | 4.88   | 4.25     | 4.80    |
| 39    | 5.57      | 4.93  | 4.57     | 4.97   | 4.44     | 4.90    |
| 40    | 6.03      | 5.66  | 5.23     | 5.69   | 5.05     | 5.53    |
| 41    | 5.73      | 5.14  | 4.73     | 5.01   | 5.42     | 5.21    |
| 42    | 5.80      | 5.39  | 5.20     | 5.28   | 5.29     | 5.39    |
| 43    | 5.49      | 5.31  | 4.93     | 5.19   | 5.61     | 5.31    |
| 44    | 5.36      | 5.20  | 4.95     | 5.07   | 5.76     | 5.27    |
| 45    | 4.91      | 5.03  | 4.72     | 4.89   | 5.36     | 4.98    |
| 46    | 4.61      | 4.65  | 4.33     | 4.56   | 5.07     | 4.64    |
| 47    | 4.41      | 4.48  | 4.22     | 4.33   | 4.56     | 4.40    |
| 48    | 4.14      | 4.30  | 4.04     | 4.22   | 4.56     | 4.25    |
| 49    | 3.92      | 4.17  | 3.96     | 4.15   | 4.16     | 4.07    |
| 50    | 3.66      | 3.76  | 3.85     | 3.91   | 4.20     | 3.88    |
| 51    | 3.68      | 3.80  | 3.90     | 3.72   | 4.11     | 3.84    |
| 52    | 3.61      | 3.61  | 3.73     | 3.31   | 4.09     | 3.67    |

**TABLE 7.3**  
**ET<sub>o</sub> BY RADIATION METHOD**  
**Rate in mm/day**

| WEEKS | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|-------|-----------|-------|----------|--------|----------|---------|
| 1     | 4.27      | 4.13  | 4.42     | 4.39   | 4.47     | 4.34    |
| 2     | 4.39      | 4.20  | 4.48     | 4.40   | 4.68     | 4.43    |
| 3     | 4.40      | 4.34  | 4.68     | 4.40   | 4.83     | 4.53    |
| 4     | 4.50      | 4.41  | 4.83     | 4.61   | 4.81     | 4.63    |
| 5     | 4.67      | 4.83  | 5.08     | 4.95   | 5.15     | 4.94    |
| 6     | 4.90      | 5.33  | 5.28     | 5.27   | 5.43     | 5.24    |
| 7     | 5.23      | 5.41  | 5.33     | 5.06   | 5.55     | 5.32    |
| 8     | 5.48      | 5.65  | 5.72     | 5.50   | 5.84     | 5.64    |
| 9     | 5.73      | 6.16  | 6.09     | 6.04   | 6.10     | 6.02    |
| 10    | 6.77      | 6.66  | 6.63     | 6.34   | 6.60     | 6.60    |
| 11    | 7.09      | 6.69  | 7.06     | 6.33   | 6.55     | 6.74    |
| 12    | 7.01      | 6.67  | 7.00     | 6.45   | 6.60     | 6.75    |
| 13    | 7.19      | 6.80  | 7.28     | 6.43   | 6.76     | 6.89    |
| 14    | 8.04      | 7.48  | 7.65     | 6.94   | 7.30     | 7.48    |
| 15    | 8.29      | 7.58  | 7.72     | 7.29   | 7.09     | 7.59    |
| 16    | 8.35      | 7.65  | 7.62     | 7.72   | 7.34     | 7.74    |
| 17    | 8.61      | 7.70  | 7.80     | 7.67   | 7.43     | 7.84    |
| 18    | 8.61      | 8.26  | 8.08     | 8.04   | 7.28     | 8.05    |
| 19    | 8.56      | 8.03  | 8.26     | 8.53   | 7.69     | 8.21    |
| 20    | 8.65      | 8.20  | 8.42     | 8.74   | 7.69     | 8.34    |
| 21    | 8.74      | 8.08  | 8.50     | 8.51   | 7.38     | 8.24    |
| 22    | 8.28      | 7.87  | 7.35     | 8.13   | 7.56     | 7.84    |
| 23    | 8.52      | 7.14  | 7.68     | 7.71   | 6.11     | 7.43    |
| 24    | 7.83      | 6.29  | 6.58     | 6.68   | 5.40     | 6.56    |
| 25    | 6.74      | 5.62  | 6.04     | 5.83   | 4.30     | 5.71    |
| 26    | 6.30      | 4.85  | 5.34     | 5.37   | 4.07     | 5.19    |
| 27    | 5.78      | 4.41  | 4.35     | 4.92   | 4.15     | 4.72    |
| 28    | 5.77      | 4.37  | 4.45     | 4.42   | 3.51     | 4.50    |
| 29    | 4.98      | 3.81  | 3.76     | 4.22   | 2.90     | 3.93    |
| 30    | 4.13      | 3.81  | 3.68     | 3.88   | 2.63     | 3.63    |
| 31    | 4.13      | 3.52  | 3.42     | 3.69   | 2.86     | 3.52    |
| 32    | 4.14      | 3.16  | 3.22     | 3.72   | 2.76     | 3.40    |
| 33    | 3.69      | 3.52  | 3.65     | 3.42   | 2.55     | 3.37    |
| 34    | 4.16      | 3.47  | 3.48     | 3.61   | 3.12     | 3.57    |
| 35    | 4.09      | 4.14  | 3.61     | 4.55   | 3.65     | 4.01    |
| 36    | 5.09      | 4.50  | 4.32     | 4.65   | 3.91     | 4.49    |
| 37    | 5.39      | 4.72  | 4.58     | 5.01   | 4.58     | 4.86    |
| 38    | 6.04      | 5.20  | 5.02     | 5.08   | 4.84     | 5.24    |
| 39    | 5.92      | 5.28  | 5.19     | 5.07   | 4.93     | 5.28    |
| 40    | 5.61      | 5.47  | 5.35     | 5.33   | 4.90     | 5.33    |
| 41    | 5.79      | 5.39  | 5.37     | 5.40   | 5.57     | 5.50    |
| 42    | 6.15      | 5.81  | 5.90     | 5.79   | 5.70     | 5.87    |
| 43    | 5.87      | 5.88  | 5.84     | 5.91   | 5.91     | 5.88    |
| 44    | 5.28      | 5.44  | 5.45     | 5.45   | 5.59     | 5.44    |
| 45    | 4.80      | 5.10  | 5.11     | 5.15   | 4.92     | 5.02    |
| 46    | 4.73      | 4.94  | 4.81     | 5.15   | 4.84     | 4.89    |
| 47    | 4.65      | 4.67  | 4.65     | 4.98   | 4.58     | 4.71    |
| 48    | 4.34      | 4.46  | 4.44     | 4.70   | 4.49     | 4.49    |
| 49    | 4.11      | 4.19  | 4.31     | 4.61   | 4.19     | 4.28    |
| 50    | 3.87      | 3.94  | 4.22     | 4.43   | 4.07     | 4.11    |
| 51    | 3.90      | 4.02  | 4.25     | 4.37   | 4.08     | 4.12    |
| 52    | 3.96      | 3.97  | 4.08     | 4.16   | 4.17     | 4.07    |

