Course Code	Course Title	L	Т	Ρ	С					
BCLE216L	Water Resource Management	3	0	0	3					
Pre-requisite	NIL	Syllabus version 1.0								
-	•									
Course Objectives										
The objectives 1. Acquire 2. Enhanc 3. Identify world.	r reso	urces.								
Course Outco	omes									
 Unders manage Unders water notes Acquire Explain 	on of this course, the student will be able to : stand the planning of water resources and need for water re ement. stand the water resource potential in global, India scenario esources using different technologies. a knowledge international and national water law and its of the concept of water in agricultural and economic aspects the future trends of water demand and its management d	and e policy s.	explor /.							
	ater, A Multi-Dimensional Resource			5 hoi	urs					
	rces planning-Multi-dimensional management-Water by sector-Stress, international policy-Climate change, oce resource management.		thdrav challe		and and					
Module:2 GI	obal and Indian Scenario for Water Resources			4 ho	urs					
	r and Groundwater Global and Indian Scenario-Quality nd sustainable reuse methods-Usable water resources footprint.									
Module:3 Wa	ater Resources Assessment			5 hoi	urs					
	gn-Stream flow gauging-Weir design-Gauges-Current gaxploration-Test drilling-Application of remote sensing techr			t dilut	ion-					
Module:4 Wa	ater in Agricultural Systems	7 ho			urs					
efficiencies, irr	I production, virtual water trade for achieving global wate igation methods and current water pricing, water for livest from agricultural production									
Module:5 Wa	ater Economics			8 hoi	urs					
Economic characteristics of water good and services-Nonmarket monetary valua methods-Water economic instruments-Policy options for water conservation and sustainause, pricing, distinction between values and charges-Private sector involvement in ware resources management.										
Module:6 Wa	*									
Module:6Water Legal and Regulatory Settings8 hoursNational and International Framework for Water Law; Basic structure of water law- A overview of water law in India -Evolution of water law, key features of water law, evolving water law and policy-Water policy for Irrigation, decentralization and participation in irrigation management, and the policy measures proposed to establish water user associations National level initiatives for regulation of groundwater, State groundwater laws and rainwater harvesting.										

Module:7	Demand Management				6 hours				
Balancing supply and demand-Economic theory of supply and demand-management by u of tariffs-Timing, long-term, operational time-frame-Crisis management-Cost of water-Futu trends-Economic value of water-Loss control-Water harvesting.									
Module:8	Contemporary issues				2 hours				
	Total Lect	ure Hours			45 hours				
Text Book	(s)								
	 David Stephenson, Water Resources Management, 2004, A. A. Balkema Publishers, Netherlands. 								
Reference	Books								
 Louis Theodore, Ryan Dupont R., Water Resource Management Issues, Basic Principles and Applications, 2020, CRC Press, Taylor & Francis Group, New York. Philippe Cullet and Sujith Koonan, Water Law in India- An Introduction to Legal Instruments, 2017. Second Edition, Oxford University Press, New Delhi. Subramanya. K., Engineering Hydrology, 2020, Fifth Edition, McGraw Hill Education Pvt. Ltd., New Delhi. 									
Mode of E	Mode of Evaluation: CAT, Assignment, Quiz, FAT.								
Recommended by Board of Studies 24.02.2022									
Approved	by Academic Council	No. 66	Date	16-06-2022					

