		A.Y. 2	2023-24	4 (Odd	Semeste	r)				
		Walchar (Gov	nd Colleg	e of Engin	eering, Sang	gli				
		(00)	A	Y 2023-24						
			Cours	se Information	n					
Program	nme		B.Tech. (C	ivil Engineeri	ng)					
Class, Se	emester		Third Year	B. Tech., Sen	n V					
Course (Code		6CV301							
Course M	Name		Water Supp	ply and Treatn	nent Technolog	/				
Desired	Requisites:		Basic hydr	aulics and Eng	gineering Chemi	stry				
7	Feaching Sch	eme		Exami	ination Scheme	(Marks)				
Lecture		3 Hrs/week	MSE	ESE	ISE	To	otal			
Tutorial	•	-	30	50	20	1	00			
Practica Internet	l 	-	C							
Interacti	aon - Credits: 3									
			Cour	sa Objectives						
1	To provide the pertinent knowledge on water supply and treatment systems									
2	To impart n	To impart necessary skill for the design and operation of water treatment units								
3	To prepare students for higher studies and research in the field of water treatment technology.									
4	4 To familiarize the students with latest trends in water treatment.									
Course Outcomes (CO) with Bloom's Taxonomy Level										
After cor	npletion of th	e course stude	nts will able	to						
CO1	Explain wat	er quality, wat	ter supply sy	stem and treat	ment technolog	ies.	Und	erstand		
CO2	and treatme	nt.	blems on wa	iter related to q	luality, quantity	conveyance	Ar Ar	pply/ nalyse		
CO3	Design wate	er treatment un	its, and pipe	eline system.			C	reate		
Module			Moo	dule Contents				Hours		
	Water Den	nand and Qua	lity							
	Water suppl	ly system: Intr	oduction, Co	omponents	Variation E	timation (Dro	cont			
I	intermediate	e and ultimate))	verning factor	s, variation, Es		sent,	6		
	Water Qual	ity: Physical, C	Chemical and	d biological pa	arameters, IS 10	500-2012				
	Sources: Qu	antitative and	Qualitative	study						
	Conveyance	e of water ks: Intako (Tyr	oes and locat	tion) Design of	f river inteka I	ack wall Dum	ning			
	system, Pov	ver and capaci	ty of pump	uon), Design (n make, j	ack well, I ull	iping			
П	Conveyance system: Types (Gravity, gravity fed and pressure), Materials (Ductile									
	Iron, Mild steel and Plastic), Jointing, Laying, Hydraulic testing, Break pressure tank,									
	Design of g	ravity fed and	pressure pip	e, Economic c	lesign					
	Water trea	tment (Aerati	ion, Mixing	and Settling)						
	Treatment:	Philosophy, U	nit processes	s and operation	ns					
	Aeration: Pr	rocess, Types	of aerator, D	esign of casca	de aerator					
III	Coagulation	1: Physics and	chemistry, F	Practice, Desig	n of rapid mixe			8		
	Settling Th	n: Theory, Des eory, Types D	esign of slow and s	tangular and ci	ne and mechani reular clarifiers	cal) for type 1 sett	ling			
	High rate	,,						L		

IV	Water treatment (Filtration and Disinfection) Granular Filtration: Classification, Theory of deep mono and dual bed filter, Components of deep bed filter, Clean filter bed head loss, Filter operation, Design of mono and dual bed filter Disinfection: Types, Ideal and non-ideal disinfectant, Kinetics, Chlorination, Chemistry of chlorination, Chlorine demand, Chlorination practice, UV and Ozone disinfection	6
V	Treatment for TDS removal Membrane filtration: Types, Basic concepts, Applications Adsorption: Introduction, Basics of Carbon adsorption Ion Exchange: Theory, Design of softener Point of use purifiers, Package drinking water plant, Water plant residual management	5
VI	Water distribution system and Operation-Maintenance Water distribution: Methods, System configurations, Hydraulic and functional requirements, Hydraulic analysis, Design, Computer applications Service reservoirs: Necessity, Components, Location, Head, and Capacity Concept of 24×7 supply, Leakage: Causes, Detection and Control, Water quality in distribution: Causes of deterioration, Source trace, Water age, Nodal constituent concentration, Operation and maintenance: Water supply system	9
	Text Books	
1	Modi, P. N., "Water Supply Engineering (Environmental Engineering I)", Standard Bool 6 th Edition, 2018.	k House,
2	Raju, B.S.N., "Water Supply and Wastewater Engineering" Tata McGraw Hill Private New Delhi, 2 nd Edition, 2000.	limited,
3	Garg, S. K. "Water Supply Engineering", Khanna Publishers, 33rd Edition, 2010	
	References	
1	"Manual on Water Supply and Treatment", CPHEEO, Ministry of Housing and Urban Development, Govt., of India, New Delhi, 1999.	n Affairs
2	Hammer M, J and Hammer M, J, "Water and Wastewater Technology", PHI learning limited, 7th Edition, 2018	g private
3	Nathanson, J. A., "Basic Environmental Technology", PHI Learning private limited, 5 th 2009.	Edition,
4	Davis, M, L, and Cornwell, D, A, "Introduction to Environmental Engineering", Tata M Hill Publishing Company, Special Indian Edition, 2010.	McGraw

CO-PO Mapping															
	Programme Outcomes (PO) PSO														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3						2						3	3	
CO2		3					2						3	3	
CO3			3				2						3	3	

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

Assessment

ISE: Assignment on real-life problem pertaining to modules 1 to 3 and evaluated by test/quiz/presentation/oral; Field visit to water treatment plants and evaluated by test/quiz/presentation/oral. MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Walchand College of Engineering, Sangli									
			(Government Aide	ed Autonomous Instit	ute)				
				2023-24					
Due and			D Tash (Civil I						
Progra	amme		B. I ech. (Civil E	ingineering)					
Class,	Semester	^	Third Year B. I	ech., Sem V					
Cours	e Code		6CV302						
Cours	e Name	•.	Soil Mechanics	~					
Desire	d Requis	ites:	Fluid mechanics	s, Solid Mechanics					
· · · · · · · · · · · · · · · · · · ·	Teaching	Scheme		Examination	Scheme (Marks)				
Lectur	e.	3 Hrs/week	MSE	ISE	ESE	To	tal		
Tutori	al	-	30	20	50	10	0		
Practi	cal	_		II					
Intera	ction	-		Cre	edits: 3				
			1						
			Course	e Objectives					
1	To prov	ide the knowledg	ge of behaviour of	soil under stresses	to students				
2	To prep	are students for c	competitive exami	nations and higher	studies in the field of	of geotech	nical		
	enginee	ing.	Course C	Outcomes (CO)					
After c	ompletio	n of the course st	udents will able to	0					
CO1	CO1 Explain soil parameters, derive their interrelationships and classify the soil based Understand Apply								
CO2	CO2 Explain concepts and solve problems related to topics of seepage through soil, Understand analyse								
CO3	Evaluat	te the stiffness of	soil using shear st	rength parameters	and ground settlemen	nts Ev	aluate		
	against	linie							
Modu	le		Mod	ule Contents			Hours		
I	Intr Defi engi soil	oduction: nitions: soil m neering, Three-p parameters in lab	nechanics, soil hase system and poratory	engineering, rock phase relationship	mechanics, geot s, Determination of	echnical various	6		
II	Soil Grai deter	Classification n size and hyd mination, Unifie	rometer analysis, ed and IS soil class	Plasticity Chara sification system.	cteristics of Soil a	nd their	6		
III	Perr One effic uplif quic	neability and Se dimensional flo ient of permeabi t pressure, pipir ksand condition.	eepage: ow, Darcy's law, ility, Seepage thro ng, Principle of e	laboratory methoough soils - two-confective stress, ca	ds for determination limensional flow, flo pillarity, seepage fo	n of co- ow nets, prce and	7		
IV	Con Theo max	ppaction of Soils bry of compaction imum dry density	: on, laboratory det y, Compaction in	ermination of opt field: specification	imum moisture con as and quality control	tent and I.	6		
v	Com Com cons theor	pressibility and parison betweer olidation, spring ry of consolidation	Consolidation on compaction and analogy, Interpre- on, Final settlement	t soils l consolidation, ir etation of consolid nt of soil deposits	nitial, primary & se ation test results, Te	condary rzaghi's	7		
VI	Shea Moh para	ar Strength of S r-Coulomb failu meters, Stress-St	oils re criterion, Deter rain characteristic	rmination of effec s of clays and sand	tive and total shear l; Stress paths.	strength	7		
	Text Books								

1	Gopal Ranjan and Rao A.S.R., "Basic and Applied Soil Mechanics", New Age International
1	Publishers, 3 rd Edition, 2016
2	Murthy, V. N. S., "Textbook of Soil Mechanics and Foundation Engineering Geotechnical
2	Engineering Series", CBS publishing; 1 st edition, 2018
3	Das B. M., "Principles of Geotechnical Engineering", Cengage Learning, 7th Edition
4	Gulhati, S. K. and Datta, M., "Geotechnical Engineering", Tata McGraw-Hill, 1st Edition, 2005
	References
1	Robert D. Holtz, William D. Kovacs, Thomas C. Sheahan, "An Introduction to Geotechnical
1	<i>Engineering</i> ", Pearson, 2 nd Edition, 2015
2	Couduto, Donald P., "Geotechnical Engineering – Principles and Practices", Prentice-Hall.,
Z	2 nd Edition, 2017
3	Budhu M., "Soil Mechanics and Foundations", John Wiley & Sons, Inc, 3rd Edition, 2011
	Useful Links
1	https://www.youtube.com/watch?v=Lng0hVDvsu0&list
1	=PLOzRYVm0a65dtbpo_DP7acjsLYdmWT99r
2	https://www.youtube.com/watch?v=V1m3cB-Aqy8&list=PL940DD62E8781E147

CO-PO Mapping														
	Programme Outcomes (PO) PSO													
	1	2 3 4 5 6 7 8 9 10 11 12 1 2												
CO1	2			1										3
CO2	3	3 3												3
CO3	CO3 3 1 3													
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High														
East CO	Each CO afthe amount and a structure DO													

Each CO of the course must map to at least one PO.

