

Development of IDF Curves for Precipitation in Western Watershed of Guwahati, Assam

Authors : Rajarshi Sharma, Rashidul Alam, Visavino Seleyi, Yuvila Sangtam

Abstract : The Intensity-Duration-Frequency (IDF) relationship of rainfall amounts is one of the most commonly used tools in water resources engineering for planning, design and operation of water resources project, or for various engineering projects against design floods. The establishment of such relationships was reported as early as in 1932 (Bernard). Since then many sets of relationships have been constructed for several parts of the globe. The objective of this research is to derive IDF relationship of rainfall for western watershed of Guwahati, Assam. These relationships are useful in the design of urban drainage works, e.g. storm sewers, culverts and other hydraulic structures. In the study, rainfall depth for 10 years viz. 2001 to 2010 has been collected from the Regional Meteorological Centre Borjhar, Guwahati. Firstly, the data has been used to construct the mass curve for duration of more than 7 hours rainfall to calculate the maximum intensity and to form the intensity duration curves. Gumbel's frequency analysis technique has been used to calculate the probable maximum rainfall intensities for a period of 2 yr, 5 yr, 10 yr, 50 yr, 100 yr from the maximum intensity. Finally, regression analysis has been used to develop the intensity-duration-frequency (IDF) curve. Thus, from the analysis the values for the constants 'a', 'b' & 'c' have been found out. The values of 'a' for which the sum of the squared deviation is minimum has been found out to be 40 and when the corresponding value of 'c' and 'b' for the minimum squared deviation of 'a' are 0.744 and 1981.527 respectively. The results obtained showed that in all the cases the correlation coefficient is very high indicating the goodness of fit of the formulae to estimate IDF curves in the region of interest.

Keywords : intensity-duration-frequency relationship, mass curve, regression analysis, correlation coefficient

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