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3. Relate di	differer	ent	techr	nique	s to c	contr	ol win	d eros	sion									
4. Apply ra	ain wa	vate	r harv	vestir	ıg me	ethod	ls to co	onserv	ve water	r								
5. Interpret																		
6. Design in	irrigati	itio	n syst	ems	and p	olan e	erosior	n cont	rol mea	isures								
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4.	Calculation of erosion index, estimation and measurement of soil loss	4 hours						
5.	Contour maps: Area and volume computations	2 hours						
6.	Design of grassed water ways and bench terracing system	4 hours						
7.	Design of a contour bund and graded bund	2 hours						
8.	Water flow measurement, water duty and irrigation efficiency	4 hours						
9.	Water requirement, agricultural drainage, sprinkler and drip system lay out	2 hours						
10.	Problems on wind erosion	2 hours						
	Total Laboratory Hours	30						
Tex	xt Book	1						
1.	Huffman, Rodney L., Delmar D. Fangmeier, William J. Elliot, and Stepher	n R. Workman.						
1.	Huffman, Rodney L., Delmar D. Fangmeier, William J. Elliot, and Stepher 2013. Soil and Water Conservation Engineering, 7 th edition. America							
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1. 2.	2013. Soil and Water Conservation Engineering, 7th edition. America	an Society of						
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 2. Ref 1. 2. 	 2013. Soil and Water Conservation Engineering, 7th edition. America Agricultural Engineers. Michigan, USA. Khan Towhid Osman. 2013. Soil Degradation, Conservation and Remedia Germany. Serence Books Ghanashyam Das. 2009. Hydrology and Soil Conservation engineering: Inclue Management. Prentice Hall India Learning Private Limited, India. Gurmail Singh et al., 1990. Manual ofsoil and water Conservation practices in the series of th	an Society of ation. Springer, ding Watershed n India.Oxford						
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	L	Т	Р	J	С			
CLE2004 WATER RESOURCE ENGINEERING	2	0	2	4	4			
Pre-requisite MEE1004 – Fluid Mechanics	Sy	llab	us ve	ersio	n			
			1.0					
Course Objectives:	1 1				.1			
1. To motivate the students to identify, formulate, solve the complex pro	blen	n to	man	age 1	the			
water resource related issues.To prepare the students to synthesize data and technical concepts to app	1	mot	~ * * ~					
2. To prepare the students to synthesize data and technical concepts to apply in engineering.								
3. To develop the ability of the students to conduct appropriate exper	imer	nte s	analy	se a	and			
interpret data and use engineering judgement to draw conclusions			•					
problems.		are	1 10	Jour				
 To get the exposure about the concept of irrigation and flood control. 								
5. To provide the students an opportunity to work as a part of a project tear	n.							
6. To train the students for a successful career in water resources engineers								
Expected Course Outcome:								
Upon completion of this course, the student will be able to								
1. Identify the various components of hydrological cycle and the spatial an	d ter	mpoi	ral va	ariati	ion			
of rainfall.		-						
2. Determine the different methods and hydrological models to estimate the	e stre	eam f	flow.					
3. Examine the different techniques to calculate the probable maxim	um	flood	l ba	sed	on			
different returned period.								
4. Evaluate the basic aquifer parameters and groundwater resources	for o	diffe	rent	hyd	ro-			
geological boundary conditions.	_				_			
5. Understand the different methods of irrigation and find the optimum r	neth	ods o	of irr	rigati	ion			
for judicious use of water resources.	1		C 1'		1			
6. Examine different distribution system of irrigation canal and the basic	desi	ign c	of lin	ied a	ind			
unlined irrigation canal.	inat		tanat		to			
7. Apply the mathematics, science and technology to design the minor in develop the command area.	igat	IOI S	struct	ures	10			
Student Learning Outcomes (SLO): 2, 7, 9, 17								
Module:1 Precipitation Measurement and Analysis			1 h	ours				
Hydrologic cycle and budget, Precipitation variability, rainfall and snow meas		nant						
design of precipitation gauging network, Hydrologic Abstractions-Infi								
evapotranspiration-interception and depression storage, rain harvesting-design				лан	JII-			
Module:2 Stream Flow	51000			ours				
Measurement of stream flow; factors affecting stream flow; hydrograph	anal	voie						
separation, unit hydrograph and curve number methods of stream flow determined								
hydrograph, hydrological modeling for stream flow estimation, methods								
estimation.	101	Pour	. un	Jenu	. 50			
Module:3 Flood Analysis			3 ho	ours				
Design flood estimation, frequency analysis, flood routing, storm drainage des	ign.	flood						
Design mood estimation, nequency analysis. mood routing, storm dramage des	0 -7				.,			
	flood damage analysis.							
			4 ho	ours				

Ground	water flow analysis, steady state well hydraulics – Fundamentals of unsteady	state.
Modu	le:5 Irrigation Practices	5 hours
Need for	or Irrigation in India, Scope, National Water Policy, Physical properties of sc	oil that influence
soil me	visture characteristics - Concept of soil water potential and its compone	nts, Crop water
require	nents-Irrigation Scheduling- Irrigation efficiencies – Duty-Delta-base peri-	od, Surface and
	face methods of Irrigation, Standards for irrigation water, Water logging and	consequences -
Salinity	and alkalinity-Reclamation	_
Modu	8	4 hours
	cation of canals, Alignment of canals, Design of rigid boundary canals, Lace	
	oncepts in canal design, lining of canals; Sediment transport in canals, River	
Modu	0	3hours
	procedure for -Canal Head works-Canal regulators-Canal drop -Cross of	drainage works-
	Dutlet-Escapes, Lining and maintenance of canals	T
Modu		2 hours
	Total Lecture hours	30 hours
Text B		
	bramanya. K., "Engineering Hydrology" McGraw Hill Education (India) Pv	
	ntosh Kumar Garg, "Irrigation Engineering and Hydraulic Structures",Khann	a Publishers,
	w Delhi, (2013)	
Refere	nce Books	
1. Ch	ow, V.T., Maidment, D.R. and Mays, W.L., (2010) "Applied Hydrology", Ta	ataMcGraw
	l Education Pvt. Ltd.	
	nmia. B. C., Ashok Kumar Jain, Arun Kumar Jain and Pande Brij BasiLal, (2	012)
	rigation and Water Power Engineering", Laxmi Publications (P) Ltd.	
3. Ma	ys, L.W.(2010). Water Resources Engineering, John wiley and sons.	
4. To	dd D.K. and Larry W. Mays (2005)"Groundwater Hydrology", John Wiley &	z Sons, Inc,
Ne	w York.	
5. A.	K. Rastogi, (2011) "Numerical Groundwater Hydrology", Penram Internation	al
Pu	blishing (India) Pvt. Ltd.	
Mode of	f Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Ass	sessment Test
Labora	tory exercises	30 hours
[1] Mo	dels for Groundwater flow analysis	
[2] Esti	mate seepage losses and reservoir losses.	
[3] See	page analysis using software	
[4] Res	ervoir operation losses	
	od analysis	
[6] Rai	nfall runoff modeling	
Sl. No.	Project Titles (J component)	hrs
1.	Advanced rain water harvesting structures	
2.	New methods of irrigation	
3.	Groundwater modeling using MODFLOW	- 60hrs
4.	Flood frequency analysis	1

5.	Rainfall-runoff model				
Recomm	nended by Board of Studies	09.06.2015			
Approve	ed by Academic Council	37 th ACM	Date	16.06.2015	