Assessment

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. Mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
			AY 2023-2	4						
			Course Inform	ation						
Progra	amme		B. Tech. (Civil Engin	neering)						
Class,	Semester		Third Year B. Tech.,	Sem V						
Cours	e Code		6CV303							
Course	e Name		Transportation Engir	eering						
Desire	d Requisites:		Engineering Surveyi	ng						
			8~~~~8~~~~	-8						
	Teaching Scheme Examination Scheme (Marks)									
Lectur	e	3 Hrs/week	ISE	MSE	ESE	To	tal			
Tutori	al	_	20	30	50	10	00			
Practi	cal	_								
Intera	ction		Credits: 3							
			ci cuitor c							
			Course Object	tives						
1	To give exp	To give exposures to highway planning and designing of geometric elements of roads and rails								
	To compreh	end to geometri	c standards and variou	s practices adopte	d for construc	tion of ro	ads and			
2	rails.			s praesies adopte			and and			
3	3 To develop skills of construction and maintenance and traffic management of highways and railways									
	Course Outcomes (CO) with Bloom's Taxonomy Level									
After t	After the completion of the course students will be able to									
COL	Explain and	apply the princ	ciples of planning and o	designing of vario	us geometric	Under	stand &			
	elements of	highways and ra	ailways.			Ap	oply			
CO2	Apply know	vledge for selec	tion of construction m	aterials and selec	t appropriate	Ap	ply			
	methods of a	construction and	a maintenance for road	is and railways.	ichways and	Anol				
CO3	railways and	assess the geore	metric standards of pay	management of n	iigiiways and	Allal	yse a			
	Turiways and		incure standards of pu	vennentis.		Eva	Iuale			
Modul			Modulo Con	tonts			Hours			
Mouu	Uighway	Developmente	Mouule Coll				nours			
	Role and i	mortance of it	nfrastructure developm	ent Various mod	les of transpor	tation				
	characteri	stics and suitab	ility, history of high	vav engineering.	development	plans.				
I	various or	ganizations inv	volved in highway dev	velopment, their	setups and wo	orking,	6			
	finance op	otions.			•	C .				
	Highway	Alignment: ba	sic requirements for a	an ideal alignmen	it, factors gov	erning				
	highway a	lignment, highv	way location surveys a	nd studies.						
	Geometri	c Design-I: Cro	oss sectional elements	, sight distance, r	eaction time, a	analysis				
	of safe si	gnt distance, a	nd analysis of overta	king signt distan	ce, intersectio	on signt	0			
	Geometri	c Design-II: F	Horizontal vertical a	nd transition cur	ves super ele	evation				
III	widening,	requirements as	s per IRC, Basic conce	pts and methods	of pavement d	esign.	7			
	Highway	Construction:								
	Materials	 Stone aggrega 	ates, soil, cement, bitur	men properties an	d their testing.	• .				
	Constructi	on methods fo	r various types of fle	exible and rigid p	pavements, Dr	rainage,				
IV	repairs and	d maintenance.			tusffin in 1 ·		8			
	I rathc E	ngineering: Tra	arric Surveys, traffic fl	ow and capacity,	traffic regulat	f troffic				
	signal des	ign, Introduction	n to Traffic Safety		ster method 0					

	Railway Engineering Part I	
V	History, Indian Railways, Permanent Way – components, types, functions, Rails: Coning of wheels and tilting of rails	6
	Geometric Design: Alignment, Gradients, Horizontal and transition curves, superelevation design, Points and crossings, track junctions, track resistances, tractive effort.	-
	Railway Engineering Part II	
	Stations and Yards: Purpose, location, site selection, types and layouts.	
VI	Signalling and Interlocking: Objectives, types, principle of interlocking, control of train movements.	6
	Construction and Maintenance: Methods, Materials, special measures for high speed track, maintenance of tracks and traffic operations, Modern trends in railways.	
	· · · · · · · · · · · · · · · · · · ·	
	Text Books	
1	Bindra S. P., "A Course in Highway Engineering", Dhanpat Rai Publications, 5th Edition 2012	2.
2	Khanna S. K., Justo C. E. G., Veeraragavan A, "Highway Engineering", Nem Chand & Sons edition, 2018	s, 10 th
3	Arora S. P. and Saxena S. C., "A Textbook of Railway Engineering", Dhanpat Rai Publication Ltd, 7 th Edition, 2006.	ons Pvt,
	References	
1	Kadiyalai, L. R., "Traffic Engineering and Transport Planning", Khanna Publishers, 8th Editio	on 2013
2	Mundrey J. S., "Railway Track Engineering", Tata McGraw Hills Publications, 4th Edition, 2	2009.
3	Wright, Paul H. and Dixon, "Highway Engineering", John Wiley & Sons; 7th Edition 2003.	
	Useful Links	
1	https://nptel.ac.in/courses/105/101/105101087/	
2	https://nptel.ac.in/courses/105/101/105101008/	
3	https://nptel.ac.in/courses/105/105/105107/	

CO-PO Mapping														
		Programme Outcomes (PO) PSPO												20
	1	1 2 3 4 5 6 7 8 9 10 11 12 1 2												
CO1	3		1		1								1	
CO2			3			1							2	1
CO3		3	3	2				1					2	1
The strength of manning is to be written as 1.2.2; Where 1:Low 2: Medium 2: High														

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE + ISE + ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

	Walchand College of Engineering, Sangli									
			(Government Aided	d Autonomous Insti	itute)					
				2023-24 Information						
Progr	ommo		B Tech (Civil En	gineering)						
Close	Somostor		Third Yoar B. Too	sh Som V						
Class,	o Code		6CV204							
Cours	e Coue		Design of steel St	ructures						
Desire	d Requisi	itos.	Solid Mechanics	& Structural Mec	hanics					
Desire	u Kequis	ites.	Solid Meenanies e		names					
,	Teaching	Scheme		Examination	Scheme (Marks)					
Lectur	re	3 Hrs/week	ISE	MSE	ESE	Т	otal			
Tutori	ial	-	20	30	50	1	00			
Practi	cal	-		1						
Intera	ction	_		Cro	edits: 3					
			1							
			Course	Objectives						
1	To illust	rate various des	ign philosophies an	d concept of plas	tic analysis.					
2	To impa	rt the knowledg	e of design of vario	us steel members	and their connecti	ons.				
3	To provide knowledge of design practical steel structures such as industrial sheds, steel buildings									
	ctc.	Course	e Outcomes (CO) w	vith Bloom's Tax	konomy Level					
C01	CO1 Apply the concept of limit state for design of steel structures. Apply									
CO2	Calculat	e the strength of	f steel structural me	mbers and conne	ctions.		Evaluate			
CO3	Design s	steel structures s	such as industrial sh	eds, steel building	gs etc.		Create			
Modu	ile		Modul	e Contents			Hours			
I	Intro Intro desig IS Co Intro mom	duction duction to steel mation, Design odes and specifi duction to Plas ent, Shape facto	structures, standard philosophies, Types cations: IS 875, IS tic theory- Plastic h or, Plastic section m	rolled steel sections of loads acting of 800. ninge concept, Pl nodulus.	ons and their prope on structure, Introdu astic collapse load	erties and uction to l, Plastic	7			
П	Con Type conn	nections as of bolts, bolte ections, simple	ed and welded conn connection of brack	ections. Concentrate to column	ric and eccentricall	y loaded	6			
Ш	Tens Vario block Buck doub	ion and Comp bus types of fail c shear. Design cling classification le angle struts i	ression Members ures such as yieldin of single and double on of various secti n trusses,	g of gross area, ru e angle sections. ons, Buckling cu	pture at critical sec rves, Design of sin	ction and	7			
IV	Beams and Girders IV Laterally restrained and unrestrained simply supported beams. Design of compound beams and welded plate girder. Selection of section and positioning of stiffeners, Curtailment of flange plates. 7									
V	Colu Colu and b Colu bolts	mns and Column subjected to battened column mn bases: Desi .	mn Bases Axial load and bia: ns. gn of slab base, gu	xial bending, buil sseted base, mon	t up column section nent resisting base,	ns, laced , Anchor	6			

