

**Course No. : SWCE – 233**  
**Sem : III**

**Title: Watershed Hydrology**  
**Credit: 3 (2+1)**

**Theory:**

Introduction; hydrologic cycle; precipitation - forms, rainfall measurement, mass curve, hyetograph, mean rainfall depth, frequency analysis of point rainfall, plotting position, estimation of missing data, test for consistency of rainfall records; interception; infiltration; evaporation; evapo-transpiration - estimation and measurement; geomorphology of watersheds - stream number, stream length, stream area, stream slope and Horton' s laws; runoff - factors affecting, measurement; stage and velocity, rating curve, extension of rating curve; estimation of peak runoff rate; rational method, Cook' s method, SCS method and volume by Curve number method; hydrograph; components, base flow separation, unit hydrograph theory - unit hydrograph of different durations, dimensionless unit hydrograph, distribution hydrograph, synthetic unit hydrograph, uses and limitations of unit hydrograph; head water flood control methods, flood routing – graphical methods of reservoir flood routing; hydrology of dry land areas - drought and its classification; introduction to watershed management and planning.

**Practical:**

Visit to meteorological observatory; Study of different types of rain gauges; Exercise on analysis of rainfall data; Determination of average depth of rainfall and frequency analysis; Study of stage recorders and current meters; Exercise on estimation of peak runoff rate and runoff volume; Exercises on hydrograph and unit hydrograph; Exercises on flood routing problems.

**DEPARTMENT OF SOIL & WATER CONSERVATION ENGINEERING**

Lesson Plan for the B.Tech.[Agril.Engg.] from 2007-08

Course No.SWCE-233  
 Credit: 2+1=3

Course Title : Watershed Hydrology.  
 Semester-III

**Lesson Plan**

Lect. No.	Topic	Book No.	Article No.	Page No.
1	Introduction, Scope of Hydrology Hydrologic cycle	2 1	- 3.1	1-3,11-14 24-25
2	Precipitation-forms, Rainfall measurement, mass curve	2 4 1	- 2.1 3.3,3.9	16-21/ 39-40 13-14 26-34
3	Hyetograph, mean rainfall depth. Adequacy of raingauge, point precipitation, Mean Areal precipitation.	2 4	- 3.10,3.11,3.12	28-35, 39 46-54
4	Intensity-Duration relationship, Intensity-Duration frequency relationship, Depth Area duration relationship, plotting positions. Frequency Analysis,	3 4	3.8 -	87-89 60-68
5	Estimation of missing data, Test of consistency of rainfall records.	4	3.7, 3.8	36-45
6-8	Hydrologic Losses (Interception, infiltration, Evaporation, Evapo-transpiration): Estimation &	4	4.1, 4.2, 4.3, 4.6, 4.9.2, 4.10, 4.12,	82-88, 90-94, 101-109, 115-124, 135-138

	Measurement	2	-	62-68
9	Geomorphology of watershed, stream number stream length, stream slope Horton law,	2		99-103
10-11	Runoff-factors affecting runoff Measurement: Stage & velocity, rating curve	2 4	- -	108,186-194, 253-259
12-13	Estimation of peak runoff rate, rational method, Cook's method, SCS method; Numericals on above	2 1 4 5	- 3.11 5.2.1, 5.2.2 2.6	109-112 36-38 151-162 29-36
14-15	Curve Number method (estimation of runoff volume) Numericals on above	4 1 5	5.2.3 - -	162-166 39-43 44-48
16-17	Hydrograph, Components. Base flow separation.	2 4	- 6.1,6.4	121-129 182-184, 191-193
18	Unit Hydrograph theory, Unit hydrograph of different duration	4	6.6	193-208
19-21	Examples/Numericals on above. Distribution hydrograph.	2	-	148-157
22-23	Synthetic Unit Hydrograph(Snyder Method) Numericals on above	4	6.7	208-217
24	Dimensionless Unit Hydrograph	4	6.8	217-220
25-26	Head water flood control- methods	2 4	- 8.3	258-272 290-297
27	Flood routing, graphical method of Reservoir Flood Routing	4	9.1-9.3, 9.8	310-311, 328
28	Hydrology of dryland areas-drought & its classification	4	11.1,11.2,11.4, 11.5	395-399 401-402
29-30	Introduction to watershed management & planning	1	28.1-28.3,28.9	556-558 565-567

### **PRACTICALS :**

- i) Visit to meteorological observatory and study of meteorological instruments
- ii) Study of different types of raingauges
- iii) Analysis of rain gauge charts
- iv) Estimation of average rainfall depth
- v) Probability analysis of rainfall data by Weibull's method
- vi) Estimation of peak runoff rate by rational method
- vii) Estimation of peak runoff rate by Cook's method
- viii) Computation of runoff volume by Curve Number method
- ix) Study of stream gauging instruments(Stage level recorder and current meter)
- x) Development of DRH from stage hydrograph
- xi) Development of unit hydrograph
- xii) Development of Dimensionless Unit Hydrograph

**TEXT BOOKS :**

1. Land and Water Management Engineering by V.V.N. Murthy, Kalyani Publishers, New Delhi, 1998 (2<sup>nd</sup> Ed.).
2. Hydrology by H.M. Raghunath, Wiley Eastern Limited, 1997.
3. Applied Hydrology by K.N. Mutreja, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1995 (4<sup>th</sup> Ed.).
4. Watershed Hydrology by R.Suresh, Standard Publishers Distributors, New Delhi-6, 1997 (1<sup>st</sup> Ed.).
5. Manual of Soil and Water Conservation Practices By G. Singh, C. Venkataramanan, G. Sastry, and B.P. Joshi.

**REFERENCE BOOK :**

1. Engineering Hydrology by K. Subramanya.