

HWRM-204 SURFACE WATER HYDROLOGY (THEORY)

(02 Credit hrs)

PRE-REQUISITE: HWRM-101

LEARNING OUTCOMES:

- This course will provide an introduction to the surface water hydrology to the students.
- The students will learn about the precipitation as a process and its types
- The students will get used to the presentation and analysis of precipitation data
- They will become conversant with the different hydrological processes of the hydrological cycle
- Students will learn about the applications and the concepts of hydrographs and Unit hydrograph theory
- The student will be able to understand the different methods of stream routing and reservoir routing.

CONTENTS

This course provides an introduction to the hydrological cycle, hydrological data, precipitation, runoff, hydrographs and unit hydrographs, consistency analysis of hydrological data, PMF studies, S-Curves and flow duration curves channel routing and reservoir routing.

THEORY

Unit-I: Introduction:

- 1.1. Hydrological Cycle and its components
- 1.2. Water budget at global and catchment scale
- 1.3. Surface Water Resources

Unit-II: Precipitation:

- 2.1. Process and types of precipitation
- 2.2. Estimation of areal precipitation

Unit-III: Analysis of precipitation data:

- 3.1. Representation of precipitation data
- 3.2. Uncertainties of precipitation data
- 3.3. Consistency analyses and database handling

Unit-IV: Hydrological Processes:

- 4.1. Evaporation and evapotranspiration
- 4.2. Interception
- 4.3. Infiltration
- 4.4. Runoff

Unit-V: Runoff:

- 5.1. Processes in runoff
- 5.2. Components of runoff
- 5.3. Factor affecting runoff
- 5.4. Measurement and estimation of streamflow

Unit-VI: Analyses of Hydrological data:

- 6.1. Hydrographs, interpretations and components
- 6.2. Discharge rating curves.
- 6.3. Flow duration curves and Discharge analysis for water availability.
- 6.4. S-Curve,
- 6.5. PMF studies.
- 6.6. Unit hydrographs

Unit-VII: Flood Routing:

- 7.1. Basic of flood routing
- 7.2. Reservoir routing
- 7.3. Stream channel routing

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Mays, L. W. (2011). *Ground and Surface Water Hydrology* 1st Edition Wiley ISBN-13: 978-0470169872

2. [Guthrie](#), M. (2018). *Ground and Surface Water Hydrology* Larsen and Keller Education ISBN-13: 978-1635496949
3. Manning, J. C. (1996). *Applied Principles of Hydrology 3rd Edition* Prentice Hall ISBN-13: 978-0135655320
4. Viessman, Jr., Warren Lewis, Gary L. (2011). *Introduction to Hydrology*, 5th Edition, Upper Saddle River, N.J.; Harlow, ISBN: 9780132763608.
5. Viessman, W. and Lewis, G. L. (2002). *Introduction to Hydrology*. 5/e. Prentice Hall.

HWRM-204 SURFACE WATER HYDROLOGY (LAB)

(01 Credit hr)

PRE-REQUISITE: HYD-103 Introduction to Hydrology

LEARNING OUTCOMES:

- This course will provide a practical aspect of precipitation data handling and analyses
- The students will learn about the different methods of estimating areal precipitation
- They will have the knowledge about the measurement of hydrological losses
- They will become conversant with the construction of unit hydrograph for given catchment

CONTENTS

Practical course provides a introduction to the consistency analysis of hydrological data, mean areal precipitation estimation, measurement of hydrological losses, base flow separation techniques and development of unit hydrographs.

PRACTICAL

Unit-1 Analysis of Precipitation data:

- 1.1. Hydrological data consistency analysis through graphical, numerical and mathematical procedures

Unit-II Areal Precipitation:

- 2.1. Arithmetic mean method
- 2.2. Thiessen polygon method,
- 2.3. Isohyet method

Unit-III: Hydrological Losses:

- 3.1. Measurement/estimation of Evaporation. Interception. Infiltration

Unit –IV: Hydrograph Analyses:

- 4.1. Baseflow separation techniques
- 4.2. Development of Unit Hydrographs

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

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