	Roof	Coofing System													
	Trus	ses, Pu	irlins.	Dead 1	load, L	ive loa	ad and	l Wind	l load	calcula	tions.	Analys	sis and		
VI	desig	gn of tr	uss. Co	onnecti	ons of	truss to	o colu	mn.							7
	Intro	duction	n to Pr	e-Engi	neered	Buildi	ngs (P	EB)- I	Primary	y Mem	bers /]	Main F	rames		
	Seco	ndary	Membe	ers / Co	old For	med M	Iembe	rs, Roo	of & W	all Par	els.				
						T	ext Bo	oks							
1	Dugg 2nd l	gal S.K Editior	, "Lin 1 <u>, 2014</u>	nit state	e desig	n of ste	el stru	ctures'	', Tata I	McGra	w-Hill	Public	ations,	New	Delhi,
2	Shiyekar, M. R., "Limit state design in structural steel", PHI learning Pvt.Ltd Publications 2nd Edition 2013.														
3	Subramanian N., "Design of steel structures", Oxford University Press, 2010.														
	References														
1	Daya	aratnan	n, P., "	Design	of ste	el struc	tures"	, S. Ch	and Pu	ıblicati	on, Ne	w Dell	ni, 200	8.	
2	Engl	Englekirk, Robert, "Steel structures: controlling behavior through design", John Wiley and Sons,													
	2003	2003.													
3	Gayl	Gaylord, Edwin and Gaylord, Charles, "Design of steel structures", Tata McGraw Hill Publishing													
	Com	pany L	td., Ne	ew Del	hi, 3rd	Editior	n, 2010)							
4	IS 80	0-200	7 "Cod	le of P	ractice	for Ge	eneral (Constr	uction	in steel	l", and	IS 87.	5-1987	part	1 to 5;
	Coc	le of P	ractice	for De	esign L	.oads (other t	han ea	rthqua	ke) for	buildi	ng stru	ctures'	', Bur	eau of
	India	in Stan	dards,	New L	Delhi.										
			-			U	seful I	Links							
1	https	://arch	ive.npt	el.ac.ii	n/cours	es/105	/105/1	05105	162/						
2	https	://onlii	necours	ses.npt	el.ac.ir	n/nocl9	P_ce25	/previe	ew						
						CO-	PO M	apping	5						
				P	rograr	nme O	utcon	nes (PO	D)	1				PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	3 1 1													
CO2	3 2 2														
CO3	CO3 3														
The streng	The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High														
Each CO	Each CO of the course must map to at least one PO.														

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. Mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

	ΔV 2022-21									
			A Y 2023	-24						
Drogre	mmo		B. Tach (Civil Engin	mation opring)						
Close	Somostor		Third Vear B. Tech	Semester V						
Class,	e Code		6CV351	Semester v						
Cours	e Name		Water Quality Analys	is Laboratory						
Desire	d Requisit	es:	Engineering Chemist	v Laboratory and V	Water Treatment	Technology				
2 00110	<u></u>									
	Teaching	Scheme	E	xamination Schen	ne (Marks)					
Le	cture	-	LA1	LA2	Lab ESE	Total				
Pra	octical	2 h/week	30	30	40	100				
Tu	torial	-		·						
Inte	raction	-	Credits: 1							
			Course Obj	ectives						
1	To provide the provide the provided the prov	de the students water.	s hands-on practice for	analyzing physica	l, chemical and	oacteriologica				
2	To develo	op the skills req	uired for applying know	vledge to decide the	e chemical dose r	equirements.				
			Course Outco	mes (CO)						
After c	completion	of the course s	tudents will able to							
CO1	Applythe analysis techniques to determine the physical, chemical and bacteriological water quality parameters.Apply									
CO2	<i>Design</i> experiment/s to address real-life cases pertinent to water quality. Design									
CO3	Analyze and <i>interpret</i> the results to assess the quality of water for potability.Analyse									
			List of Experiments	/ Lab Activities						
List of	Experime	ents:								
1.	Physical	and chemica	ıl water quality paran	neters:						
	a. Elect	rical conductiv	ity and Total Dissolved	Solids						
	b. Turb	idity and Total	Suspended Solids							
	d. Sulpl	nate								
	e. Resid	lual chlorine								
	f. Fluor	ide								
2	g. Iron	and Manganese) 							
2.	Biologic	ui water quali Drobabla Nuv	<i>uy parameter</i> mber (MDN)							
2	a. WIUS	ion of water	much (wirn)							
5.	a. Opti	nal coagulant	dose by jar test							
	b. Chlo	rine demand f	for surface/groundwat	er						
	c. Effic	iency of wate	r purifier (reverse osn	osis/resin) for ha	rdness removal					
	d. Asse	ssment of rive	er/bore well water pol	ution through ch	oride content					
	e. Effic	iency of cases	ade aerator for dissolv	ed oxygen enhan	cement					
				ea ony gon ennañ						
			Text Bo	oks						
1	Metca Public	alf and Eddy,	"Wastewater Engineer on 2014	ing Treatment an	d Reuse", Tata	McGraw Hil				
2	Sawy Hill P	er. C. N. And Mublishing Com	McCarty. P. L., "Chemi pany Limited 5 th Editic	stry for Environme n. 2003	ntal Engineers", '	Tata McGraw				
	1 1111 1	sononing COIII	pany Linnou, 5 Lunn	, 2000.						
			Referen	ces						
1	IS 302	25 (Relevant pa	arts), Bureau of Indian S	tandards.						

2	Standard Methods for the Examination of Water and Wastewater, APHA, 23 rd Revised Edition, 2017.

Useful Links

https://www.youtube.com/channel/UCXOTUs9n8uhzYzBC8NHeacA

1

	CO-PO Mapping														
	Programme Outcomes (PO) PSO														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1				2			1						2		
CO2				2			2						2		
CO3			1	3			2	1		2			2		
The stren	oth of t	nannir	ng is to	he wr	itten as	123.	Where	1.Lo	$w 2 \cdot M$	ledium	3.Hic	rh			

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

	Assessment												
There are three components of lab assessment, LA1, LA2 and Lab ESE.													
IMP: Lab ES	E is a separate head of	passing. LAI, LA	A2 together is treated as in-Semester Evaluat	10n.									
Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks									
т а 1	Lab activities,	Lab Course	During Week 1 to Week 6	20									
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50									
1.42	Lab activities,	Lab Course	During Week 7 to Week 12	20									
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50									
Lab ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40									
	attendance, journal	Faculty	Marks Submission at the end of Week 18	40									

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)											
AY 2023-24											
Course Information											
B.Tech. (Civil Eng	gineering)										
Class, Semester Third Year B. Tech., Sem V											
6CV352											
Soil Mechanics Laboratory											
Soil Mechanics											
	Examination Sc	heme (Marks)									
LA1	LA2	Lab ESE	Total								
30	30	40	100								
Credits: 1											
	hand College of (Government Aided A AY 20 Course In B.Tech. (Civil Eng Third Year B. Tec 6CV352 Soil Mechanics La Soil Mechanics Soil Mechanics LA1 30 Credits: 1	Hand College of Engineering, (Government Aided Autonomous Institute AY 2023-24 Course Information B.Tech. (Civil Engineering) Third Year B. Tech., Sem V 6CV352 Soil Mechanics Laboratory Soil Mechanics Examination Sc LA1 LA2 30 30 Credits: 1	hand College of Engineering, Sangli (Government Aided Autonomous Institute)AY 2023-24Course InformationB.Tech. (Civil Engineering)Third Year B. Tech., Sem V6CV3526CV352Soil Mechanics LaboratorySoil MechanicsExamination Scheme (Marks)A111112130303040Credits: 1								

Course Objectives

To develop the skills to find Index properties and engineering properties of soil and the classification of soil.

	Course Outcomes (CO)									
After c	After completion of the course students will able to									
CO1	Determine index properties of soil and Classify soil sample	Understand & Apply								
CO2	Determine Engineering properties of soils and interpret the behaviour of soils based upon experimental results data.	Understand & Analyse								
CO3	Demonstrate use of MS-Excel for data analysis and interpretation	Understand								

List of Experiments / Lab Activities

List of Experiments:

- 1. Identification and classification of soils by field procedures
- 2. Determination of specific gravity of soil
- 3. Particle size distribution Mechanical sieve analysis
- 4. Determination of consistency limits and indices
- 5. Determination of coefficient of permeability by constant and variable head method
- 6. Determination of MDD and OMC for soil by Standard Proctor compaction test
- 7. Determination of Field density of soil
- 8. Demonstration of one-dimensional consolidation test
- 9. Determination of shear strength parameters of soil by direct/box shear test
- 10. Determination of Unconfined compression test of soil.
- 11. Demonstration of triaxial compression/shear test
- 12. Determination of California Bearing Ratio

Text Books										
1	Shamsher P. and Jain P. K., "Engineering Soil Testing", 4th edition, 1999									
2	Beauro of Indian Standards, IS 2720 (Various sections / parts)									
3	Sharma R. K., "A Laboratory Manual on Soil Mechanics: Testing and Interpretation" 2016									
	References									

1	Bowles J. E., "Engineering Properties of Soil & Their Measurement", Tata - McGraw-Hill Publishing Co., 4 th Edition, 1992.
2	Das B. M., "Soil Mechanics Laboratory Manual", 6th edition
3	Lambe T.W., "Soil Testing", Willey Eastern Ltd., New Delhi, 1st edition, 1978
	Useful Links
1	https://research.iitgn.ac.in/stl/labmanual/
2	https://onlinecourses.nptel.ac.in/noc21_ce54/preview
3	https://smfe-iiith.vlabs.ac.in/

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1				3									1	3	
CO2				3									1	3	
CO3					3								2		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Assessment											
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.											
Assessment	Based on	Conducted by	Typical Schedule (for 13-week Sem)	Marks							
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	20							
	attendance, journal	Faculty	Marks Submission at the end of Week 6	50							
ТАЭ	Lab activities,	Lab Course	During Week 7 to Week 12	20							
	attendance, journal Faculty Marks Submission at the end of Week 1										
Lab ESE	Lab activities,	Lab Course	During Week 13 to Week 18	40							
Lab ESE	attendance, journal	Faculty	Marks Submission at the end of Week 13	40							
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown,											
considering a	13-week semester. Th	e actual schedule	shall be as per academic calendar.								

considering a 13-week semester. The actual schedule shall be as per academic calendar.