**TABLE 7.4**  
**ET<sub>o</sub> BY PAN EVAPORATION METHOD**  
**Rate in mm/day**

| WEEKS | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|-------|-----------|-------|----------|--------|----------|---------|
| 1     | 3.37      | 2.63  | 3.62     | 4.27   | 5.14     | 3.81    |
| 2     | 3.43      | 2.64  | 3.62     | 4.41   | 5.10     | 3.84    |
| 3     | 3.47      | 2.66  | 3.88     | 4.41   | 4.96     | 3.88    |
| 4     | 3.82      | 2.82  | 4.05     | 4.63   | 5.30     | 4.12    |
| 5     | 4.04      | 3.07  | 4.04     | 4.97   | 5.67     | 4.36    |
| 6     | 3.88      | 3.17  | 4.37     | 5.38   | 6.09     | 4.58    |
| 7     | 4.56      | 3.51  | 4.45     | 5.60   | 5.92     | 4.81    |
| 8     | 4.90      | 4.02  | 4.46     | 6.17   | 6.02     | 5.11    |
| 9     | 4.72      | 4.55  | 5.48     | 6.70   | 6.47     | 5.58    |
| 10    | 5.34      | 3.90  | 6.01     | 7.27   | 7.16     | 5.94    |
| 11    | 5.90      | 4.54  | 6.34     | 7.26   | 7.08     | 6.22    |
| 12    | 6.12      | 5.22  | 6.34     | 7.66   | 7.48     | 6.56    |
| 13    | 6.65      | 4.85  | 5.35     | 7.93   | 7.69     | 6.49    |
| 14    | 7.53      | 5.36  | 6.42     | 8.71   | 6.97     | 7.00    |
| 15    | 7.94      | 6.66  | 7.35     | 9.64   | 7.76     | 7.87    |
| 16    | 8.36      | 6.58  | 7.30     | 10.29  | 7.94     | 8.09    |
|       | 8.57      | 6.71  | 7.34     | 10.89  | 7.69     | 8.24    |
| 18    | 8.03      | 6.86  | 7.51     | 10.78  | 7.24     | 8.08    |
| 19    | 9.22      | 6.87  | 7.90     | 11.11  | 7.87     | 8.59    |
| 20    | 9.56      | 6.83  | 8.36     | 11.53  | 8.59     | 8.97    |
| 21    | 10.14     | 6.76  | 8.42     | 9.73   | 8.59     | 8.73    |
| 22    | 10.23     | 6.92  | 8.12     | 10.73  | 8.25     | 8.85    |
| 23    | 10.16     | 6.63  | 7.66     | 9.80   | 7.38     | 8.33    |
| 24    | 9.07      | 5.95  | 6.48     | 8.48   | 6.32     | 7.26    |
| 25    | 9.15      | 5.53  | 5.78     | 6.46   | 6.75     | 6.73    |
| 26    | 7.82      | 5.26  | 4.70     | 7.08   | 6.28     | 6.23    |
| 27    | 7.07      | 4.50  | 4.25     | 5.73   | 6.02     | 5.51    |
| 28    | 6.79      | 3.90  | 4.24     | 5.36   | 5.45     | 5.15    |
| 29    | 6.18      | 3.69  | 4.28     | 5.18   | 4.98     | 4.86    |
| 30    | 5.36      | 2.98  | 4.03     | 4.70   | 5.01     | 4.42    |
| 31    | 4.54      | 3.52  | 3.56     | 4.55   | 4.38     | 4.11    |
| 32    | 4.06      | 2.86  | 3.58     | 3.74   | 3.69     | 3.59    |
| 33    | 4.19      | 3.23  | 3.62     | 3.66   | 3.47     | 3.63    |
| 34    | 5.00      | 2.86  | 3.58     | 4.02   | 4.16     | 3.92    |
| 35    | 4.96      | 3.30  | 3.18     | 4.44   | 4.11     | 4.00    |
| 36    | 5.72      | 3.81  | 3.55     | 5.01   | 3.41     | 4.30    |
| 37    | 5.48      | 4.05  | 4.12     | 5.06   | 3.98     | 4.54    |
| 38    | 5.64      | 4.09  | 4.70     | 5.26   | 4.05     | 4.75    |
| 39    | 5.54      | 3.65  | 4.73     | 5.00   | 4.08     | 4.60    |
| 40    | 5.97      | 3.94  | 4.98     | 5.45   | 5.24     | 5.12    |
| 41    | 5.40      | 3.82  | 4.78     | 5.73   | 4.98     | 4.94    |
| 42    | 5.61      | 4.18  | 4.62     | 6.43   | 5.51     | 5.27    |
| 43    | 4.98      | 3.83  | 4.46     | 6.06   | 5.45     | 4.96    |
| 44    | 4.49      | 3.62  | 4.56     | 5.53   | 5.32     | 4.70    |
| 45    | 3.78      | 3.55  | 4.03     | 5.32   | 5.29     | 4.39    |
| 46    | 4.18      | 3.10  | 3.73     | 5.57   | 4.66     | 4.25    |
| 47    | 3.65      | 3.06  | 3.56     | 4.94   | 4.12     | 3.87    |
| 48    | 3.67      | 3.09  | 3.72     | 5.17   | 4.70     | 4.07    |
| 49    | 3.80      | 3.02  | 3.60     | 4.99   | 4.46     | 3.97    |
| 50    | 3.61      | 2.54  | 3.40     | 4.52   | 4.39     | 3.69    |
| 51    | 3.25      | 2.52  | 3.48     | 4.37   | 4.03     | 3.53    |
| 52    | 3.32      | 2.49  | 3.43     | 4.45   | 4.05     | 3.55    |

**TABLE 7.5**  
**ET<sub>o</sub> BY HARGREAVES METHOD**  
**Rate in mm/day**

| WEEKS | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|-------|-----------|-------|----------|--------|----------|---------|
| 1     | 4.10      | 4.17  | 4.45     | 4.43   | 4.33     | 4.30    |
| 2     | 4.15      | 4.24  | 4.54     | 4.44   | 4.37     | 4.35    |
| 3     | 4.17      | 4.27  | 4.58     | 4.54   | 4.48     | 4.41    |
| 4     | 4.25      | 4.31  | 4.89     | 4.59   | 4.52     | 4.51    |
| 5     | 4.41      | 4.73  | 4.94     | 4.89   | 4.82     | 4.76    |
| 6     | 4.54      | 5.12  | 5.18     | 5.22   | 5.04     | 5.02    |
| 7     | 4.96      | 5.27  | 5.27     | 5.21   | 5.21     | 5.18    |
| 8     | 5.19      | 5.41  | 5.54     | 5.52   | 5.56     | 5.44    |
| 9     | 5.45      | 5.92  | 5.58     | 6.00   | 5.82     | 5.75    |
| 10    | 6.38      | 6.43  | 6.63     | 6.40   | 6.25     | 6.42    |
| 11    | 6.71      | 5.51  | 6.92     | 6.48   | 6.26     | 6.38    |
| 12    | 6.63      | 6.55  | 6.86     | 6.66   | 6.42     | 6.62    |
| 13    | 6.86      | 6.67  | 6.86     | 6.68   | 6.52     | 6.72    |
| 14    | 7.73      | 7.35  | 7.68     | 7.29   | 6.97     | 7.40    |
| 15    | 8.09      | 7.61  | 7.92     | 7.66   | 7.19     | 7.69    |
| 16    | 8.22      | 7.80  | 7.98     | 7.98   | 7.37     | 7.87    |
| 17    | 8.52      | 7.99  | 8.25     | 7.89   | 7.76     | 8.08    |
| 18    | 8.53      | 8.60  | 8.40     | 8.35   | 7.74     | 8.32    |
| 19    | 8.69      | 8.47  | 8.62     | 8.71   | 7.99     | 8.50    |
| 20    | 8.78      | 8.62  | 8.86     | 8.93   | 8.22     | 8.68    |
| 21    | 9.03      | 8.56  | 8.98     | 8.81   | 8.07     | 8.69    |
| 22    | 8.66      | 8.42  | 7.85     | 8.53   | 8.02     | 8.30    |
| 23    | 8.90      | 7.76  | 8.25     | 8.20   | 6.84     | 7.99    |
| 24    | 8.13      | 7.06  | 7.34     | 7.21   | 6.23     | 7.19    |
| 25    | 7.19      | 6.53  | 6.85     | 6.25   | 5.11     | 6.39    |
| 26    | 6.87      | 5.82  | 6.18     | 6.09   | 4.93     | 5.98    |
| 27    | 6.50      | 5.50  | 5.35     | 5.63   | 5.05     | 5.61    |
| 28    | 6.55      | 5.31  | 5.41     | 5.31   | 4.27     | 5.37    |
| 29    | 5.97      | 4.93  | 4.73     | 5.04   | 4.03     | 4.94    |
| 30    | 4.95      | 5.03  | 4.73     | 4.74   | 3.59     | 4.61    |
| 31    | 5.08      | 4.59  | 4.39     | 4.55   | 3.92     | 4.51    |
| 32    | 5.11      | 4.23  | 4.19     | 4.66   | 3.64     | 4.37    |
| 33    | 4.71      | 4.62  | 4.72     | 4.36   | 3.49     | 4.38    |
| 34    | 4.75      | 4.56  | 4.55     | 4.58   | 4.14     | 4.52    |
| 35    | 5.00      | 5.22  | 4.59     | 5.52   | 4.57     | 4.98    |
| 36    | 6.06      | 5.41  | 5.30     | 5.59   | 4.82     | 5.44    |
| 37    | 6.26      | 5.70  | 5.59     | 6.05   | 5.57     | 5.83    |
| 38    | 6.83      | 6.20  | 6.11     | 6.03   | 5.81     | 6.20    |
| 39    | 6.64      | 6.28  | 6.36     | 6.03   | 5.91     | 6.24    |
| 40    | 6.17      | 6.21  | 6.30     | 6.17   | 5.84     | 6.14    |
| 41    | 6.06      | 6.02  | 6.17     | 6.20   | 6.17     | 6.12    |
| 42    | 6.22      | 6.19  | 6.42     | 6.34   | 6.31     | 6.30    |
| 43    | 5.92      | 6.08  | 6.18     | 6.26   | 6.11     | 6.11    |
| 44    | 5.23      | 5.60  | 5.70     | 5.74   | 5.64     | 5.58    |
| 45    | 4.83      | 5.15  | 5.32     | 5.30   | 4.96     | 5.11    |
| 46    | 4.80      | 5.04  | 5.06     | 5.34   | 4.84     | 5.02    |
| 47    | 4.65      | 4.69  | 4.84     | 5.14   | 4.69     | 4.80    |
| 48    | 4.27      | 4.45  | 4.64     | 4.75   | 4.48     | 4.52    |
| 49    | 4.02      | 4.15  | 4.44     | 4.56   | 4.32     | 4.30    |
| 50    | 3.83      | 4.02  | 4.32     | 4.44   | 4.08     | 4.14    |
| 51    | 3.94      | 4.05  | 4.35     | 4.52   | 4.07     | 4.19    |
| 52    | 3.86      | 4.01  | 4.20     | 4.33   | 4.08     | 4.10    |

