

Course Coordinator Sravani Duvvuri	A.Y: 2020-2021 & SEM-II (CE 2206)	L	T	P	C
	Subject Name: Water Resources Engineering	2	1	0	3
	Total Contact Hours– 45				
	Prerequisite: None				

Course Learning Objectives:

1. To provide knowledge in the hydrologic cycle, precipitation, evapotranspiration, infiltration and its measures.
2. To be familiarized with the construction of hydrograph for different durations of rainfall
3. To develop the skills in modeling of flood flows and flood routing
4. To develop skills in the ground water flow, type of aquifers and yield from the well.
5. To impart the knowledge of various irrigation techniques, crop requirements and different land management practices.
6. To familiarize with water logging and antiwater logging measures.

*****Lecture Plan*****

Lecture	Topics to be covered	Contact Hours	Monthly test	Reference	e-Resources	
					Video resources	Study material
L-1	Introduction to hydrology, Hydrologic cycle and its components	2	MT-1	1,2,3	IIT Kanpur, December 31 2009, 'Water Resources Engineering', URL: https://nptel.ac.in/courses/105104103/	Lecture notes on Water Resources Engineering prepared by the course coordinator, available at RGUKT Intranet
L-2	Types and forms of precipitation, Recording and Non-recording type rain gauges and rain gauge network	1		1,2,3		
L-3	Rain gauge network, estimation of Missing rainfall	1		1,2,3		
L-4		1		1,2,3		

	Consistency of rainfall data Arithmetic mean method, Thiessen Polygon method and Isohyetal method		MT-1			
L-5	Uses of IDF and DAD curves, estimation of probable maximum precipitation Types and forms of precipitation, Recording and Non-recording type rain gauges and rain gauge network	1		1,2,3		
L-6	Estimation of rainfall over a catchment area	1		1,2,3		
L-7	Evaporation, transpiration, Evapotranspiration, infiltration	1		1,2,3		
L-8	Measurement, empirical and analytical methods to find evaporation and transpiration	1		1,2,3		
L-9	Measurement, empirical and analytical methods, Infiltration Indices (Φ -index and w-index)	2		1,2,3		
L-10	Estimation of initial and infiltration losses from a rainfall event	2		1,2,3		
	UNIT-II: RUNOFF					
L-11	Stream flow, components and flow characteristics of stream flow	1		1,2,3		

L-12	Hydrograph, components and factors affecting hydrograph, base flow separation methods	2				
L-13	Construction and applications of UH, superposition method to convert UH duration	2		1,2,3		
L-14	conversion of the duration of UH by Summation curve technique	1		1,2,3		
L-15	Limitations of unit hydrograph and construction of Instantaneous unit hydrograph	1	MT-2		IIT Kanpur, December 31 2009, ' <i>Water Resources Engineering</i> ', URL: https://nptel.ac.in/courses/105104103/	
L-16	Definition and construction of SUH, flow mass curve and its uses	1		1,2,3		
L-17	Flow duration curve, methods to estimate yield, the concept of drought	1		1,2,3		
L-18	Estimation of ordinates of runoff from a typical rainfall event using several techniques	1		1,2,3		
	UNIT-III: FLOODS					
L-19	Estimation of flood discharge using rational and empirical methods.	1		1,2,3		
L-20	Return period, risk and reliability, frequency analysis	1				
L-21	Gumbell and Log Pearson type-III distributions	1		1,2,3		

L-22	Estimation of flow values for several return periods using flood flow frequency analysis	1	MT2	1,2,3	IIT Kanpur, December 31 2009, 'Water Resources Engineering', URL: https://nptel.ac.in/courses/105104103/
L-23	Flood routing and its techniques	1		1,2,3	
L-24	Modified Puls method, Goodrich method	1		1,2,3	
L-25	Muskingum's routing method	1		1,2,3	
L-26	Structural and non-structural methods of flood control	1		1,2,3	
	UNIT-IV: GROUND WATER				
L-27	Introduction, type of aquifers and aquifer properties	1	MT-3	1,2,3	
L-28	Darcey's law, continuity equation, compressibility of aquifers	1		1,2,3	
L-29	Confined groundwater flow between two aquifers	1		1,2,3	
L-30	Flow of confined aquifer towards well. Steady state (Theim's) condition	1		1,2,3	
L-31	unsteady state (Theis equation) conditions	1		1,2,3	
L-32	Steady state 1-D flow with recharge, steady flow towards well in unconfined aquifer				
L-33	Ground water flow in confined/unconfined aquifers	1		1,2,3	
	UNIT-V: IRRIGATION				

L-34	Necessity, scope and benefits of irrigation, methods of applying water to crops	1	MT-3	1,2,4	IIT Kharagpur, December 31 2009, 'Water Resources Engineering', URL: https://nptel.ac.in/courses/105105110/	
L-35	classification and availability of soil water, depth of water stored in root zone	1		1,2,4		
L-36	Limiting soil moisture conditions, Depth and frequency of irrigation	1		1,2,4		
L-37	Definitions of important terms pertaining to command area, Base, Duty and Delta, Types of irrigation efficiencies	1		1,2,4		
	UNIT-VI: WATER LOGGING & GRAINAGE					
L-38	Assessment of irrigation water requirement	1		1,2,4		
L-39	Causes and ill effects of water logging, anti-water logging measures	1		1,2,4		
L-40	Sea Water Intrusion and its control	1		1,2,4		
L-41	Ghyben-Herzberg relation, ill-effects of sea water intrusion	1		1,2,4		

Learning Resources:

Text Book:

1. K. Subramanyan, “*Engineering Hydrology*”, Fourth Edition., Tata McGraw Hill, New Delhi, 2013

Reference Books:

1. Dr. P.N. Modi, “*Irrigation, Water Resources & Water Power Engineering*”, 9th ed., Standard Book House, New Delhi, 2014.
2. K.N Duggal, “*Elements of Water Resources Engineering*”, New age international Publishers, 2003
3. R.K. Linsley and J.L.H. Paulhus: *Water Resources Engineering*, McGraw Hill Book Co., 1992.
4. Dr. B.C. Punmia & Dr. Pande B.B. Lal, “*Irrigation and water power Engineering*”, 16th ed., Laxmi Publications Pvt. Ltd., New Delhi, 2009

Web Resources:

1. IIT Kanpur, December 31 2009, ‘*Water Resources Engineering*’, URL: <https://nptel.ac.in/courses/105104103/>
2. IIT Kharagpur, December 31 2009, ‘*Water Resources Engineering*’, URL: <https://nptel.ac.in/courses/105105110/>

Course outcomes: At the end of the course, the student will be able to

CO 1	Estimate the hydrological parameters.
CO 2	Compute the missing rainfall, consistency and average rainfall of a region.
CO 3	Interpret hydrograph, S-Hydrograph, unit hydrograph and IUH
CO 4	Carryout statistical and probability analysis of hydrological data
CO 5	Visualize and understand the occurrence and movement of ground water.
CO 6	Identify the appropriate irrigation technique to increase the crop efficiency.

Course Nature		Theory		
Assessment Method				
Assessment Tool	Weekly tests/Assignments (In Semester)	Monthly tests (In Semester)	End Semester Test	Total
Weightage (%)	10%	30%	60%	100%