Walchand College of Engineering, Sangli											
AY 2023-24											
			Course Ir	offermation							
Progr	amme		B. Tech. (Civil En	gineering)							
Class	, Semester		Third Year B. Tec	h., Sem V							
Cours	se Code		6CV353								
Cours	se Name		Highway Material	s and Traffic Engine	ering Laboratory						
Desired Requisites: Highway Engineering											
Leafer	Teaching	Scheme	T A 1	Examination Scho	eme (Marks)	Tatal					
Tutor	re	-		20		100					
Practi	ical	- 2 hrs/week	50	50	40	100					
Intera	action	-	Credits: 1								
		<u> </u>									
			Course (Objectives							
1	To explai	in parameters go	overning the selection	on of best pavement c	construction materia	al.					
2	To develo	op ability to assurt op ability to assurt op ability to assure the second second second second second second se	ess various propertie	es of highway materi	als and various pra	ctices adopted					
3	To demo	nstrate the meth	od of design of bitu	minous mixes for fle	xible pavement.						
4	To give the and mana	he exposure of v agement of traffi	arious tests adopted ic.	on field to characteri	ise the road constru-	ction materials					
		Course	Outcomes (CO) wi	th Bloom's Taxonoi	my Level						
At the	end of the	course, students	s will be able to,			I					
C01	Apply practices to examine the properties of road construction material for their use in road construction and to manage the road traffic.Apply										
CO2	CO2 Interpret the test results of materials and compare the values with Indian standard codal provision to decide the suitability of road construction material Analyse										
CO3	Compre	hend concept of	bituminous mix de	sign for flexible pave	ements.	Understand					
			List of Experime	nts / Lab Activities							
List o	f Experim	ents:									
4.	Specific	Gravity of Bit	tumen								
5.	Penetrat	ion Test on Bi	tumen								
6.	V1scosit	y of Cutback I	31tumen								
8.	Flash an	d Fire Point of	f Bitumen								
9.	Ductility	y of Bitumen									
10). Bitumin	ous Extraction	Test								
11	1. Spot Spo	eed Study									
12	2. Intersect	tion Traffic Vo	olume Study								
13	3. Impact a	and Abrasion to	est of Aggregate								
14	4. Demons	tration of Mar	shall Stability Test	t							
			Tout	Books							
1	Khan	na S. K., Justo (C. E. G., Veeraragav	van A, "Highway En	gineering", Nem (Chand & Sons,					

2	Khanna S. K., Justo C. E. G., Veeraragavan A, "Highway Materials And Pavement Testing", Nem Chand & Sons, 2013										
	References										
1	IS 1201 to 1220 (1978). "Methods for testing tar and bituminous materials." Bureau of Indian Standards (BIS), New Delhi, India.										
2	IS 73 (2013). "PAVING BITUMEN — SPECIFICATION" Bureau of Indian Standards (BIS), New Delhi, India										
3	MORTH Specifications for Road and Bridge Works, Indian Roads Congress (IRC) 5 th Revision 2013, New Delhi, India										
	Useful Links										
1	https://ts-nitk.vlabs.ac.in/List of experiments.html										

CO-PO Mapping															
		Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C01				3					1	1			1		
CO2				3					1	1			2		
CO3			3		1				1	1			2		
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High															
Each CO of	the co	urse m	lust ma	p to at	least o	one PO									

		Asses	ssment				
There are three	There are three components of lab assessment, LA1, LA2, and Lab ESE						
IMP: Lab ES	IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all						
experiments/l	ab activities.						
Assessment	Based on	Conducted by	Typical Schedule	Marks			
TA1	Lab activities,	Lab Course	During Week 1 to Week 6	20			
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50			
T A 2	Lab activities,	Lab Course	During Week 7 to Week 12	20			
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50			
Lab ESE	Lab Performance	Lab Course	During Week 13 to Week 18	40			
Labese	and documentation	faculty	Marks Submission at the end of Week 18	40			
Week 1 indica	ates starting week of a	semester. The typ	ical schedule of lab assessments is shown, co	nsidering			
a 26-week ser	a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance						
shall include performing experiments, mini-project, presentations, drawings, programming and other							
suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have							
typically 8-10) experiments.	_	_				

Walchand College of Engineering, Sangli										
			AY 2	023-24	()					
			Course I	nformation						
Progra	amme		B.Tech. (Civil En	gineering)						
Class.	Semester		Third Year B. Tec	ch Sem V						
Cours	e Code		6CV355	.,						
Cours	e Name		Presentation and I	Report Writing						
Desire	d Requisi	tes:	-	1 0						
1	Teaching	Scheme		Examination S	cheme (Marks)					
Lectur	re	-	LA1	LA2	Lab ESE	Total				
Tutori	ial	-	30	30	40	100				
Practi	ical 2 h/week									
Intera	ction	-	Credits: 1							
	1		Course	Objectives						
1	To enhar	nce students' con	mmunication skills.	al acard						
2	To expos	te students to ethe	nical and profession	al conduct in tech	nical writing.					
	10 0000	de necessary kno	Course Ou	tcomes (CO)						
After o	completion	of the course st	tudents will able to							
CO1	Demonst	rate presentatio	n skills.			Apply				
CO2	Use of m	odern tools for	effective technical v	writing.		Apply				
CO3	Prepare I	Engineering and	other reports			Create				
	1	0 0								
			Lah A	ctivities						
1.	Standard	Practice of tech	nical writing (Ethic	s. Plagiarism, Cit	ation and Referencir	g Conventions				
2	Presentat	tion on		, i inginisiii, eie						
	a (General Topic ()	Non-Engineering)							
	u. (Fechnical Topic								
	0. I	Teennear Topie								
2	Ctudy on	d presentation of	n Tashnisal Articla	a (min 2) (Dagaan	ah nanana fuam nany	to diagram ala)				
5.	Study an			s (mm. 2) (Resear	ch papers from repu	ted journals)				
4.	Use of M	lendeley Deskto	p, Grammerly and	Quilibot						
5.	Study of									
	a. I	Detailed project	report (DPR) for ar	engineering proje	ect					
	b. I	Research Propos	sal							
6.	Preparati	on Engineering	Reports							
7.	Preparati	on of Resume a	and Statement of Pur	rpose (SOP)						
8.	Study on	Ethics, Copyrig	ght and Intellectual	Property Right						
			Text	Books						
1	Ande Ed. 2	rson P. V. "Tec 014	chnical Communica	tion: A Reader-C	entered Approach"	CENGAGE, 8 th				
2	Turk	C. and Kirkma	an J. "Effective Wi	riting: Improving Hall New York	Scientific, Technica 2 nd edition 1989	al, and Business				
3					<u> </u>					
	~	D W V	Refe	erences		11 4th				
1	Smith	n D., Worthing GAGE. 2017	gton and Jefferson	S. "Technical	Writing for Succe	ss", 4 ^m edition,				
2	Rhod	es M. W. and D	avid R. Topolewski	Writing in Engi	neering: A Brief Gu	ide"				

Useful Links

	CO-PO Mapping													
]	Progra	mme	Outco	mes (P	0)				P	SO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1					2	1		2		3		1		1
CO2					2			2		1		1		
CO3					2	1		2		3		1		1
The stron	ath of t	monni	ag is to	haum	itton of	1 2 2.	When	. 1.I.a	.	[adimma	2.11:	-l-		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

1

	Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.								
IMP: Lab ES	E is a separate head of	passing. LA1, LA	A2 together is treated as In-Semester Evaluat	ion.					
Assessment	Assessment Based on Conducted by Typical Schedule (for 13-week Sem) Marks								
Lab activities, Lab Course During Week 1 to Week 6									
LAI	attendance, journal	Faculty	Marks Submission at the end of Week 6	50					
ТАЭ	Lab activities,	Lab Course	During Week 7 to Week 12	20					
	attendance, journal	Faculty	Marks Submission at the end of Week 12	50					
Lob ESE	Lab activities,	Lab Course	During Week 13 to Week 18	40					
Lab ESEattendance, journalFacultyMarks Submission at the end of Week 1340									
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown,									
considering a	13-week semester. Th	e actual schedule	shall be as per academic calendar.						