**TABLE 7.6**  
**ET<sub>o</sub> BY JENSEN HAISE METHOD**

Rate in mm/day

| WEEKS | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|-------|-----------|-------|----------|--------|----------|---------|
| 1     | 4.14      | 4.14  | 4.35     | 4.53   | 4.35     | 4.30    |
| 2     | 4.21      | 4.20  | 4.44     | 4.52   | 4.39     | 4.35    |
| 3     | 4.20      | 4.22  | 4.48     | 4.65   | 4.48     | 4.41    |
| 4     | 4.30      | 4.27  | 4.59     | 4.71   | 4.54     | 4.48    |
| 5     | 4.47      | 4.69  | 4.83     | 5.04   | 4.86     | 4.78    |
| 6     | 4.58      | 5.11  | 5.09     | 5.40   | 5.10     | 5.06    |
| 7     | 5.10      | 5.31  | 5.21     | 5.41   | 5.32     | 5.27    |
| 8     | 5.39      | 5.49  | 5.53     | 5.76   | 5.73     | 5.58    |
| 9     | 5.70      | 6.05  | 6.01     | 6.32   | 6.02     | 6.02    |
| 10    | 6.74      | 6.64  | 6.71     | 6.82   | 6.52     | 6.69    |
| 11    | 7.15      | 6.77  | 7.03     | 6.96   | 6.87     | 6.96    |
| 12    | 7.09      | 6.82  | 7.03     | 7.14   | 6.75     | 6.97    |
| 13    | 7.38      | 7.01  | 7.07     | 7.20   | 6.90     | 7.11    |
| 14    | 8.37      | 7.75  | 7.96     | 7.93   | 7.40     | 7.88    |
| 15    | 8.82      | 8.08  | 8.25     | 8.38   | 7.69     | 8.24    |
| 16    | 8.99      | 8.31  | 8.34     | 8.76   | 7.88     | 8.46    |
| 17    | 9.36      | 8.56  | 8.66     | 8.69   | 8.31     | 8.72    |
| 18    | 9.37      | 9.23  | 8.84     | 9.22   | 8.30     | 8.99    |
| 19    | 9.59      | 9.12  | 9.11     | 9.64   | 8.61     | 9.21    |
| 20    | 9.70      | 9.32  | 9.38     | 9.90   | 8.86     | 9.43    |
| 21    | 9.99      | 9.26  | 9.50     | 9.77   | 8.71     | 9.45    |
| 22    | 9.58      | 9.10  | 8.30     | 9.45   | 8.63     | 9.01    |
| 23    | 9.86      | 8.38  | 8.70     | 9.10   | 7.35     | 8.68    |
| 24    | 8.99      | 7.60  | 7.73     | 7.98   | 6.67     | 7.79    |
| 25    | 7.92      | 7.07  | 7.18     | 6.88   | 5.46     | 6.90    |
| 26    | 7.54      | 6.21  | 6.44     | 6.68   | 5.25     | 6.42    |
| 27    | 7.13      | 5.85  | 5.56     | 6.16   | 5.36     | 6.01    |
| 28    | 7.15      | 5.63  | 5.62     | 5.80   | 4.53     | 5.75    |
| 29    | 6.49      | 5.21  | 4.89     | 5.49   | 4.26     | 5.27    |
| 30    | 5.38      | 5.35  | 4.89     | 5.14   | 3.79     | 4.91    |
| 31    | 5.50      | 4.85  | 4.54     | 4.94   | 4.12     | 4.79    |
| 32    | 5.52      | 4.46  | 4.32     | 5.03   | 3.83     | 4.63    |
| 33    | 5.10      | 4.86  | 4.86     | 4.71   | 3.67     | 4.64    |
| 34    | 5.14      | 4.80  | 4.68     | 4.95   | 4.31     | 4.78    |
| 35    | 5.41      | 5.50  | 4.72     | 5.98   | 4.80     | 5.28    |
| 36    | 6.56      | 5.71  | 4.45     | 6.06   | 5.07     | 5.57    |
| 37    | 6.79      | 6.01  | 5.76     | 6.57   | 5.86     | 6.20    |
| 38    | 7.43      | 6.55  | 6.32     | 6.56   | 6.13     | 6.60    |
| 39    | 7.22      | 6.65  | 6.60     | 6.57   | 6.26     | 6.66    |
| 40    | 6.72      | 6.58  | 6.54     | 6.73   | 6.21     | 6.56    |
| 41    | 6.58      | 6.37  | 6.38     | 6.74   | 6.57     | 6.53    |
| 42    | 6.70      | 6.51  | 6.64     | 6.88   | 6.71     | 6.69    |
| 43    | 6.36      | 6.36  | 6.35     | 6.76   | 6.46     | 6.46    |
| 44    | 5.60      | 5.82  | 5.83     | 6.17   | 5.93     | 5.87    |
| 45    | 5.12      | 5.33  | 5.39     | 5.65   | 5.20     | 5.34    |
| 46    | 5.08      | 5.19  | 5.12     | 5.57   | 5.06     | 5.20    |
| 47    | 4.87      | 4.80  | 4.87     | 5.43   | 4.85     | 4.96    |
| 48    | 4.42      | 4.53  | 4.63     | 4.97   | 4.60     | 4.63    |
| 49    | 4.14      | 4.18  | 4.41     | 4.76   | 4.41     | 4.38    |
| 50    | 3.91      | 4.04  | 4.27     | 4.61   | 4.14     | 4.19    |
| 51    | 3.92      | 4.06  | 4.30     | 4.69   | 4.12     | 4.22    |
| 52    | 3.91      | 4.00  | 4.12     | 4.43   | 4.14     | 4.12    |

