

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V CIVIL ENGINEERING

Subject Name: **Hydrology and Water Resources Engineering**

Subject Code: **150602**

| Teaching Scheme | | | | Evaluation Scheme | | |
|-----------------|----------|-----------|-------|------------------------------------|------------------------------------|-------------------------------|
| Theory | Tutorial | Practical | Total | University Exam (Theory) (E) | Mid Sem Exam (Theory) (M) | Internal Assessment (I) |
| 3 | 1 | 0 | 4 | 70 | 30 | 50 |

MODULE – I

- 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.

MODULE – II

- 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.
- Groundwater:**

Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test.

MODULE – III

- Reservoir:**

Types, Investigations, Site selection, Zones of storage, Safe yield, Reservoir capacity, Reservoir sedimentation and control.
- Hydroelectric Power:**

Low, Medium and High head plants, Power house components, Hydel schemes.

| MODULE – IV | |
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| 1. | Flood Management: Indian rivers and floods, Causes of flooding, Alleviation, Leeves and floodwalls, Floodways, Channel improvement, Flood damage analysis. |
| 2. | Hydrologic Analysis and Design: Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels, Storm drainage design. |

| MODULE – V | |
|-------------------|---|
| 1. | 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. |
| 2. | Water Resources Planning and Development: Levels in planning, Functional requirements of water resources projects, steps in water resources planning, Environmental aspects in water resources planning. |

Note: Each module carries 20 percent weightage

Term Work: Tutorials shall be based on above mentioned course content.

Reference Books:

1. C.S.P. Ojha, R. Berndtsson and P. Bhunya, Engineering Hydrology, Oxford University Press, New Delhi.
2. K. Subramanya, Engineering Hydrology, Tata McGraw Hill Pub. Co. New Delhi.
3. R.A. Wurbs and W.P. James, Water Resources Engineering, Prentice Hall of India, New Delhi.
4. R.K. Sharma and T.K. Sharma, Hydrology and Water Resources Engineering, Dhanpat Rai Publications, New Delhi.
5. R.K. Linsley, J.B. Franzini, D.L. Freyberg and G. Tchobanoglous, Water Resources Engineering, McGraw Hill Singapore.
6. V.P. Singh, Elementary Hydrology, Prentice Hall, Englewood Cliffs, New Jersey.
7. Ven Te Chow, D.R. Maidment and L.W Mays, Applied Hydrology, McGraw Hill International Edition, New York.