		Wal	chand College of E (Government Aided Aut	Cngineering, Sa onomous Institute)	angli				
			AY 2023	3-24					
			Course Info	mation					
Progra	amme		B. Tech. (Civil Engine	ering)					
Class,	Semes	ter	Third Year B. Tech., S	em V					
Course	e Cod	;	6CV311						
Course	e Nam	e	Professional Elective	1: Remote Sensing	and GIS				
Desire	d Req	uisites:	Surveying, Transportat	ion Engineering					
7	Teaching Scheme Examination Scheme (Marks)								
Lectur	e	2 Hrs/week	MSE	ISE	ESE	To	tal		
Tutori	al	- 30 20 50 100							
Practio	cal	-		1	11				
Intera	ction	-	Credits: 2						
			Course Oh:	~ ~ 4!					
	-		Course Obj	ectives	11 12 1 1 1	~			
1	Intro engin engin	duce students the neering significand neering students.	necessary knowledge and e. To develop the sense of	concepts in the fie of Applications of S	eld of RS and GI Spatial technolog	S and the gy amon	eir civil g civil		
2	Intro Engi	duce the technique neering decision r	e of interpreting, classifyi naking	ng and applying va	rious RS and G	IS data i	n Civil		
3	Enat prep	le students in deci uring and impleme	sion making to manage the standard stand Standard standard stand Standard standard stan	he Civil Engineerin 1g action plans	g related spatial	probler	ns before		
		Course	Outcomes (CO) with Blo	oom's Taxonomy l	Level				
After co	mpleti	on of the course s	udents will able to			1			
CO1	Iden	ify and describe the	ne fundamentals of Remo	te Sensing and pho	togrammetry.	Und	lerstand		
CO2	Dem	onstrate, Classify	and Interpret spatial data	to extract maximum	n information.	A	nalyse		
CO3	Inve	tigate, and genera	te spatial database.			A	pply		
Modu	ule		Module Co	ontents			Hours		
I	I E v a t	troduction of R refinition and prin ith Earth's surface and interpretation, ppes of aerial phot	emote Sensing ciples of remote sensing, l e, Platforms and sensors u Early history of aerial pho ographs, taking vertical a	Electromagnetic sp ised in remote sens otography, simple o aerial photograph a	ectrum and inter ing, Image acqu camera, aerial ca nd flight plannin	raction isition amera, ng	4		
II	F C F	emote Sensing D ypes of remote naracteristics an adiometric and ge	ata sensing data (optical, l properties, Data fo ometric corrections	thermal, radar, l rmats and prepr	LiDAR, etc.), rocessing tech	Image niques,	4		
ш	I V e	Image Interpretation and AnalysisVisual interpretation of images, Digital image processing techniques, Imageenhancement and classification, Change detection and time-series analysis							
IV	I D n p	Atroduction to G refinition and prin rethods), Spatial rojections	S aciples of GIS, Compone data models (vector and	ents of a GIS (hard d raster), Coordina	dware, software ate systems and	, data, d map	5		
v	I E e	ata Managemen ata input, storage ements, Map layo	t and Analysis in GIS e, and retrieval, Map dea out and composition	sign principles, Sy	mbolization an	d map	4		

VI	Applications of Remote Sensing and GIS: Land use and land cover mapping, Environmental monitoring and assessment, Urban planning and management, Natural resource management and conservation	5
	Text Books	
1	Reddy M. A., "Remote Sensing & Geographical Information System", BS Publ Hyderabad, 2002	ications,
2	Lillesand T. M. & Kiefer R., "Remote Sensing and Image Interpretation", John Villey,	1999
3	Longley P. A., Goodchild M. F., David J. Maguire, and David W. Rhind. "Geo Information Science and Systems"	ographic
	References	
1	Jensen J. R. "Remote Sensing & Digital Image Processing", Department of Ge University of South Carolina Columbia, 2003	ography
2	Panda B C, "Principles of Remote Sensing", Viva Books Private Limited, 2002	

	CO-PO Mapping														
				Р	rograi	nme C	Outcon	nes (PO))				PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	2													2	
CO2		2		1	3								2	2	
CO3				1	3									1	
The stren	The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High														
Each CO of the course must map to at least one PO.															
	Assessment														

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. Mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

Walchand College of Engineering, Sangli								
			(Government Atded	2023-24				
			Course	Information				
Progr	amme		B. Tech. Civil En	gineering				
Class.	Semes	ter	Third Year B. Te	ch Semester V				
Cours	e Code	,	6CV312					
Cours	e Nam	e	Professional Elec	tive 1: Plastic and	Electronic Waste Ma	nagem	ent	
Desire	ed Requ	uisites:	-			0		
			1					
	Teachi	ing Scheme		Examination S	cheme (Marks)			
Lectu	re	2 Hrs/week	MSE	ISE	ESE	Т	otal	
Tutor	ial	-	30	20	50	1	00	
			Credits: 2	1				
		1	1					
			Course	Objectives				
1	To pr	ovide students with	a comprehensive	understanding of th	ne environmental and	health	impacts	
	assoc	iated with plastic ar	nd e-waste, and the	urgency of effectiv	e management.			
2	To e mana	gement, including	neworks, regulation	ons, and initiative responsibility (EP	es related to plastic (R) programs and cir	c and cular of	e-waste economy	
2	appro To ac	aches. quaint students with	the sources, types	s, and generation pa	tterns of plastic and e	e-waste	e, and the	
3	challe	enges associated with	th their collection,	recycling, and disp	osal.			
At the	end of	the course the stud	Outcomes (CO) w ents will be able to	Th Bloom's Taxo	nomy Level			
	Expla	in the environment	al and health impa	, cts of plastic and e	-waste, and the need			
	for su	stainable managem	ent practices.			Unc	lerstand	
CO2	Perce	ive policy framewo	press, regulations, a	and initiatives relat	ed to plastic and e-	Un	foretand	
	produ	cer responsibility (EPR) programs and	bromoting circular	r economy practices.		iei stanu	
CO3	Identi	fy the sources, type	es, and generation	patterns of plastic a	nd e-waste, and the	A.	nalwaa	
	challe	enges and opportuni	ties in their collect	ion, recycling, and	disposal.	A		
Modu	ıle		Modu	le Contents			Hours	
	In	troduction to Plas	tic and E-Waste N	Aanagement				
Ι	Ui of	nderstanding the en the global plastic an proaches Policies	vironmental and he nd e-waste crisis, In and regulations rela	ealth impacts of plas atroduction to plasti ated to plastic and e	stic and e-waste, Ove c and e-waste manage e-waste management	rview ement	4	
II	Pl Sc Sc	astic Waste Mana burces and types of orting and segregati	gement plastic waste, Plast ion techniques for	ic waste collection plastic waste, Recy	methods and technological methods and technological methods and reprocession anagement	ogies, ng of	5	
III		•Waste Generation	and Sources e: consumer electron and b	ctronics, IT equi	pment, appliances,	etc.,	4	
	ge	eneration trends and Waste Recycling :	patterns, E-waste	collection methods	and systems	waste		
IV	 Recycling technologies for e-waste: dismantling, shredding, and separation, Hazardous substance management in e-waste recycling, Resource recovery from e-waste: precious metals, rare earth elements, etc., E-waste disposal methods: landfilling, incineration, and their environmental impacts 							
v	Ex O re to	stended Producer verview of Extended gulations for plastic promote EPR, Case	Responsibility (El ed Producer Respo e and e-waste mana e studies on succes	PR) and Policy Fr onsibility (EPR) pro agement, Internatio sful EPR implement	amework ograms, EPR policie nal and national initiation	s and atives	4	
VI	Ci Do re	ircular Economy a esign for sustainab furbishment, and re	nd Sustainable P ility: eco-design a sale of electronics,	ractices nd product life ext Circular economy	ension, Promoting r approaches for plasti	epair, c and	4	

	e-waste management, Future trends and innovations in circular economy practices
	Textbooks
1	Chandrappa R. and Das D. B, "Solid Waste Management: Principles and Practice" 2012
2	Tchobanoglous G., Theisen H., Vigil S. "Integrated Solid Waste Management", 2014
3	Subramanian M. N. "Plastics Waste Management: Processing and Disposal", Wiley publications, 2 nd Edition, 2019
	References
1	Pope K. "Global Waste Management: Models for Tackling the International Waste Crisis", Kogan Page publishing, 1 st Edition, 2020
2	Williams E., Hieronymi K., Kahhat R. "E-waste Management From Waste to Resource", Tayler and Francis, 2012.
3	Letcher T. "Plastic Waste and Recycling: Environmental Impact, Societal Issues, Prevention, and Solutions", Academic Press Inc. 2020.
	Useful Links
1	https://www.youtube.com/watch?v=_r5rHyMHKEg&list=PL3MO67NH2XxJngITU5LDb2md2TX4Gqe x-
2	https://www.youtube.com/watch?v=sF7NhoIp1C8&list=PL3MO67NH2XxJngITU5LDb2md2TX4Gqex -&index=11
3	https://www.youtube.com/watch?v=VjKRPOUMu- 8&list=PLbRMhDVUMngcUlCNSaynDVY7T1XFaMFFy&index=5

						CO-PO) Map	ping						
					Progra	amme (Dutcon	nes (PC)				P	50
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1						3	3							
CO2	1					3	3						1	
CO3	2					3	3						1	
		The	thanath	ofma		to ha		og 1. I		Madium	2.11:	ah		

