

B.E. (Civil) Semester: V

Subject Name: HYDROLOGY AND WATER RESOURCES (CV504)

A. Course Objective:

- To study occurrence movement and distribution of water that is a prime resource for development of a civilization..
- To know diverse methods of collecting the hydrological information, which is essential, to understand surface and ground water hydrology.
- To know the basic principles and movement of ground water and properties of ground water flow.

B. Teaching /Examination Scheme:

Teaching scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract/ Tut.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
03	02	00	05	05	03	70	30	20	30	150

C. Detailed Syllabus:

1 Introduction, Hydrologic cycle, Climate and water availability, Water balances, Precipitation:

Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method. Infiltration: Factors affection infiltration, Horton's equation and Green Ampt method.

2 Hyetograph and Hydrograph Analysis:

Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts assumptions and limitations of unit hydrograph, Derivation of unit hydrograph S hydrograph, Flow duration curve.

3 Groundwater & Well Hydraulics:

Occurrence and movement of groundwater, Darcy's law, governing ground water flow equations, Factors governing ground water flow, Types of aquifers, porosity, specific yield, specific retention, storage coefficient, permeability, hydraulic conductivity, hydraulic transmissibility, Conjunctive use and it's necessity.

4 Reservoir:

Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control.

5 Flood Management:

Indian rivers and floods, Causes of flooding, Alleviation, Levees and floodwalls Floodways, Channel improvement, Flood damage analysis.

6 Hydrologic Analysis and Design:

Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels, Storm drainage design.

7 Drought Management and Water Harvesting

Definition of drought, Causes of drought, measures for water conservation and augmentation, drought contingency planning. Water harvesting: rainwater collection, small dams, runoff enhancement, runoff collection, ponds, tanks, natural and artificial ground water recharge methods.

8 Hydroelectric Power and Water Resources Planning and Development

Introduction & Components of Hydroelectric Power Plant, Levels in planning, Functional requirements of water resources projects, steps in water resources planning, Environmental aspects in water resources planning.

D. Lesson Planning:

Sr. No.	Title of the Unit	Min Hrs	Weightage
1.	Introduction, Hydrologic cycle, Climate and water availability, Water balances, Precipitation	09	20%
2.	Hyetograph and Hydrograph Analysis	05	11%
3.	Groundwater	06	13%
4.	Reservoir	06	13%
5.	Flood Management	05	11%
6.	Hydrologic Analysis and Design	06	13%
7.	Drought Management and Water Harvesting	04	9%
8	Hydroelectric Power and Water Resources Planning and Development	04	9%
Total Hours		45	100

E. Tutorials shall be based on the above mentioned course content.**F. Instructional method and pedagogy (Continuous Internal Assessment Scheme) (CIA):**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.

- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and practical which carries marks.
- At regular intervals assignments will be given. Students should submit all assignments during given period.
- Classroom participation and involvement in solving the problems in Tutorial rooms
Carries Marks
- Internal exam of 30 marks will be conducted as a part of Mid semester evaluation.
- Experiments shall be performed in the field related to course contents.
- The course includes a practical, where students have an opportunity to build an appreciation for the concept being taught in lectures.

G. Students Learning Outcomes:

- Provide a background in the theory of hydrological processes and their measurement
- Apply science and engineering fundamentals to solve current problems and to anticipate, mitigate and prevent future problems in the area of water resources management
- An ability to manipulate hydrological data and undertake widely-used data analysis.
- a systematic understanding of the nature of hydrological stores and fluxes and a critical awareness of the methods used to measure, analyze and forecast their variability; and the appropriate contexts for their application.
- Can define the key components of a functioning groundwater, can determine the main aquifer properties – permeability, transmissivity and storage Identify geological formations capable of storing and transporting groundwater.
- Different methods and importance of rain water harvesting.

H. Recommended Study Materials

A. Reference Books:

1. Garg S.K., Hydrology and Water Resources Engineering
2. Subramanya, K., Engineering Hydrology, Tata McGraw Hill, New Delhi.
3. Raghunath, H.M., Groundwater, 1987, Wiley Eastern Ltd., New Delhi.
4. Modi, P.N., Irrigation Water Resources and Water Power Engineering, Standard Book House, New Delhi.
5. Todd, D.K., Groundwater Hydrology, 1993 John Wiley & Sons..
6. Raghunath, H.M., Hydrology – Principles, Analysis and Design, 1986, Wiley
7. Dr. P.Jaya Rami Reddy, A Textbook of Hydrology, University Science Press.

B. Web Materials:

1. <http://nptel.iitm.ac.in>
2. <http://www.groundwatermanagement.org>
3. <http://www.uiowa.edu>
4. <http://www.ngwa.org>