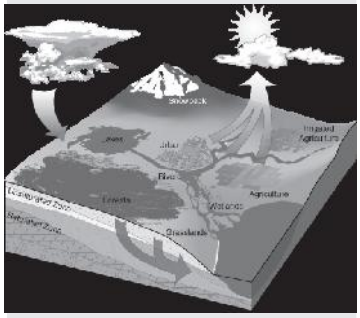
19AG202 WATERSHED HYDROLOGY



Source :

Hours Per Week :

L	T	P	C
1	0	2	2

Total Hours :

L	T	P
15	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
10	45	-	-	-	-

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.

COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand important hydrological processes and their variability in space and time at the watershed scale	---
2	Apply measurements and external datasets into hydrological investigations in areas with limited data by collecting and analyzing data during laboratory assignments and the course project.	4
3	Analyse hydrological and hydrochemical functioning of small watersheds can be altered by human and natural disturbance through comprehensive test questions and in-depth investigation of watershed response during the class project.	6
4	Analyse types of hydrological models, advantages and limitations through laboratory investigations and answering integrative questions	5
5	Creative the scientific method to study hydrological response to disturbance by quantifying water, solute, and energy fluxes using analytical methods and communicating those results effectively through written and verbal parts of the class project	7

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 fieldmethods.*

UNIT - I **L-3**

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 and intensity-duration-frequency relationship.

UNIT - II **L-3**

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

UNIT - III **L-3**

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.

UNIT - IV **L-3**

Floods: Terms and definitions head water flood control- method. Stream gauging - discharge rating curves, flood peak, design flood and computation of probable flood.

UNIT - V **L-3**

Flood routing: Channel and reservoir routing. Drought – classification, causes and impacts, drought management strategy.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS **TOTAL HOURS: 30**

1. Visit to meteorological observatory and study of different instruments.
2. Design of rain gauge network .
3. Exercise on intensity - frequency - duration curves.
4. Exercise on depth - area – duration and double mass curves .
5. Analysis of rainfall data and estimation of mean rainfall by different methods.
6. Exercise on frequency analysis of hydrologic data and estimation of missing data, test for consistency of rainfall records .
7. Exercise on computation of infiltration indices.
8. Computation of peak runoff and runoff volume by Cook's method and rational formula.
9. Computation of runoff volume by SCS curve number method.
10. Study of stream gauging instruments - current meter and stage level recorder.
11. Exercise on geomorphic parameters of watersheds.
12. Exercise on runoff hydrograph.
13. Exercise on Unit hydrograph.
14. Exercise on synthetic hydrograph.
15. Exercise on flood routing.
16. Practical examinations.

TEXT BOOKS:

1. K. Subramanya, 2013,"Engineering Hydrology", 4th edition, Tata McGraw Hill, New Delhi.
2. V. P. Singh,2006, "Elementary Hydrology", Prentice Hall India.

REFERENCE BOOKS:

1. V. T. Chow,2010, "Hand Book of Applied Hydrology", 2nd edition, McGraw-Hill, New York.
2. H. M. Raghunath, "Hydrology Principles, Analysis and Design", 3rd edition, New Age International.