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

		Walc	hand College	of Engineering	g, Sangli				
			(Government Aidea	l Autonomous Institu	te)				
			AY	2023-24					
			Course l	Information					
Progra	amme		B. Tech. (Civil E	ngineering)					
Class,	Semester		Third Year B. Te	ch., Semester V					
Course Code 6CV313									
Cours	e Name		Professional Elec	tive 1: Air and Noi	se Pollution Contro	1			
Desire	d Requisi	tes	Engineering Phys	sics, Environmenta	l Science				
	Teaching	Scheme		Examination S	cheme (Marks)				
Lectur	re	2 Hrs./week	MSE	ISE	ESE	Tota	l		
Tutori	al	-	30	20	50	100			
				Cred	lits: 2				
			Course	Objectives					
1	To provi	de knowledge o	n physics of atmosp	ohere, meteorology	and its relation to a	ir pollutior	۱,		
	different	types of air poll	ution control equip	ment.					
		Course	Outcomes (CO) w	ith Bloom's Taxo	nomy Level				
At the	end of the	course, the stud	lents will be able to	,					
CO1	Recogniz studies	ze and summar	<i>ize</i> scientific and e	engineering princi	ples for air pollutio	Under	stand		
CO2	Apply ap	propriate disper	sion models <i>estima</i>	te air pollutant cor	centrations	Apj Eval	ply uate		
C03	Analyze	situations leadin	ig to air pollution and to technical env	nd <i>design</i> air pollu vironmental bealth	tion control strategie	es Ana	lyze		
	considera	ations			, salety and sool	Eval	luae		
Modu	le		Mod	ule Contents			Hrs		
	Air p	ollution: A ret	rospective		NT / 1 1 / /				
	Air p	ollution: source	s and types and effe	ects on biosphere,	National and interna	ational air	3		
	Mete	orology	All Quality Index (A	4QI)					
	Physi	cs of atmospher	e, Solar radiation, V	Wind circulation, L	apse rate, Inversion	, Stability			
п	condi	tions, Pasquil	stability model, I	Maximum mixing	depth, Wind ros	e, Plume	5		
	behav	viour,					5		
		al effects of air j	pollution: Green ho	buse effects, acid ra	in and ozone layer	depletion,			
	Disn	ersion of nollute	ants in the atmos	here					
	Eddy	diffusion mod	el, the Gaussian	dispersion model,	Point source, Lin	e source,	4		
111	Maxi	mum ground le	vel concentration,	Determination of	stack height, Samp	oling time	4		
	corre	ctions, Effects o	f inversion trap						
	Cont	rol of Air Pollu	tion pr Dortioulate Matte	m Onaration dasia	n and component d	tailing of	5		
1 V	Settli	ng chamber. Cv	clone. Wet collecto	rs. Fabric filter. an	d Electrostatic preci	pitator	5		
	Moto	or Vehicle Emis	sions		<u> </u>	<u>r</u>			
V	Autor	nobile Source	Emission of pollu	tants from automo	biles, Photochemic	cal smog,	4		
	Redu	ction of emissio	ns by different met	hods					
	Noise	Noise Pollution							
	Dasic	Basics of acoustics and specification of sound; Sound power, Sound intensity and sound pressure levels: Plane Point and line sources. Multiple sources: Outdoor and indoor poise							
VI	propagation; Psycho-acoustics and noise criteria, Effects of noise on health, Annovance 5								
	rating	schemes; Nois	e standards and lim	it values; Noise in	strumentation and n	nonitoring			
	proce	dure. Noise indi	ces.						

	Textbooks
1	Wark and Warner, "Air Pollution", C.F., H.R. Publication, 1st Edition, 1978.
2	Nevers N., "Air Pollution Control Engineering" McGraw-Hill, New York, 2 nd edition, 1995.
3	Martin Crawford, "Air Pollution and Control", Tata McGraw Hill Publication, 1st Edition, 1976.
	References
1	Richard W. Boubel and Bruce Turner, "Fundamentals of Air Pollution", Academic Press, New
I	York, Third edition, 1994.
2	Stern A. C., "Air Pollution Vol. I and II", Allied Publishers Limited, 1st Edition, 1994.
3	Rao H.V.N. and Rao M. N., "Air Pollution", Tata McGraw Hill, 1st Edition, 1989.
4	Cunniff PE, "Environmental Noise Pollution", McGraw Hill, New York, 1987.

	CO-PO Mapping													
		Programme Outcomes (PO)								PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2						3							
CO2		2					3							
CO3			2			3	3							

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2023-24									
			Course I	nformation						
Progr	amme		B. Tech. (Civil E	ngineering)						
Class,	Semester		Third Year B. Te	ch., Sem V						
Cours	e Code		6CV314							
Cours	e Name		Professional Elec	tive 1: River Engin	neering					
Desire	d Requisi	tes:	Open Chanel Hyd	Iraulics and Water	Resources Engine	ering				
			1							
	Teaching	Scheme		Examination S	cheme (Marks)					
Lectu	re	2 Hrs/week	MSE	ISE	ESE		Total			
Tutor	ial	0 Hrs/week	30	20	50		100			
			Credits: 2							
			Course	Objectives						
1	To provid	de the student fu	indamentals of fluv	ial geomorphology	/	d a4abla a	11			
2	channels	and fluvial desi	analysis of fiver ho on for river bank p	ow nyuraunes, nyur	raunc geometry an	d stable a	IIuviai			
3	To prepar	re the students f	or higher studies ar	nd research in the f	ield of river engine	eering.				
						U				
	Course Outcomes (CO) with Bloom's Taxonomy Level									
At the	At the end of the course, the students will be able to,									
CO1 Explain the fundamentals of fluvial geomorphology. Understand										
Apply the knowledge of fundamental of analysis of fiver flow hydraulics, and hydraulic geometry for stable alluvial channels							Analyse			
CO3	Design of	f fluvial stable a	illuvial channels an	d river bank protec	ction work.	Eva	luate			
Modu	lle		Modul	e Contents			Hours			
	Fluvia	al Geomorpholo	gy: Fluvial system,	variables for alluv	vial rivers, regime	concept,				
I	river	classifications,	thresholds of river	morphology, hyd	raulic geometry, 1	neander	4			
	platfo	rm, geomorphic	analysis of river c	hannel responses.						
	Found	lation of Fluvial	Process: Hydraulic	cs of flow in river cl	hannel, physical pr	operties				
II	of sec	liments, scour c	riteria and scour-re	elated problems, al	luvial bed forms a	ind flow	5			
	resista	ance, sediment i	novements in Rive	rs, flow in curved c	channels.					
III	stable	alluvial channel	xesponses: Analyti	cal dasis for hydra	aunc geometry, de	esign of	5			
IV	Anal	vtical river mor	hology plan geor	etry and processes	of river meanders	,				
	Mode	ling of river che	nnel changes. Mat	hematical model for	r erodible channel	s				
v	Gradi	al breach morn	hology tidal respon	ises of river and de	elta system fluvia	l design	+			
VI	of riv	er bank protecti	on	ises of fiver and a	enta system, mavia	i design	4			
1	TT		Tex	tbooks	ohn Wilser 9 G	1000				
$\frac{1}{2}$	Howa Kuma	ra C. H., "Fluvi ar S. "River Eng	al Processes in Kiv	Publishing House:	$\frac{1^{\text{st}}}{1^{\text{st}}}$ edition 2020	, 1988.				
3	Gupta	a K D, "River E	ngineering". Vavu	Education Of India	Edition, First Edi	tion, 2014	4.			
			Refe	erences						
1	Kuma	ar D.S., "Practic	al River And Canal	Engineering", Rea	ad Books, 2011.					
	US Army Corps of Engineers "Engineering and Design: River Hydraulics (Engineer Manual									
2	1110-	2-1416)", Khan	na Publishers, New	Delhi, 8th Edition,	, 1993.					

	Useful Links						
1							
2							

	CO-PO Mapping													
		Programme Outcomes (PO) PSO												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2												1	1
CO2		3											2	2
CO3			3										3	2
1: Low, 2	1: Low, 2: Medium, 3: High													