TABLE-7.7

ET<sub>o</sub> BY THORNTHWAITE METHOD

Rate in mm/day

| WEEK | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|------|-----------|-------|----------|--------|----------|---------|
| 1    | 0.99      | 1.30  | 1.58     | 1.22   | 1.50     | 1.32    |
| 2    | 1.11      | 1.27  | 1.57     | 1.13   | 1.53     | 1.32    |
| 3    | 0.96      | 1.16  | 1.52     | 1.29   | 1.44     | 1.28    |
| 4    | 1.10      | 1.22  | 1.57     | 1.35   | 1.59     | 1.37    |
| 5    | 1.04      | 1.27  | 1.53     | 1.46   | 1.58     | 1.38    |
| 6    | 1.18      | 1.34  | 1.69     | 1.54   | 1.73     | 1.50    |
| 7    | 1.50      | 1.73  | 1.91     | 1.71   | 2.06     | 1.78    |
| 8    | 1.85      | 2.00  | 2.38     | 1.95   | 2.63     | 2.16    |
| 9    | 2.52      | 2.56  | 3.06     | 2.67   | 3.03     | 2.77    |
| 10   | 3.35      | 3.44  | 3.81     | 3.66   | 3.93     | 3.64    |
| 11   | 4.19      | 4.08  | 4.16     | 4.49   | 4.48     | 4.28    |
| 12   | 4.44      | 4.25  | 5.07     | 4.24   | 4.80     | 4.56    |
| 13   | 5.26      | 5.14  | 6.00     | 4.93   | 5.70     | 5.41    |
| 14   | 6.22      | 5.96  | 6.90     | 6.23   | 6.27     | 6.32    |
| 15   | 7.54      | 7.02  | 7.80     | 7.41   | 7.16     | 7.39    |
| 16   | 8.24      | 7.48  | 8.51     | 8.23   | 7.31     | 7.95    |
| 17   | 9.10      | 8.66  | 9.74     | 9.04   | 7.58     | 8.82    |
| 18   | 9.81      | 9.87  | 10.81    | 10.03  | 8.41     | 9.79    |
| 19   | 11.67     | 10.61 | 12.37    | 10.89  | 9.38     | 10.98   |
| 20   | 11.87     | 11.62 | 13.06    | 11.52  | 9.73     | 11.56   |
| 21   | 12.22     | 11.92 | 12.75    | 11.64  | 9.89     | 11.69   |
| 22   | 11.96     | 11.81 | 12.22    | 11.26  | 9.33     | 11.32   |
| 23   | 12.38     | 11.07 | 11.61    | 11.79  | 8.98     | 11.17   |
| 24   | 11.75     | 10.40 | 10.98    | 10.76  | 8.14     | 10.41   |
| 25   | 10.89     | 9.56  | 10.05    | 9.32   | 7.64     | 9.49    |
| 26   | 9.86      | 8.46  | 8.45     | 8.75   | 7.00     | 8.51    |
| 27   | 9.54      | 7.88  | 8.14     | 8.13   | 6.76     | 8.09    |
| 28   | 8.52      | 7.38  | 7.81     | 7.59   | 6.59     | 7.58    |
| 29   | 7.63      | 6.95  | 7.14     | 6.98   | 5.98     | 6.93    |
| 30   | 7.58      | 7.69  | 7.14     | 6.58   | 5.80     | 6.96    |
| 31   | 6.98      | 6.47  | 6.82     | 6.49   | 5.29     | 6.41    |
| 32   | 6.27      | 6.02  | 6.38     | 5.67   | 5.06     | 5.88    |
| 33   | 6.58      | 5.94  | 6.25     | 5.57   | 5.10     | 5.89    |
| 34   | 6.53      | 5.97  | 5.94     | 5.92   | 4.64     | 5.80    |
| 35   | 6.50      | 5.91  | 5.88     | 5.72   | 5.13     | 5.83    |
| 36   | 6.08      | 5.61  | 5.52     | 5.66   | 4.76     | 5.53    |
| 37   | 6.16      | 5.79  | 5.97     | 5.89   | 4.75     | 5.71    |
| 38   | 6.81      | 6.17  | 6.50     | 6.27   | 5.07     | 6.16    |
| 39   | 6.76      | 6.27  | 6.96     | 6.32   | 5.54     | 6.37    |
| 40   | 6.66      | 6.06  | 6.80     | 6.44   | 6.12     | 6.41    |
| 41   | 6.15      | 5.85  | 6.21     | 5.96   | 6.27     | 6.09    |
| 42   | 5.33      | 5.20  | 6.21     | 5.73   | 5.94     | 5.68    |
| 43   | 4.80      | 4.45  | 5.27     | 5.02   | 5.38     | 4.98    |
| 44   | 4.05      | 3.86  | 4.38     | 4.34   | 4.45     | 4.22    |
| 45   | 3.29      | 3.21  | 3.61     | 3.38   | 3.95     | 3.49    |
| 46   | 3.02      | 2.83  | 3.38     | 3.04   | 3.61     | 3.18    |
| 47   | 2.41      | 2.48  | 2.90     | 2.65   | 2.96     | 2.68    |
| 48   | 1.88      | 2.16  | 2.47     | 2.19   | 2.51     | 2.24    |
| 49   | 1.54      | 1.93  | 2.20     | 1.91   | 2.18     | 1.95    |
| 50   | 1.36      | 1.66  | 1.90     | 1.79   | 1.88     | 1.72    |
| 51   | 1.28      | 1.60  | 1.99     | 1.77   | 1.82     | 1.69    |
| 52   | 1.10      | 1.35  | 1.72     | 1.23   | 1.54     | 1.39    |

**TABLE-7.8**  
**ET<sub>o</sub> FOR DANTIWADA**  
**Rate in mm/day**

| WEEKS | ET-PEN | ET-BC | ETrad | ETpane | ET-HAR | ET-JH | AVERAGE |
|-------|--------|-------|-------|--------|--------|-------|---------|
| 1     | 3.66   | 3.60  | 4.27  | 3.37   | 4.10   | 4.14  | 3.86    |
| 2     | 3.96   | 3.87  | 4.39  | 3.43   | 4.15   | 4.21  | 4.00    |
| 3     | 3.73   | 3.73  | 4.40  | 3.47   | 4.17   | 4.20  | 3.95    |
| 4     | 3.87   | 3.89  | 4.50  | 3.82   | 4.25   | 4.30  | 4.11    |
| 5     | 4.00   | 3.95  | 4.67  | 4.04   | 4.41   | 4.47  | 4.26    |
| 6     | 4.46   | 4.33  | 4.90  | 3.88   | 4.54   | 4.58  | 4.45    |
| 7     | 4.72   | 4.60  | 5.23  | 4.56   | 4.96   | 5.10  | 4.86    |
| 8     | 4.98   | 4.85  | 5.48  | 4.90   | 5.19   | 5.39  | 5.13    |
| 9     | 5.20   | 4.89  | 5.73  | 4.72   | 5.45   | 5.70  | 5.28    |
| 10    | 6.01   | 5.60  | 6.77  | 5.34   | 6.38   | 6.74  | 6.14    |
| 11    | 6.49   | 6.26  | 7.09  | 5.90   | 6.71   | 7.15  | 6.60    |
| 12    | 6.30   | 6.32  | 7.01  | 6.12   | 6.63   | 7.09  | 6.58    |
| 13    | 6.60   | 6.56  | 7.19  | 6.65   | 6.86   | 7.38  | 6.87    |
| 14    | 7.37   | 6.76  | 8.04  | 7.53   | 7.73   | 8.37  | 7.63    |
| 15    | 7.58   | 7.76  | 8.29  | 7.94   | 8.09   | 8.82  | 8.08    |
| 16    | 8.00   | 8.06  | 8.35  | 8.36   | 8.22   | 8.99  | 8.33    |
| 17    | 8.36   | 8.48  | 8.61  | 8.57   | 8.52   | 9.36  | 8.65    |
| 18    | 8.58   | 8.19  | 8.61  | 8.03   | 8.53   | 9.37  | 8.55    |
| 19    | 8.87   | 8.80  | 8.56  | 9.22   | 8.69   | 9.59  | 8.96    |
| 20    | 9.03   | 8.89  | 8.65  | 9.56   | 8.78   | 9.70  | 9.10    |
| 21    | 9.18   | 9.00  | 8.74  | 10.14  | 9.03   | 9.99  | 9.35    |
| 22    | 8.99   | 8.49  | 8.28  | 10.23  | 8.66   | 9.58  | 9.04    |
| 23    | 9.33   | 8.74  | 8.52  | 10.16  | 8.90   | 9.86  | 9.25    |
| 24    | 8.93   | 8.26  | 7.83  | 9.07   | 8.13   | 8.99  | 8.54    |
| 25    | 8.06   | 7.29  | 6.74  | 9.15   | 7.19   | 7.92  | 7.73    |
| 26    | 7.57   | 6.76  | 6.30  | 7.82   | 6.87   | 7.54  | 7.14    |
| 27    | 7.65   | 6.14  | 5.78  | 7.07   | 6.50   | 7.13  | 6.71    |
| 28    | 7.52   | 6.03  | 5.77  | 6.79   | 6.55   | 7.15  | 6.64    |
| 29    | 6.34   | 4.99  | 4.98  | 6.18   | 5.97   | 6.49  | 5.83    |
| 30    | 5.86   | 4.50  | 4.13  | 5.36   | 4.95   | 5.38  | 5.03    |
| 31    | 5.67   | 4.31  | 4.13  | 4.54   | 5.08   | 5.50  | 4.87    |
| 32    | 5.37   | 3.90  | 4.14  | 4.06   | 5.11   | 5.52  | 4.68    |
| 33    | 4.84   | 3.59  | 3.69  | 4.19   | 4.71   | 5.10  | 4.35    |
| 34    | 4.31   | 3.75  | 4.16  | 5.00   | 4.75   | 5.14  | 4.52    |
| 35    | 5.18   | 4.23  | 4.09  | 4.96   | 5.00   | 5.41  | 4.81    |
| 36    | 5.89   | 4.94  | 5.09  | 5.72   | 6.06   | 6.56  | 5.71    |
| 37    | 5.97   | 5.01  | 5.39  | 5.48   | 6.26   | 6.79  | 5.82    |
| 38    | 6.30   | 5.62  | 6.04  | 5.64   | 6.83   | 7.43  | 6.31    |
| 39    | 6.21   | 5.57  | 5.92  | 5.54   | 6.64   | 7.22  | 6.18    |
| 40    | 5.34   | 6.03  | 5.61  | 5.97   | 6.17   | 6.72  | 5.97    |
| 41    | 5.67   | 5.73  | 5.79  | 5.40   | 6.06   | 6.58  | 5.87    |
| 42    | 5.79   | 5.80  | 6.15  | 5.61   | 6.22   | 6.70  | 6.05    |
| 43    | 5.35   | 5.49  | 5.87  | 4.98   | 5.92   | 6.36  | 5.66    |
| 44    | 4.83   | 5.36  | 5.28  | 4.49   | 5.23   | 5.60  | 5.13    |
| 45    | 4.07   | 4.91  | 4.80  | 3.78   | 4.83   | 5.12  | 4.59    |
| 46    | 4.09   | 4.61  | 4.73  | 4.18   | 4.80   | 5.08  | 4.58    |
| 47    | 4.05   | 4.41  | 4.65  | 3.65   | 4.65   | 4.87  | 4.38    |
| 48    | 3.92   | 4.14  | 4.34  | 3.67   | 4.27   | 4.43  | 4.13    |
| 49    | 3.59   | 3.92  | 4.11  | 3.80   | 4.02   | 4.14  | 3.93    |
| 50    | 3.53   | 3.66  | 3.87  | 3.61   | 3.83   | 3.91  | 3.74    |
| 51    | 3.51   | 3.68  | 3.90  | 3.25   | 3.94   | 3.92  | 3.70    |
| 52    | 3.56   | 3.61  | 3.96  | 3.32   | 3.86   | 3.91  | 3.70    |

