Departmental Core

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCEC508	Engineering Hydrology and Hydraulics	3	1	0	4

Course Objective
The course aims to familiarize the students with the concepts in hydrology and hydraulics.
Learning Outcomes
Upon successful completion of this course, the students should be able to: ● Understand the concepts involved in surface hydrology including hydrology of floods and droughts. ● Know the basics of subsurface hydrology. ● Understand the concepts of open channel hydraulics, applications with case studies.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	**Surface Hydrology** **Introduction:** India's and World's water resources, Concept of hydrologic cycle, Significance of Hydrology in Infrastructure planning and development. **Precipitation and Hydrologic Abstractions:** Introduction, Precipitation, hyetograph, Consistency of rainfall record, Estimation of hydrologic abstractions.	8 L+2 T	Understand the different components of hydrologic cycle, precipitation and hydrologic abstractions.
2	**Runoff and Hydrographs** **Introduction:** Runoff coefficients, mass curve, direct runoff, rainfall-runoff correlation. **Hydrograph analysis:** Hydrograph, hydrograph analysis, Concepts of synthetic unit hydrograph and instantaneous unit hydrograph.	11 L+3 T	Know the basics of runoff, hydrograph and perform hydrograph analysis.
3	**Hydrology of Floods** **Introduction:** Causes of floods, flood discharge formulae, flood frequency analysis, flood mitigation. **Flood Routing:** Flood routing, reservoir and channel routing- Muskingum method.	7 L+2 T	Know the concepts of floods, frequency analysis and flood routing.
4	**Hydrology of Droughts** **Introduction:** Types and effects of droughts, combating droughts.	2 L	Know the basic concepts of hydrology of droughts

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
5	**Subsurface Hydrology** Introduction: Divisions of subsurface water, Types of aquifers, Steady state flow in confined and unconfined aquifers, yield from open well.	5 L +2 T	Know the basics of subsurface hydrology, types of aquifers and yield from open well.
6	**Hydraulics** **Introduction:** Principles and Classification of open channel flow, Governing equations of channel flows, Energy and momentum equations. **Uniform and critical flow computations:** Energy depth relationships, critical and normal depths, hydraulically efficient channel sections. **Non uniform flow:** Gradually and rapidly varied flow, basic concepts of spatially varied flow. Applications with Case studies	9 L+5 T	Understand the concepts of uniform flow, non-uniform flow, applications with case studies.
	Total Contact Hours	42L+ 14T	

Text Books:

1. Subramanya, K. (2017), 4th edition, "Engineering Hydrology", Tata McGraw Hill.
2. Subramanya, K. (2015), 4th edition, "Flow in Open Channels", Tata McGraw Hill.
3. Garg, S.K. (2015), 20th edition, "Hydrology and Water Resources Engineering", Khanna Publishers.

Reference Books:

1. Chow, V.T., Maidment, D.R., Mays, L.W. (2010),1st edition, "Applied Hydrology", Tata McGraw Hill.
2. Maidment, D.R., Ed., (1993), 1st edition, "Handbook of Hydrology", McGraw-Hill.
3. Srivastava, R. (2014), 1st edition, "Flow through Open Channels", Oxford University Press.