SWCE 502 Applied Watershed Hydrology 2+1

Objectives:

To provide in depth knowledge of surface and sub-surface hydrology of watershed including stream flow measurement and computer simulation of hydrological processes in small watersheds.

Unit-I

Hydrology in water resources planning, rainfall, surface run off and sub-surface run off as components of hydrologic cycle. Run off phenomena, relationship between precipitation and run off. Stream flow measurement and analysis of data in detail.

Unit-II

Synthetic unit hydrograph. Recent advances in analysis of hydrologic data and flow from small watersheds. Methods of run off estimation from small watersheds. Use of IUH and various methods of estimation. Run off estimation models: SCS, CN software.

Unit-III

Microclimate, estimation methods of evaporation. Advances and improvements in rational approach. SCS approach criticism and improvements.

Unit-IV

Hydrological hazard functions. Methods of estimation of hydrologic parameters. Data transformation. Flood routing, Reservoir sedimentation process.

Unit-V

Calibration and evaluation of hydrologic models. Computer simulation of hydrological process in small watersheds.

Practical:

Delineation of watershed and study of watershed characteristics. Measurement of rainfall and runoff in a watershed and data analysis. Estimation of infiltration and runoff from a watershed. Analysis and derivation of various types of hydrographs. Flood routing. Reservoir sedimentation. Watershed model components. Visit to a watershed.

Course Outcome:

The students will be able to understand and analyse the process and the effect of various climatic parameters on rainfall-runoff relationship. They can also be able to develop the competency for calibration and evaluation of hydrologic models and computer simulation.

Teaching Schedule

S.No.	Topic	No. of Lectures
1	Hydrology in water resources planning, rainfall, surface runoff and sub-surface runoff as components of hydrologic cycle	2
2	Basics of watershed hydrology and processes, global and watershed perspectives	2
3	Runoff phenomena, relationship between precipitation and runoff	1
4	Synthetic unit hydrograph, Unit hydrograph and its derivation including for complex storm,	3
5	S-hydrograph and derivation, Use of IUH and various methods of estimation.	3

6	Runoff estimation models: SCS, CN software	3
7	Flood routing principles	2
8	Recent advances in analysis of hydrologic data and flow from small watersheds. Methods of runoff estimation from small watersheds.	3
9	Microclimate, estimation methods of evaporation. Advances and improvements in rational approach. SCS approach criticism and improvements	3
10	Process of sedimentation of reservoirs	2
11	Hydrological hazard functions, Methods of estimation of hydrologic parameters, Data transformation,	3
12	Hydrologic modeling approaches, component conceptualization, Types of watershed hydrologic models and choice of model.	3
13	Calibration and evaluation of hydrologic models. Computer simulation of hydrological process in small watersheds	2
	Total	**32**

List of Practical

S.No.	Topic	No. of Practicals
1	Delineation of watershed and study of watershed characteristics	1
2	Measurement of rainfall and runoff in a watershed	1
3	Analysis of hydrologic data and flow from small watersheds	1
4	Estimation of infiltration and runoff from a watershed	1
5	Measurement and analysis of stream flow data	1
6	Analysis of synthetic unit hydrograph for complex storm	1
7	Analysis of S-hydrograph for complex storm	1
8	Use of runoff estimation models: SCS, CN software	2
9	Study of different types of flood routing methods	2
10	Computer simulation of hydrological process in small watersheds	1
11	Study of reservoir sedimentation	1
12	Study of watershed model components	1
13	Visit to a watershed	1
	Total	**16**

Suggested Readings :

1. Singh V P 2010. Rainfall-Runoff Modeling (Vol.I) Prentice Hall, New York.
2. Singh V P 2010. Environmental Hydrology, Springer, New York.
3. Haan C T. Hydrologic Modeling of Small Watershed.
4. Mutreja K N Applied Hydrology Tata Mc Grow Hill publishing company Limited, New York.
5. Subramanya K. Engineering Hydrology. Tata Mc Grow-Hill Publishing company Limited, Second edition.
6. Suresh, R. Soil and Water Conservation Engineering. Standard publishers distributors, 5th edition,

7. Ven Te chow, David R Mauldment, Larry w Mays (2010). Applied Hydrology TATA Mc Grow Hill edition.
8. Gayathri K Devi, Ganasri B P, Dwarakish G S. 2015 A Review on Hydrological Models. International Conference On Water Resources, Coastal And Ocean engineering (ICWRCOE 2015)
9. Tommaso Caloiero. 2018. Hydrological Hazard: Analysis and Prevention. National Research Council—Institute for Agricultural and Forest Systems in Mediterranean (CNR-ISAFOM)
10. Müsteyde Baduna Koçyiğit ,Hüseyin Akay, Ali Melih Yanmaz.2017. Estimation of Hydrologic Parameters of Kocanaz Watershed by a Hydrologic Model, International Journal of Engineering & Applied Sciences (IJEAS),Vol.9, Issue 4 (2017) 42-50,
11. Hoshin Vijai Gupta and Soroosh Sorooshian. 1998. Toward improved calibration of hydrologic models: Multiple and non commensurable measures of information. Water Resources Research, VOL. 34, NO. 4, PAGES 751–763,