Table-7.9

ETo FOR ANAND

Rate in mm/day

| WEEKS | ET-PEN | ET-BC | ETrad | ETpane | ET-HAR | ET-JH | AVERAGE |
|-------|--------|-------|-------|--------|--------|-------|---------|
| 1     | 3.90   | 3.60  | 4.13  | 2.63   | 4.17   | 4.14  | 3.76    |
| 2     | 3.86   | 3.55  | 4.20  | 2.64   | 4.24   | 4.20  | 3.78    |
| 3     | 3.90   | 3.63  | 4.34  | 2.66   | 4.27   | 4.22  | 3.84    |
| 4     | 3.96   | 3.73  | 4.41  | 2.82   | 4.31   | 4.27  | 3.92    |
| 5     | 4.31   | 4.00  | 4.83  | 3.07   | 4.73   | 4.69  | 4.27    |
| 6     | 4.78   | 4.44  | 5.33  | 3.17   | 5.12   | 5.11  | 4.66    |
| 7     | 4.83   | 4.58  | 5.41  | 3.51   | 5.27   | 5.31  | 4.82    |
| 8     | 5.10   | 4.89  | 5.65  | 4.02   | 5.41   | 5.49  | 5.09    |
| 9     | 5.64   | 5.13  | 6.16  | 4.55   | 5.92   | 6.05  | 5.58    |
| 10    | 6.12   | 5.52  | 6.66  | 3.90   | 6.43   | 6.64  | 5.88    |
| 11    | 6.25   | 5.77  | 6.69  | 4.54   | 5.51   | 6.77  | 5.92    |
| 12    | 6.41   | 5.91  | 6.67  | 5.22   | 6.55   | 6.82  | 6.26    |
| 13    | 6.58   | 6.18  | 6.80  | 4.85   | 6.67   | 7.01  | 6.35    |
| 14    | 7.14   | 6.39  | 7.48  | 5.36   | 7.35   | 7.75  | 6.91    |
| 15    | 7.35   | 7.12  | 7.58  | 6.66   | 7.61   | 8.08  | 7.40    |
| 16    | 7.61   | 7.29  | 7.65  | 6.58   | 7.80   | 8.31  | 7.54    |
| 17    | 7.71   | 7.31  | 7.70  | 6.71   | 7.99   | 8.56  | 7.66    |
| 18    | 8.21   | 7.52  | 8.26  | 6.86   | 8.60   | 9.23  | 8.11    |
| 19    | 8.23   | 7.74  | 8.03  | 6.87   | 8.47   | 9.12  | 8.08    |
| 20    | 8.50   | 8.06  | 8.20  | 6.83   | 8.62   | 9.32  | 8.26    |
| 21    | 8.57   | 8.09  | 8.08  | 6.76   | 8.56   | 9.26  | 8.22    |
| 22    | 8.46   | 7.70  | 7.87  | 6.92   | 8.42   | 9.10  | 8.08    |
| 23    | 7.94   | 7.12  | 7.14  | 6.63   | 7.76   | 8.38  | 7.50    |
| 24    | 7.20   | 6.49  | 6.29  | 5.95   | 7.06   | 7.60  | 6.77    |
| 25    | 6.50   | 5.77  | 5.62  | 5.53   | 6.53   | 7.07  | 6.17    |
| 26    | 5.70   | 5.10  | 4.85  | 5.26   | 5.82   | 6.21  | 5.49    |
| 27    | 5.67   | 4.54  | 4.41  | 4.50   | 5.50   | 5.85  | 5.08    |
| 28    | 5.70   | 4.64  | 4.37  | 3.90   | 5.31   | 5.63  | 4.93    |
| 29    | 5.02   | 3.81  | 3.81  | 3.69   | 4.93   | 5.21  | 4.41    |
| 30    | 5.07   | 3.76  | 3.81  | 2.98   | 5.03   | 5.35  | 4.33    |
| 31    | 4.71   | 3.55  | 3.52  | 3.52   | 4.59   | 4.85  | 4.12    |
| 32    | 3.96   | 2.99  | 3.16  | 2.86   | 4.23   | 4.46  | 3.61    |
| 33    | 4.39   | 3.24  | 3.52  | 3.23   | 4.62   | 4.86  | 3.98    |
| 34    | 4.54   | 3.25  | 3.47  | 2.86   | 4.56   | 4.80  | 3.91    |
| 35    | 5.10   | 3.91  | 4.14  | 3.30   | 5.22   | 5.50  | 4.53    |
| 36    | 5.39   | 4.61  | 4.50  | 3.81   | 5.41   | 5.71  | 4.91    |
| 37    | 5.50   | 4.49  | 4.72  | 4.05   | 5.70   | 6.01  | 5.08    |
| 38    | 5.86   | 4.81  | 5.20  | 4.09   | 6.20   | 6.55  | 5.45    |
| 39    | 5.83   | 4.93  | 5.28  | 3.65   | 6.28   | 6.65  | 5.44    |
| 40    | 5.59   | 5.66  | 5.47  | 3.94   | 6.21   | 6.58  | 5.58    |
| 41    | 5.49   | 5.14  | 5.39  | 3.82   | 6.02   | 6.37  | 5.37    |
| 42    | 5.61   | 5.39  | 5.81  | 4.18   | 6.19   | 6.51  | 5.62    |
| 43    | 5.54   | 5.31  | 5.88  | 3.83   | 6.08   | 6.36  | 5.50    |
| 44    | 5.07   | 5.20  | 5.44  | 3.62   | 5.60   | 5.82  | 5.13    |
| 45    | 4.69   | 5.03  | 5.10  | 3.55   | 5.15   | 5.33  | 4.81    |
| 46    | 4.47   | 4.65  | 4.94  | 3.10   | 5.04   | 5.19  | 4.57    |
| 47    | 4.39   | 4.48  | 4.67  | 3.06   | 4.69   | 4.80  | 4.35    |
| 48    | 4.25   | 4.30  | 4.46  | 3.09   | 4.45   | 4.53  | 4.18    |
| 49    | 4.01   | 4.17  | 4.19  | 3.02   | 4.15   | 4.18  | 3.95    |
| 50    | 3.74   | 3.76  | 3.94  | 2.54   | 4.02   | 4.04  | 3.67    |
| 51    | 3.78   | 3.80  | 4.02  | 2.52   | 4.05   | 4.06  | 3.71    |
| 52    | 3.65   | 3.61  | 3.97  | 2.49   | 4.01   | 4.00  | 3.62    |