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 2 and 60% weightage on modules 3 to 4.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
			AY 202	23-24						
			Course Info	ormation						
Progra	amme		B.Tech. (Civil Engi	neering)						
Class,	Semester		Third Year B. Tech.	, Sem VI						
Cours	e Code		6CV315	·						
Course	e Name		Professional Electiv	e 1: Advanced Survey	ying					
Desire	d Requisi	tes:	Engineering Survey	ing						
				-						
1	Teaching	Scheme		Examination Schem	e (Marks)					
Lectur	·e	2 Hrs/week	MSE	ISE	ESE		Total			
Tutori	al	0	30	20	50		100			
Practi	cal	-								
Intera	ction - Credits: 2									
			Course Ob	ojectives						
1	To under	stand advanced	surveying techniques	and geospatial techni	ques.					
2	To develo	op an ability to a	analyze land profiles i	n logical manner and	will be able to	apply	y well			
	To adopt	suitable survey	technique and select	equipment based on f	he required lev	n s su vel of	accuracy			
3	3 10 adopt suitable survey technique and select equipment based on the required level of accuracy and prevailing field conditions									
			Course Outc	omes (CO)		1				
CO1	CO1 Study modern surveying equipment effectively to improve quality of surveys. Understand									
CO2	CO2 Analyze and synthesize data from the aerial photographs and remote sensing Analyze images to prepare thematic maps.									
CO3	Analyze and Solve surveying problems by using remote sensing, GIS and GPS. Analyze &									
005						App	oly			
	•		MILO				TT			
Modu		atia Commentina	Module C	ontents			Hours			
Ι	Princ: tower statio	iples, Classificates, Baseline mea n, Reduction to	tion if triangulation sy surement and correction center, Introduction to	stems, Selection of st on, Extension of base o theory of errors and	ations, Signals , base net, Sate technical term	and ellite 1s.	5			
II	Total	Station Survey	y vations Software				5			
	Aeria	l Photogramm 1 Photogramme	etry try, Basic concepts. C	Geometry of vertical r	photographs. S	cale				
111	and F and P	lying height, Re arallax, Photo n	lief displacement, Fli nosaic, Elements of pl	ght planning computation.	tions, Stereosc	сору	5			
IV	Remo Conce	ote Sensing epts and founda	ations of remote sens	ing, Characteristics of	of Remote sen	sing	5			
V	GIS	ites and sensors	• • • • • •							
	GPS	view of GIS, dat	a input and output, da	ita management.			3			
VI	Introc mapp	luction to GPS ing techniques.	, Geodesy, Working	principle of GPS,	Measurement	and	3			
				•						
1	Chan	dra A M Uigha	Text B	00KS	e Limited 201	5				
1			\sim	dond Doct Harry 10	h adition 201	ی ہ				
2	2 Arora K. R. "Surveying", Vol. 1 & 2, Standard Book House, 16th edition, 2018. 2 Anoraal N.K. "Exactly by COS" Control of the transmission of tran									
3	Agrav	wai in. k. , ESSE	nuais of OFS Spatial	INCLIMULK FVI. LIU., F	1901a0a0199/.					

	References						
1	James Anderson and Edward Mikhail, Surveying: Theory and Practice, McGraw Hill Education;						
1	7th edition, 2017						
2	Lillesand T. M. and Kiefer. R.W., "Remote Sensing and Image Interpretation", 4th Edition,						
2	John Wiley and Sons, New York, 2002						
2	R. E. Davis, F. Foote and J. Kelly, "Surveying; Theory and Practice", McGraw Hill Book						
3	Company, New York.						
	Usoful Links						

Uselul Links

	CO-PO Mapping														
		Programme Outcomes (PO) PSO													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3				2								1		
CO2		2											1		
CO3		1													
701	.1 0	•	• .	1	•	1 0 0	X X 71	1 T	2.1	r 1'	A 11'	1			

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

1

ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
AY 2023-24									
			Co	urse Informat	ion				
Progra	amme		B.Tech. (Civ	il Engineering)	1				
Class,	Semeste	r	Third Year B	. Tech., Sem V	Ί				
Cours	e Code		6CV316						
Cours	e Name		Professional	Elective 1: Stru	ctural Mechani	ics			
Desire	d Requis	sites:	Solid Mecha	nics, Structural	Analysis				
			1	,					
Г	eaching	Scheme		Exami	nation Scheme	e (Marks)			
Lectur	e.	2 Hrs/week	MSE	ISE	ESE	T	otal		
Tutori	al	-	30	20	50		100		
Practi	cal	-		1	11				
Intera	ction	-	Credits: 2						
			C	ourse Objectiv	/es				
1	To expl	ain the concept	of matrix meth	nods of structur	al analysis.				
2	To incu	lcate application	ns of flexibility	y and stiffness i	methods to solv	e indeterminat	e structu	res.	
3	To illus	trate the concep	t and applicati	ons of finite ele	ement method i	n structural en	gineering	<u>z</u> .	
		Course	e Outcomes (C	CO) with Bloo	m's Taxonomy	v Level	<u> </u>		
CO1	Apply t	the concepts of	matrix method	s of structural a	analysis.		App	lying	
Analyse indeterminate structures by using structure oriented and element								veina	
approach.								ysnig	
CO3 Calculate the nodal displacements and member forces by using finite element Evaluating								iating	
	method						Lvan	auting	
Modu	le]	Module Conte	nts			Hours	
	Flex	ibility Method	- Beams & Fr	ames					
I	Flex	ibility coefficie	ent matrix, Co	mpatibility con	nditions, Devel	opment of fle	xibility	5	
_	matr	ix equations, A	nalysis of inde	eterminate bear	ms and rigid join	inted frames b	y using	-	
	flexi	bility method.							
п	Flex	ability Method	- Irusses	by using flevik	vility method S	tresses due to	lack of	1	
	fit o	r error in length	. Temperature	stresses.	Sinty method, S	suesses due to	Idek OI	4	
	Stiff	fness Method-	Structure App	oroach					
ш	Stiff	ness coefficien	t matrix, Rela	ation between	flexibility and	l stiffness coe	fficient	5	
111	mati	rix, Developmer	nt of stiffness n	natrix equilibri	um equations, A	Analysis of con	tinuous	5	
	bear Stiff	ns and frames.	Flomont Anny	aaah. Daama	e Fromos				
	Forr	nulation for ele	ment stiffness	matrix for bea	x Frames m element and	plane frame e	lement		
IV	Loca	al and global c	oordinates, Tr	ansformation	of matrices, A	nalysis of con	tinuous	5	
	bear	ns and frames b	y using direct	stiffness metho	od.	2			
	Stiff	fness Method-l	Element Appr	oach: Trusses					
	V Direct stiffness method- Element approach, Development of element stiffness matrix 5								
	and Fini	te Element Me	thod	ment, Analysis	of trusses.				
	Introduction finite element method, Basic concept, General procedure of finite element								
	anal	ysis, Discretiza	ation, nodes,	element incid	ences, displace	ement model,	shape	5	
VI	func	tion, selection	of order of pol	lynomials, Prin	nciple of minin	num potential	energy,	5	
	varia	variational principle, Development of element stiffness matrix and nodal load vector							
	10r	par element,	Applications t	to bars with c	onstant and va	ariable cross s	sections		
	subj							<u> </u>	

	Text Books
1	Gere, J. M. & Weaver, W., "Matrix Analysis of Framed Structures", CBS Publishers and
1	Distributor, 2 nd Edition, 2004.
2	Godbole, P. N., "Introduction to Finite Element Methods", I K International Publishing House
2	Pvt. Ltd., 1 st Edition, 2013.
3	Reddy, C. S., "Basic Structural Analysis", McGraw Hill Education, 3 rd edition, 2017.
	References
1	Cook, Robert D., Malkus, David S., Plesha, Michael E., and Witt, Robert J., "Concepts and Applications of Finite Element Analysis", 2003.
2	McGuire, William, Gallaghar, Richard H. and Ziemian, Ronald D., "Matrix Structural Analysis",
2	John Wiley, 2 nd Edition, 2000.
3	Meghare A. S. and Deshmukh S. K., "Matrix Methods of Structural Analysis" Charotar
	Publishing House, 2 nd Edition, 2016.
	Useful Links
1	https://nptel.ac.in
2	https://nptel.ac.in/content/syllabus_pdf/105105180.pdf
3	https://onlinecourses.nptel.ac.in/noc20_me91/preview
4	HoD Applied Mechanics - YouTube

	CO-PO Mapping														
		Programme Outcomes (PO) PSO													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3													3	
CO2		3												2	
CO3			3		2									1	
The streng	The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High														

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of a teacher's assessment.

The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing

Walchand College of Engineering, Sangli										
	(Government Aided Autonomous Institute)									
			AY 2023	-24						
Drogr	mmo		B. Tach. (Civil Engine	mation						
Close	Somostor		D. Tech. (Civil Eligine	lom V						
Class,	o Codo		GCV217							
Cours	e Coue		Drofossional Elastiva	L. Advanced Concre	ta Tashnalagu					
Docimo	d Dogwigi	tage	Concrete Technology	1. Advanced Concre	te rechnology					
Desire	a Kequisi	les:	Concrete Technology							
	Teaching	Scheme	E	xamination Schemo	e (Marks)					
Lectur	re	2 Hrs/week	ISE	MSE	ESE	To	otal			
Tutori	ial	-	20	30	50	1	00			
Practi	cal	-		11	I					
Intera	ction	-	Credits: 2							
			Course Obje	ectives						
1	To give e of cemen	xposure to in de t.	pth knowledge and conc	epts of the manufact	turing of cemen	t and h	ydration			
2	To provide and development	le conceptual ki lop skills to desi	nowhow of admixtures ut ign concrete mixtures.	used in concrete to i	mprove propert	ties of	concrete			
3	3 To make students conversant with durability issues of concrete and special types of concrete.									
	Course Outcomes (CO) with Bloom's Taxonomy Level									
At the	end of the	course, the stud	lents will be able to,							
CO1 Perceive and Apply the knowledge cement, concrete and admixtures to fulfil the Understand & Apply										
CO2 Demonstrate and analyse durability of issues of concrete and apply knowledge Understand &							rstand &			
<u> </u>	special co	oncretes.	according to construction	n inductrice require	manta	Ar	alyze			
- 005	Design a			ni industries require	inents.		esign			
Modu	le		Module Co	ntents			Hours			
	Ceme	ent								
I	Clink Ceme	ering reactions, ents, Heat of Hydrogeneric	Hydration Reactions & dration, Microstructure	Chemistry of Cem of hydrated cement	ent paste, Setti paste.	ng of	5			
	Admi	ixtures in Conc	erete - I							
п	Speci	fication, Function	ons, Classification and V	Vorking principles.			4			
	Chem	ical Admixture	es: Plasticizers, Super-p	lasticizer, Accelera	tors, Retarders	, Air	-			
	entrai	ning agents, Spe	eciality Admixture, Con	npatibility of Admix	tures					
	Speci	fication. Function	ons. and Classification.							
	Miner	ral Admixtures:	Fly ash, Silica Fume, Sl	ag, Rice husk ash, I	Metakaolin		4			
	Pozzo	lanic Reactivity	of Mineral admixtures							
	Conc	rete Mix Desig	n			101				
IV		rs to be consider (2019) m	red, Concrete mix designed of Part	n of High Strength (Concrete and SC	C by	5			
	contro	o202 (2019) III ol	eniou, concept of rate	tele i acking densit	y, Statistical q	uanty				
	Speci	al Concretes:	Fibre reinforced conc	rete, Ultra-high str	ength concrete	and				
V	Pervi	ous Concrete.		-	-		3			
	Fresh	Properties of Se	elf Compacting Concret	e						
	Dura	bility of Concr	ete	. 01 . 1	1 (0 1 1 4					
VI	Chlor	ide acid leachi	e Structure, Ionic Diffus	ion, Unemical Attac cal Attack (freeze-th	rk (Sulphate, (Sulphate, Corresion	l of	5			
	reinfo	rcement, Alkali	-Aggregate Reaction	our / muor (110020-11		. 01				
	Text Books									

