

APPLIED HYDROLOGY

Module I

Introduction: Hydrologic Cycle, Systems Concept, Hydrologic model classification. Hydrologic Processes: Reynolds Transport Theorem. Atmospheric circulation: Water Vapour, perceptible water, Thunderstorm cell model. Evaporation: Energy balance method and Aerodynamic method. Evapotranspiration. Subsurface water: unsaturated flow, Richard's equation. Infiltration: Horton's and Phillip's equations. Green-Ampt Method, Ponding time. Surface Water: Hydrograph Analysis, SCS method, Effective Rainfall, Runoff, Runoff Components, Direct Runoff Hydrograph.

Module II

Unit Hydrograph Theory: Linear Time Invariant System, Response Functions of Linear Systems, Derivation of Non Parametric Unit Hydrograph From Single Storm and Multi Storm Events, S - Curve Hydrograph, Instantaneous Unit Hydrotherapy.

Module III

Rainfall – Runoff Analysis: Review of Rational Methods, Conceptual Models, Parametric Unit Hydrograph, Clarke, Nash and Dooge Models, Hydrologic Simulation Models, Stanford Watershed Model, Derivation of Unit Hydrograph for Ungagged Catchments, Synthetic Unit Hydrograph.

Module IV

Hydrologic Time Series Analysis: Independent and Auto correlated Data, Structure of a Hydrologic Time Series, Trend, Jump and Seasonality, Stationarity and Ergodicity, Auto covariance and Auto Correlation Function, Correlogaram Analysis, Spectral Analysis, Analysis of Multivariate Hydrologic Series. Modelling of Hydrologic Time Series: Data Generation Techniques, Linear Stochastic Models, Autoregressive, Moving Average, ARMA Models, Modelling of Nonstationary and seasonal Series, Thomas – Feiring Model, ARIMA Models.

Hydrologic Flood Routing: Reservoir Routing, Channel Routing, Estimation of Parameters of Flood Routing Models, Flood estimation and flood frequency studies, Real Time Flood Forecasting.

References:

1. Chow, V.T., Maidment, D.R. and Mays, L.W. "applied Hydrology", McGraw Hill Inc. N York
2. Singh, V.P. "Hydrologic Systems," , Prentice Hall Inc., N York
3. Haan C.T., "Statistical Methods in Hydrology", East West Press, New Delhi
4. Viessman, W., Lewis, G.L. and Knapp, J.W. "Introduction to Hydrology", Harper & Row Publications Inc., Singapore.
5. Ponce, W.F. "Engineering Hydrology", Prentice Hall Inc. N York.
6. Kottegoda "Stochastic Processes in Hydrology", Prentice Hall, Inc., N Jersey
7. Patra K.C "Hydrology and Water resources Engineering", Narosa publishing house, New Delhi.