TABLE - 7.10  
ETo FOR VADODARA  
Rate in mm/day

| Week | ETpen | ET-BC | ETrad | ETpane | ET-HAR | ET-JH | AVERAGE |
|------|-------|-------|-------|--------|--------|-------|---------|
| 1    | 4.39  | 3.78  | 4.42  | 3.62   | 4.45   | 4.35  | 4.17    |
| 2    | 4.45  | 3.87  | 4.48  | 3.62   | 4.54   | 4.44  | 4.23    |
| 3    | 4.55  | 4.18  | 4.68  | 3.88   | 4.58   | 4.48  | 4.39    |
| 4    | 4.73  | 4.19  | 4.83  | 4.05   | 4.69   | 4.59  | 4.51    |
| 5    | 4.99  | 4.23  | 5.08  | 4.04   | 4.94   | 4.83  | 4.68    |
| 6    | 5.14  | 4.27  | 5.28  | 4.37   | 5.18   | 5.09  | 4.89    |
| 7    | 5.26  | 4.44  | 5.33  | 4.45   | 5.27   | 5.21  | 4.99    |
| 8    | 5.86  | 4.97  | 5.72  | 4.46   | 5.54   | 5.53  | 5.35    |
| 9    | 6.11  | 4.91  | 6.09  | 5.48   | 5.98   | 6.01  | 5.76    |
| 10   | 6.65  | 5.21  | 6.63  | 6.01   | 6.63   | 6.71  | 6.31    |
| 11   | 6.94  | 5.83  | 7.06  | 6.34   | 6.92   | 7.03  | 6.69    |
| 12   | 7.10  | 6.09  | 7.00  | 6.34   | 6.86   | 7.03  | 6.74    |
| 13   | 7.76  | 7.49  | 7.28  | 5.35   | 6.86   | 7.07  | 6.97    |
| 14   | 7.70  | 6.24  | 7.65  | 6.42   | 7.68   | 7.96  | 7.27    |
| 15   | 7.73  | 6.79  | 7.72  | 7.35   | 7.92   | 8.25  | 7.63    |
| 16   | 7.81  | 6.75  | 7.62  | 7.30   | 7.98   | 8.34  | 7.63    |
| 17   | 8.19  | 7.15  | 7.80  | 7.34   | 8.25   | 8.66  | 7.90    |
| 18   | 8.49  | 7.28  | 8.08  | 7.51   | 8.40   | 8.84  | 8.10    |
| 19   | 8.86  | 7.86  | 8.26  | 7.90   | 8.62   | 9.11  | 8.44    |
| 20   | 9.13  | 8.09  | 8.42  | 8.36   | 8.86   | 9.38  | 8.71    |
| 21   | 8.98  | 7.91  | 8.50  | 8.42   | 8.98   | 9.50  | 8.71    |
| 22   | 8.32  | 7.15  | 7.35  | 8.12   | 7.85   | 8.30  | 7.85    |
| 23   | 8.57  | 7.45  | 7.68  | 7.66   | 8.25   | 8.70  | 8.05    |
| 24   | 7.58  | 6.64  | 6.58  | 6.48   | 7.34   | 7.73  | 7.06    |
| 25   | 7.03  | 6.08  | 6.04  | 5.78   | 6.85   | 7.18  | 6.49    |
| 26   | 6.30  | 5.40  | 5.34  | 4.70   | 6.18   | 6.44  | 5.73    |
| 27   | 5.89  | 4.26  | 4.35  | 4.25   | 5.35   | 5.56  | 4.94    |
| 28   | 5.96  | 4.48  | 4.45  | 4.24   | 5.41   | 5.62  | 5.03    |
| 29   | 5.23  | 3.76  | 3.76  | 4.28   | 4.73   | 4.89  | 4.44    |
| 30   | 5.07  | 3.47  | 3.68  | 4.03   | 4.73   | 4.89  | 4.31    |
| 31   | 4.42  | 3.48  | 3.42  | 3.56   | 4.39   | 4.54  | 3.97    |
| 32   | 4.15  | 3.11  | 3.22  | 3.58   | 4.19   | 4.32  | 3.76    |
| 33   | 4.78  | 3.22  | 3.65  | 3.62   | 4.72   | 4.86  | 4.14    |
| 34   | 4.61  | 3.15  | 3.48  | 3.58   | 4.55   | 4.68  | 4.01    |
| 35   | 4.73  | 3.39  | 3.61  | 3.18   | 4.59   | 4.72  | 4.04    |
| 36   | 5.29  | 4.07  | 4.32  | 3.55   | 5.30   | 5.45  | 4.66    |
| 37   | 5.36  | 4.13  | 4.58  | 4.12   | 5.59   | 5.76  | 4.92    |
| 38   | 5.72  | 4.45  | 5.02  | 4.70   | 6.11   | 6.32  | 5.39    |
| 39   | 5.85  | 4.57  | 5.19  | 4.73   | 6.36   | 6.60  | 5.55    |
| 40   | 5.73  | 5.23  | 5.35  | 4.98   | 6.30   | 6.54  | 5.69    |
| 41   | 5.71  | 4.73  | 5.37  | 4.78   | 6.17   | 6.38  | 5.52    |
| 42   | 6.08  | 5.20  | 5.90  | 4.62   | 6.42   | 6.64  | 5.81    |
| 43   | 5.72  | 4.93  | 5.84  | 4.46   | 6.18   | 6.35  | 5.58    |
| 44   | 5.36  | 4.95  | 5.45  | 4.56   | 5.70   | 5.83  | 5.31    |
| 45   | 4.98  | 4.72  | 5.11  | 4.03   | 5.32   | 5.39  | 4.93    |
| 46   | 4.56  | 4.33  | 4.81  | 3.73   | 5.06   | 5.12  | 4.60    |
| 47   | 4.69  | 4.22  | 4.65  | 3.56   | 4.84   | 4.87  | 4.47    |
| 48   | 4.43  | 4.04  | 4.44  | 3.72   | 4.64   | 4.63  | 4.32    |
| 49   | 4.15  | 3.96  | 4.31  | 3.60   | 4.44   | 4.41  | 4.14    |
| 50   | 4.06  | 3.85  | 4.22  | 3.40   | 4.32   | 4.27  | 4.02    |
| 51   | 4.11  | 3.90  | 4.25  | 3.48   | 4.35   | 4.30  | 4.07    |
| 52   | 4.08  | 3.73  | 4.08  | 3.43   | 4.20   | 4.13  | 3.94    |

