

22SWCE201 WATERSHED HYDROLOGY

Hours Per Week :

L	T	P	C
1	0	2	2

PREREQUISITE KNOWLEDGE: Basics of Hydrology.

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. To familiarize the students with the important aspects of watershed hydrology. To impart the knowledge about the various hydrologic phenomena and their relevance in the field of soil and water conservation.

MODULE-1

UNIT-1

4L+0T+8P=12 Hours

INTRODUCTION TO HYDROLOGY : Hydrologic cycle, precipitation and its forms, rainfall measurement and estimation of mean rainfall, frequency analysis of point rainfall. Mass curve, hyetograph, depth-area-duration curves (DAD) and intensity-duration-frequency relationship.

UNIT-2

04L+0T+08P=12 Hours

RUNOFF DETERMINATION: Hydrologic processes- Interception, infiltration – Factors influencing, measurement and indices. Evaporation-Estimation and measurement. Runoff-Factors affecting and measurement, stage-discharge rating curve, estimation of peak runoff rate and volume, Rational method, Cook's method and SCS curve number method.

PRACTICES:

- Visit to meteorological observatory and study of different instruments.
- Design of rain gauge network. Exercise on intensity - frequency - duration curves.
- Exercise on depth - area – duration and double mass curves.
- Analysis of rainfall data and estimation of mean rainfall by different methods.
- Exercise on frequency analysis of hydrologic data and estimation of missing data, test for consistency of rainfall records

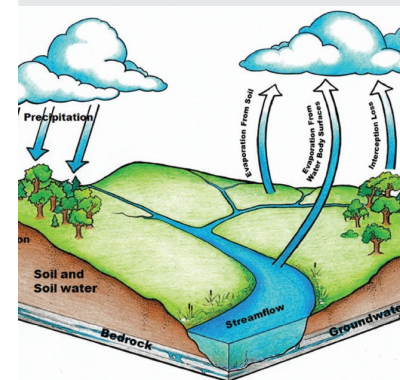
MODULE-2

UNIT-1

4L+0T+8P=12 Hours

HYDROGRAPH:

Geomorphology of watersheds–Linear, aerial and relief aspects of watersheds-stream order, drainage density and stream frequency. Hydrograph - Components, base flow separation, unit hydrograph theory, S-curve, synthetic hydrograph, applications and limitations.



Source: <https://www.google.com>

SKILLS:

- ✓ Analyze rainfall data using different techniques (Mean rainfall over an area, mass curve, double mass curve, frequency analysis, etc).
- ✓ Estimate evapo-transpiration and infiltration using different equations and field methods.
- ✓ Prepare hydrograph for watershed and its analysis.
- ✓ Estimate runoff using different methods.

UNIT-2**04L+0T+8P=12 Hours****FLOOD ROUTING:**

AStream gauging - discharge rating curves, flood peak, design flood and computation of probable flood. Flood routing – channel and reservoir routing. Drought–classification, causes and impacts, drought management strategy.

PRACTICES:

- Exercise on computation of infiltration indices.
- Computation of peak runoff and runoff volume by Cook's method and rational formula. Computation of runoff volume by SCS curve number method.
- Study of stream gauging instruments-current meter and stage level recorder.
- Exercise on geomorphic parameters of watersheds.
- Exercise on runoff hydrograph. Exercise on unit hydrograph. Exercise on synthetic hydrograph. Exercise on flood routing.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the knowledge in determining the rainfall characteristics.	Apply	1	1, 2, 4
2	Investigate characteristics of watershed and apply the knowledge to predict hydrograph.	Apply	2	1, 2, 4, 5, 11
3	Investigate causes and impact of draught and their management.	Analyze	2	1, 2, 4, 6, 7, 11, 12
4	Compute runoff of watershed and Analyze different hydrologic process.	Evaluate	1	1, 2, 4, 5, 6, 7
5	Compute discharge rating curve and design of flood routing in channel or reservoirs.	Evaluate	2	1, 2, 3, 4, 5, 6, 7, 11

TEXT BOOK:

1. Subramanya, K., "Engineering Hydrology" 3rd Edition, Tata McGraw-Hill Publishing Co., New Delhi, 2008.

REFERENCE BOOKS:

1. Chow, V.T., D.R. Maidment and L.W. Mays, "Applied Hydrology", McGraw Hill Publishing Co., New York, 2010.
2. Jaya Rami Reddy, P. "A Text Book of Hydrology" University Science Press, New Delhi, 2011.
3. Linsley, R. K., M .A . Kohler, and J.L.H. Paulhus, "Hydrology for Engineers" McGraw-Hill Publishing Co., Japan, 2012.
4. Mutreja, K.N.1990. Applied Hydrology. Tata Mc Graw-Hill Publishing Co., New Delhi.