16AG303 **HYDROLOGY**

Hours Per Week :

L	T	P	C
2	1	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
30	15	-	5	40	5	8	5	-
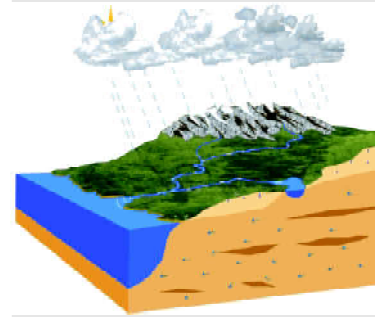
Course Description and Objectives:

This course deals with the basic concepts on hydrologic cycle, engineering hydrology computations and the relationships between hydrology and other disciplines such as ecology, meteorology and climatology. The objective of this course is to enable the student to learn the essential components and functions of the hydrologic cycle.

Course Outcomes:

The student will be able to:

- understand the essential components and functions of the hydrologic cycle.

- compute hydrologic mass balance in a closed basin.

- develop a unit hydrograph based on stream flow data and conduct basic unit hydrograph analysis and frequency analysis of hydrological data.

- perform hydrologic and hydraulic routing using hydraulic river routing.

SKILLS:

✓ *Analyze rainfall data using different techniques (Mean rainfall over an area, mass curve, double mass curve, frequency analysis, etc).*

✓ *Estimate evapotranspiration and infiltration using different equations and field methods.*

✓ *Prepare hydrograph for watershed and its analysis.*

✓ *Estimate runoff using different methods.*

UNIT - 1   L-06,T-03

HYDROLOGICAL CYCLE AND PRECIPITATION : Hydrology and hydrological cycle, Precipitation forms, weather systems for precipitation, Characteristics of precipitation in India, Rainfall measurement, rain gauge network, Optimum number, Representation of rainfall data mass curve, Hyetograph, mean precipitation over an area. Frequency analysis of point rainfall, Calculation of rainfall return period and probability, Plotting position; Estimation of missing data, Test for consistency of rainfall records; Double mass curve technique.

UNIT - 2   L-06,T-03

ABSTRACTIONS, INFILTRATION AND EVAPOTRANSPIRATION : Introduction, Abstractions from precipitation interception, Depression storage, Infiltration and infiltration indices, Evaporation and transpiration estimation and measurement, Reservoir evaporation methods of reduction, Factors affecting infiltration and evaporation.

UNIT - 3   L-06,T-03

WATERSHED PROPERTIES AND RUNOFF : Geomorphology of watersheds stream number, Stream length, Stream area, Stream slope and Horton's law, Runoff- factors affecting, Measurement of runoff, Runoff characteristics of streams, Estimation of peak runoff rate and volume using rational method and SCS method.

UNIT - 4   L-06,T-03

HYDROGRAPH : Stream flow measurement of stage and velocity, Rating curve, Extension of rating curve; Hydrograph- Components, Factors affecting the shape of hydrograph, Base flow separation; Unit hydrograph theory – Assumptions, Applications, Derivation of unit hydrographs, Unit hydrograph of different durations, Dimensionless unit hydrograph, Distribution hydrograph, Synthetic unit hydrograph, Uses and limitations of unit hydrograph.

UNIT - 5   L-06,T-03

FLOOD, DROUGHT, WEATHER AND CLIMATE : Introduction to flood, Drought, Weather and climate terms and definitions, Head water flood control methods, Retards and their location; Flood routing – graphical methods of reservoir flood routing, Channel routing, Muskinghum method, Hydrology of dry land areas drought and its classification; Introduction to watershed management and planning, Introduction to climate change – its impact on floods and droughts.

TEXT BOOKS:

1. K. Subramanya, "Engineering Hydrology", 4th edition, Tata McGraw Hill, New Delhi, 2013.

2. V. P. Singh, "Elementary Hydrology", Prentice Hall India, 2006.

REFERENCE BOOKS:

1. V. T. Chow, "Hand Book of Applied Hydrology", 2nd edition, McGraw-Hill, New York, 2012.

2. H. M. Raghunath, "Hydrology Principles, Analysis and Design", 3rd edition, New Age International, 2006.

3. K. N. Mutreja, "Applied Hydrology", 1st edition, Tata McGraw Hill, New York, 1990.