TABLE - 7.11

## ETo FOR RAJKOT

Rate in mm/day

| WEEKS | ET-PEN | ET-BC | ETrad | ETpane | ET-HAR | ET-JH | AVERAGE |
|-------|--------|-------|-------|--------|--------|-------|---------|
| 1     | 4.36   | 3.43  | 4.39  | 4.27   | 4.43   | 4.53  | 4.24    |
| 2     | 4.41   | 3.37  | 4.40  | 4.41   | 4.44   | 4.52  | 4.26    |
| 3     | 4.31   | 3.42  | 4.40  | 4.41   | 4.54   | 4.65  | 4.29    |
| 4     | 4.53   | 3.65  | 4.61  | 4.63   | 4.59   | 4.71  | 4.45    |
| 5     | 5.02   | 3.93  | 4.95  | 4.97   | 4.89   | 5.04  | 4.80    |
| 6     | 5.44   | 4.10  | 5.27  | 5.38   | 5.22   | 5.40  | 5.14    |
| 7     | 5.28   | 4.03  | 5.06  | 5.60   | 5.21   | 5.41  | 5.10    |
| 8     | 5.72   | 4.39  | 5.50  | 6.17   | 5.52   | 5.76  | 5.51    |
| 9     | 6.41   | 4.80  | 6.04  | 6.70   | 6.00   | 6.32  | 6.05    |
| 10    | 6.97   | 5.09  | 6.34  | 7.27   | 6.40   | 6.82  | 6.48    |
| 11    | 7.10   | 5.41  | 6.33  | 7.26   | 6.48   | 6.96  | 6.59    |
| 12    | 7.26   | 5.45  | 6.45  | 7.66   | 6.66   | 7.14  | 6.77    |
| 13    | 7.21   | 5.50  | 6.43  | 7.93   | 6.68   | 7.20  | 6.83    |
| 14    | 7.63   | 5.83  | 6.94  | 8.71   | 7.29   | 7.93  | 7.39    |
| 15    | 8.29   | 6.99  | 7.29  | 9.64   | 7.66   | 8.38  | 8.04    |
| 16    | 8.80   | 7.57  | 7.72  | 10.29  | 7.98   | 8.76  | 8.52    |
| 17    | 9.13   | 7.92  | 7.67  | 10.89  | 7.89   | 8.69  | 8.70    |
| 18    | 9.26   | 7.71  | 8.04  | 10.78  | 8.35   | 9.22  | 8.89    |
| 19    | 9.97   | 8.58  | 8.53  | 11.11  | 8.71   | 9.64  | 9.42    |
| 20    | 10.21  | 9.04  | 8.74  | 11.53  | 8.93   | 9.90  | 9.73    |
| 21    | 10.15  | 8.97  | 8.51  | 9.73   | 8.81   | 9.77  | 9.32    |
| 22    | 9.59   | 8.35  | 8.13  | 10.73  | 8.53   | 9.45  | 9.13    |
| 23    | 9.22   | 8.24  | 7.71  | 9.80   | 8.20   | 9.10  | 8.71    |
| 24    | 8.06   | 7.16  | 6.68  | 8.48   | 7.21   | 7.98  | 7.60    |
| 25    | 7.35   | 6.58  | 5.83  | 6.46   | 6.25   | 6.88  | 6.56    |
| 26    | 6.54   | 5.76  | 5.37  | 7.08   | 6.09   | 6.68  | 6.25    |
| 27    | 7.11   | 5.28  | 4.92  | 5.73   | 5.63   | 6.16  | 5.81    |
| 28    | 6.35   | 4.51  | 4.42  | 5.36   | 5.31   | 5.80  | 5.29    |
| 29    | 6.06   | 4.33  | 4.22  | 5.18   | 5.04   | 5.49  | 5.05    |
| 30    | 5.58   | 3.78  | 3.88  | 4.70   | 4.74   | 5.14  | 4.64    |
| 31    | 5.45   | 3.87  | 3.69  | 4.55   | 4.55   | 4.94  | 4.51    |
| 32    | 5.14   | 3.33  | 3.72  | 3.74   | 4.66   | 5.03  | 4.27    |
| 33    | 4.30   | 3.18  | 3.42  | 3.66   | 4.36   | 4.71  | 3.94    |
| 34    | 5.01   | 3.33  | 3.61  | 4.02   | 4.58   | 4.95  | 4.25    |
| 35    | 5.81   | 4.20  | 4.55  | 4.44   | 5.52   | 5.98  | 5.08    |
| 36    | 5.86   | 4.63  | 4.65  | 5.01   | 5.59   | 6.06  | 5.30    |
| 37    | 5.50   | 4.64  | 5.01  | 5.06   | 6.05   | 6.57  | 5.47    |
| 38    | 6.17   | 4.88  | 5.08  | 5.26   | 6.03   | 6.56  | 5.66    |
| 39    | 6.23   | 4.97  | 5.07  | 5.00   | 6.03   | 6.57  | 5.65    |
| 40    | 6.17   | 5.69  | 5.33  | 5.45   | 6.17   | 6.73  | 5.92    |
| 41    | 6.07   | 5.01  | 5.40  | 5.73   | 6.20   | 6.74  | 5.86    |
| 42    | 6.17   | 5.28  | 5.79  | 6.43   | 6.34   | 6.88  | 6.15    |
| 43    | 6.06   | 5.19  | 5.91  | 6.06   | 6.26   | 6.76  | 6.04    |
| 44    | 5.75   | 5.07  | 5.45  | 5.53   | 5.74   | 6.17  | 5.62    |
| 45    | 5.33   | 4.89  | 5.15  | 5.32   | 5.30   | 5.65  | 5.27    |
| 46    | 5.15   | 4.56  | 5.15  | 5.57   | 5.34   | 5.57  | 5.22    |
| 47    | 4.93   | 4.33  | 4.98  | 4.94   | 5.14   | 5.43  | 4.96    |
| 48    | 4.78   | 4.22  | 4.70  | 5.17   | 4.75   | 4.97  | 4.77    |
| 49    | 4.65   | 4.15  | 4.61  | 4.99   | 4.56   | 4.76  | 4.62    |
| 50    | 4.50   | 3.91  | 4.43  | 4.52   | 4.44   | 4.61  | 4.40    |
| 51    | 4.28   | 3.72  | 4.37  | 4.37   | 4.52   | 4.69  | 4.33    |
| 52    | 4.07   | 3.31  | 4.16  | 4.45   | 4.33   | 4.43  | 4.13    |

TABLE - 7.12  
ETo FOR JUNAGADH  
Rate in mm/day

| WEEKS | ET-PEN | ET-BC | ETrad | ETpane | ET-HAR | ET-JH | AVERAGE |
|-------|--------|-------|-------|--------|--------|-------|---------|
| 1     | 4.68   | 4.17  | 4.47  | 5.14   | 4.33   | 4.35  | 4.52    |
| 2     | 4.93   | 4.40  | 4.68  | 5.10   | 4.37   | 4.39  | 4.65    |
| 3     | 4.74   | 4.38  | 4.83  | 4.96   | 4.48   | 4.48  | 4.65    |
| 4     | 4.91   | 4.55  | 4.81  | 5.30   | 4.52   | 4.54  | 4.77    |
| 5     | 5.55   | 4.74  | 5.15  | 5.67   | 4.82   | 4.86  | 5.13    |
| 6     | 5.96   | 5.02  | 5.43  | 6.09   | 5.04   | 5.10  | 5.44    |
| 7     | 5.91   | 5.03  | 5.55  | 5.92   | 5.21   | 5.32  | 5.49    |
| 8     | 6.44   | 5.51  | 5.84  | 6.02   | 5.56   | 5.73  | 5.85    |
| 9     | 6.87   | 5.49  | 6.10  | 6.47   | 5.82   | 6.02  | 6.13    |
| 10    | 7.91   | 6.12  | 6.60  | 7.16   | 6.25   | 6.52  | 6.76    |
| 11    | 8.01   | 6.44  | 6.55  | 7.08   | 6.26   | 6.57  | 6.82    |
| 12    | 8.25   | 6.43  | 6.60  | 7.48   | 6.42   | 6.75  | 6.99    |
| 13    | 8.55   | 6.77  | 6.76  | 7.69   | 6.52   | 6.90  | 7.20    |
| 14    | 9.05   | 6.89  | 7.30  | 6.97   | 6.97   | 7.40  | 7.43    |
| 15    | 8.28   | 7.37  | 7.09  | 7.76   | 7.19   | 7.69  | 7.56    |
| 16    | 8.23   | 7.56  | 7.34  | 7.94   | 7.37   | 7.88  | 7.72    |
| 17    | 8.21   | 7.46  | 7.43  | 7.69   | 7.76   | 8.31  | 7.81    |
| 18    | 8.03   | 6.90  | 7.28  | 7.24   | 7.74   | 8.30  | 7.58    |
| 19    | 8.50   | 7.88  | 7.69  | 7.87   | 7.99   | 8.61  | 8.09    |
| 20    | 8.47   | 7.56  | 7.69  | 8.59   | 8.22   | 8.86  | 8.23    |
| 21    | 8.24   | 7.12  | 7.38  | 8.59   | 8.07   | 8.71  | 8.02    |
| 22    | 8.43   | 7.23  | 7.56  | 8.25   | 8.02   | 8.63  | 8.02    |
| 23    | 7.19   | 6.23  | 6.11  | 7.38   | 6.84   | 7.35  | 6.85    |
| 24    | 6.41   | 5.63  | 5.40  | 6.32   | 6.23   | 6.67  | 6.11    |
| 25    | 5.34   | 4.85  | 4.30  | 6.75   | 5.11   | 5.46  | 5.30    |
| 26    | 4.96   | 4.42  | 4.07  | 6.28   | 4.93   | 5.25  | 4.98    |
| 27    | 5.69   | 4.13  | 4.15  | 6.02   | 5.05   | 5.36  | 5.07    |
| 28    | 4.79   | 4.08  | 3.51  | 5.45   | 4.27   | 4.53  | 4.44    |
| 29    | 3.63   | 2.61  | 2.90  | 4.98   | 4.03   | 4.26  | 3.74    |
| 30    | 3.52   | 2.64  | 2.63  | 5.01   | 3.59   | 3.79  | 3.53    |
| 31    | 3.59   | 2.69  | 2.86  | 4.38   | 3.92   | 4.12  | 3.59    |
| 32    | 3.70   | 2.78  | 2.76  | 3.69   | 3.64   | 3.83  | 3.40    |
| 33    | 3.43   | 2.55  | 2.55  | 3.47   | 3.49   | 3.67  | 3.19    |
| 34    | 3.84   | 2.88  | 3.12  | 4.16   | 4.14   | 4.33  | 3.75    |
| 35    | 4.69   | 3.67  | 3.65  | 4.11   | 4.57   | 4.80  | 4.25    |
| 36    | 4.74   | 3.90  | 3.91  | 3.41   | 4.82   | 5.07  | 4.31    |
| 37    | 5.25   | 4.26  | 4.58  | 3.98   | 5.57   | 5.86  | 4.92    |
| 38    | 5.33   | 4.25  | 4.84  | 4.05   | 5.81   | 6.13  | 5.07    |
| 39    | 5.47   | 4.44  | 4.93  | 4.08   | 5.91   | 6.26  | 5.18    |
| 40    | 5.41   | 5.05  | 4.90  | 5.24   | 5.84   | 6.21  | 5.44    |
| 41    | 5.87   | 5.42  | 5.57  | 4.98   | 6.17   | 6.57  | 5.76    |
| 42    | 6.04   | 5.29  | 5.70  | 5.51   | 6.31   | 6.71  | 5.93    |
| 43    | 6.11   | 5.61  | 5.91  | 5.45   | 6.11   | 6.46  | 5.94    |
| 44    | 5.95   | 5.76  | 5.59  | 5.32   | 5.64   | 5.93  | 5.70    |
| 45    | 5.10   | 5.36  | 4.92  | 5.29   | 4.96   | 5.20  | 5.14    |
| 46    | 5.00   | 5.07  | 4.84  | 4.66   | 4.84   | 5.06  | 4.91    |
| 47    | 4.56   | 4.56  | 4.58  | 4.12   | 4.69   | 4.85  | 4.56    |
| 48    | 4.65   | 4.56  | 4.49  | 4.70   | 4.48   | 4.60  | 4.58    |
| 49    | 4.29   | 4.16  | 4.19  | 4.46   | 4.32   | 4.41  | 4.30    |
| 50    | 4.28   | 4.20  | 4.07  | 4.39   | 4.08   | 4.14  | 4.19    |
| 51    | 4.11   | 4.11  | 4.08  | 4.03   | 4.07   | 4.12  | 4.09    |
| 52    | 4.19   | 4.09  | 4.17  | 4.05   | 4.08   | 4.14  | 4.12    |

**TABLE 7.13**  
**ET<sub>o</sub> FOR GUJARAT**  
**Rate in mm/day**

| WEEK | DANTIWADA | ANAND | VADODARA | RAJKOT | JUNAGADH | AVERAGE |
|------|-----------|-------|----------|--------|----------|---------|
| 1    | 3.86      | 3.76  | 4.17     | 4.24   | 4.52     | 4.11    |
| 2    | 4.00      | 3.78  | 4.23     | 4.26   | 4.65     | 4.18    |
| 3    | 3.95      | 3.84  | 4.39     | 4.29   | 4.65     | 4.22    |
| 4    | 4.11      | 3.92  | 4.55     | 4.45   | 4.77     | 4.36    |
| 5    | 4.26      | 4.27  | 4.69     | 4.80   | 5.13     | 4.63    |
| 6    | 4.45      | 4.66  | 4.89     | 5.14   | 5.44     | 4.91    |
| 7    | 4.86      | 4.82  | 4.99     | 5.10   | 5.49     | 5.05    |
| 8    | 5.13      | 5.09  | 5.35     | 5.51   | 5.85     | 5.39    |
| 9    | 5.28      | 5.58  | 5.70     | 6.05   | 6.13     | 5.75    |
| 10   | 6.14      | 5.88  | 6.31     | 6.48   | 6.76     | 6.31    |
| 11   | 6.60      | 5.92  | 6.69     | 6.59   | 6.87     | 6.53    |
| 12   | 6.58      | 6.26  | 6.74     | 6.77   | 6.99     | 6.67    |
| 13   | 6.87      | 6.35  | 6.97     | 6.83   | 7.20     | 6.84    |
| 14   | 7.63      | 6.91  | 7.28     | 7.39   | 7.43     | 7.33    |
| 15   | 8.08      | 7.40  | 7.63     | 8.04   | 7.56     | 7.74    |
| 16   | 8.33      | 7.54  | 7.63     | 8.52   | 7.72     | 7.95    |
| 17   | 8.65      | 7.66  | 7.90     | 8.70   | 7.81     | 8.14    |
| 18   | 8.55      | 8.11  | 8.10     | 8.89   | 7.58     | 8.25    |
| 19   | 8.96      | 8.08  | 8.44     | 9.42   | 8.09     | 8.60    |
| 20   | 9.10      | 8.26  | 8.71     | 9.73   | 8.23     | 8.80    |
| 21   | 9.35      | 8.22  | 8.72     | 9.32   | 8.02     | 8.72    |
| 22   | 9.04      | 8.08  | 7.85     | 9.13   | 8.02     | 8.42    |
| 23   | 9.25      | 7.50  | 8.05     | 8.71   | 6.85     | 8.07    |
| 24   | 8.54      | 6.77  | 7.06     | 7.60   | 6.11     | 7.21    |
| 25   | 7.73      | 6.17  | 6.49     | 6.56   | 5.30     | 6.45    |
| 26   | 7.14      | 5.49  | 5.73     | 6.25   | 4.99     | 5.92    |
| 27   | 6.71      | 5.08  | 4.94     | 5.81   | 5.07     | 5.52    |
| 28   | 6.64      | 4.93  | 5.03     | 5.29   | 4.44     | 5.26    |
| 29   | 5.83      | 4.41  | 4.44     | 5.05   | 3.74     | 4.69    |
| 30   | 5.03      | 4.33  | 4.31     | 4.64   | 3.53     | 4.37    |
| 31   | 4.87      | 4.12  | 3.97     | 4.51   | 3.59     | 4.21    |
| 32   | 4.68      | 3.61  | 3.76     | 4.27   | 3.40     | 3.95    |
| 33   | 4.35      | 3.98  | 4.14     | 3.94   | 3.19     | 3.92    |
| 34   | 4.52      | 3.91  | 4.01     | 4.25   | 3.74     | 4.09    |
| 35   | 4.81      | 4.53  | 4.04     | 5.08   | 4.25     | 4.54    |
| 36   | 5.71      | 4.91  | 4.50     | 5.30   | 4.31     | 4.94    |
| 37   | 5.82      | 5.08  | 4.92     | 5.47   | 4.92     | 5.24    |
| 38   | 6.31      | 5.45  | 5.39     | 5.66   | 5.07     | 5.58    |
| 39   | 6.18      | 5.44  | 5.55     | 5.65   | 5.18     | 5.60    |
| 40   | 5.97      | 5.58  | 5.69     | 5.92   | 5.44     | 5.72    |
| 41   | 5.87      | 5.37  | 5.52     | 5.86   | 5.76     | 5.68    |
| 42   | 6.05      | 5.62  | 5.81     | 6.15   | 5.93     | 5.91    |
| 43   | 5.66      | 5.50  | 5.58     | 6.04   | 5.94     | 5.74    |
| 44   | 5.13      | 5.13  | 5.31     | 5.62   | 5.70     | 5.38    |
| 45   | 4.59      | 4.81  | 4.93     | 5.27   | 5.14     | 4.95    |
| 46   | 4.58      | 4.57  | 4.60     | 5.22   | 4.91     | 4.78    |
| 47   | 4.38      | 4.35  | 4.47     | 4.96   | 4.56     | 4.54    |
| 48   | 4.13      | 4.18  | 4.32     | 4.77   | 4.58     | 4.39    |
| 49   | 3.93      | 3.95  | 4.15     | 4.62   | 4.31     | 4.19    |
| 50   | 3.74      | 3.67  | 4.02     | 4.40   | 4.19     | 4.00    |
| 51   | 3.70      | 3.71  | 4.07     | 4.33   | 4.09     | 3.98    |
| 52   | 3.70      | 3.62  | 3.94     | 4.13   | 4.12     | 3.90    |