1	Mehta P. K. and Paulo J. M. M, "Concrete – Microstructure, Properties and Material", McGraw Hill Professional 3 rd Edition, 2009.
2	Neville A. M. and Brooks J. J., "Concrete Technology", Pearson Education Limited, 1987
3	Shetty M. S., "Concrete Technology", S. Chand & Company Ltd. New Delhi, 7th Edition, 2013.
	References
1	Neville A. M., "Properties of Concrete", Prentice Hall, 5th edition, 2012
n	Newman J., Choo B.S., Advanced Concrete Technology-Constituent Materials, Elsevier Ltd. 1st
L	edition, 2003
3	Taylor H.F.W., Cement chemistry, Thomas Telford, 2 nd edition, 1997
	Useful Links
1	https://www.digimat.in/nptel/courses/video/105102012/L01.html
2	https://www.digimat.in/nptel/courses/video/105104030/L01.html
3	https://www.digimat.in/nptel/courses/video/105106176/L01.html

	CO-PO Mapping														
	Programme Outcomes (PO)													PSPO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	2												2	2	
CO2		3											2	2	
CO3			3										2	2	

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE. MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO. ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE + ISE + ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

		Walcha (Ga	nd College of Eng	gineering, Sar omous Institute)	ngli						
			AY 2023-24	ļ							
			Course Informa	ntion							
Program	me		B. Tech. (Civil Engine	ering)							
Class, Ser	mester		Third Year B. Tech., S	Sem V							
Course C	ode		6CV318								
Course N	ame		Professional Elective	1: Airport Enginee	ering						
Desired F	Requisites:		Transportation Engine	ering							
			1								
Tea	aching Schen	ne	E	xamination Scher	ne (Marks)						
Lecture		2 Hrs/week	MSE	ISE	ESE	To	tal				
Tutorial		-	30	20	50	10	00				
Practical	l -										
Interactio	ction - Credits: 2										
			Course Object	ives							
	To give	exposure to air	port construction and	maintenance aspe	cts of airport a	nd make	familiar				
1	with com	ponents of airpo	ort.								
2	Impart th	e techniques of	planning and designing	g of the airport con	mponents like 1	runways,t	axiways,				
terminal building, hangars etc. along with the drainage and traffic controls methods.											
3	To make	conversant with	n various construction m	ethods of airport.							
		Course Out	comes (CO) with Bloor	m's Taxonomy L	evel						
At the end	l of the cours	se, the students	s will be able to,			1					
CO1	Demonst	rate the knowle	dge required for planni	ng and designing	of various	Unde	erstand				
	compone	nts of airports.	· 1	1 •			<u> </u>				
CO2	airports	and Apply desi	gn considerations of t	ne various comp	onents of		∞				
	Compare	and apply varie	ous techniques used in t	he construction of	f airports and	Λ	ppiy				
CO3	Analyze	professional pr	actices for solving pro	blems in the field	d of airport	Under	stand &				
	engineeri	ng.	01		I I I	An	alyze				
Module			Module Conte	ents			Hours				
	Module 1:	Introduction to	Airport Engineering								
т	Introduction	, History, Terr	ninology, characteristic	s,airport classifica	tion, and organ	izations	_				
1	concerned v	vith Airport Eng	gineering, components	of aircraft, Role	of civil engine	ering in	5				
	airport plani	ning and design									
	Module 2: 1	Planning									
п	H Factors influencing site selection for airports, Land use planning and zoning regulations,										
	Runway orientation and site-specific considerations, Safety considerations and clearance										
	requirements, airport obstructions, layouts, zoning laws.										
	Module 3 :	Geometric Des	agn of Runways, Taxiv	vays		1 .1					
	Designing:	Kunways, Kunv	way classification, Ru	nways-orientation	i, basic runway	length,	4				
	geometric d	esign. I axiways	- layouts, geometric des	ign.							
	Torminal P	ierminal Bull	alaction facilities arrest	a anto positions							
11	Hangare Fu	nction types re	encenton, racinities, aprol	is, gate positions.			4				
	1	incuon, types, it	-quinemento.				L				

V	Module 5: Air Traffic Control System									
	Air Traffic Control: VFR, IFR, visual aids, lighting and marking.									
	Heliports: Characteristics, site selection, planning, size, obstructions, orientation, marking and lighting.									
	Module 6: Airport Drainage and Environmental Considerations									
VI	Surface water management at airports, Drainage: Necessity, types. Environmental impacts of airports and mitigation measures.	4								

Text Books														
1	Robert M. Horonjeff, Francis X. McKelvey, William J. Sproule, and Seth Young "Planning and Design of Airports".													
2	Khanna S. K. & Arora M. G., "Airport Planning and Design", Nem Chand and Brothers, 6 th Edition, 2012.													
3	Surind	er Si	ngh "A	Airport	Engin	eering	Plann	ing, De	esign, a	and Op	eratior	ns".5 th Edit	ion, 2015.	
							ŀ	Referen	ices					
1	Richar Educat	d de l ion	Neufv	ille, Aı	nedeo	Odoni	, " Air	port Sy	ystem:	Planni	ng, De	sign and M	lanagemen	t",Mc Graw Hill
2	 Horonjeff R., McKelvey F., Sproule W., Young S., "Planning and Design of Airports", McGraw Hill Professional, 5th Edition, 2010. 													
							CO-	PO M	apping	5				
					Progr	amme	Outco	omes (l	PO)				PSP	0
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												3	2
CO2	3		1										3	2
CO3	3	3	1										3	2
The stren	gth of m	appin	ng is to	be wr	itten as	\$ 1,2,3;	Where	e, 1:Lo	w, 2:N	ledium	, 3:Hig	gh		
Each CO	of the co	ourse	must	map to	at leas	st one I	PO.							
							A	ssessn	nent					
The asses ISE shall visits, ass ESE shall For passi	sment is be taker ignment be on a ng a theo	base thro s etc. ll mo ory co	d on M ughou and is dules ourse,	MSE, IS t the so s expection with an Min. 4	SE and emeste eted to round 4 0% ma	l ESE. r in the map at 40% w urks in	MSE s form t least o eightag (MSE-	hall be of a tea one hig ge on n +ISE+I	e typica acher's ther oro nodules ESE) a	ally on assess der PO s 1 to 3 re need	modul ment. and 6 led, an	es 1 to 3. The mode 0% weight d Min. 40%	of assessm age on moo 6 marks in	ent can be field lules 4 to 6.

ESE are needed. (ESE shall be a separate head of passing)

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7

	Types, Engineering properties and Uses of Bricks, Stones, Aggregate, Lime, Ceme Steel, Aluminium, PVC, Glass,	nt,
	Concrete: Ingredients, Preparation, Properties of concrete, Types of concrete and th applications	eir
	Building Services and Finishes	i
	Plumbing services for water supply, plumbing services for drainage, symbols,	
VI	Electrification, symbols of electrical fixtures, Types of Plastering and Pointing,	7
	Defects, Paints and Varnishes Types, Application, Methodology on various	
	surfaces, Defects.	
	Textbooks	
1	R.K.Rajput S. 'Building Materials' S. Chand Publications.	
2	Bindra and Arora, "Building Construction", Dhanpat Rai and Sons	
3	Kumarswamy and Kameshwar Rao., "Building Planning and Design," Tata McG	raw Hill Pvt.
	ltd, 1995.	
4	Civil Engineering Drawing - V. B. Sikka, S. K. Kataria and Sons.	
	References	
1	Punmia, Jain, Jain, "Building Construction", Laxmi Publications ltd. 2005	
2	Mantri Institute's 'The A to Z of Practical Building Construction and its Managem	ent' Mantri
	Institute of Devp. and Research. Pune, 1994.	
3	Building drawing with Integrated approach – Shah, Kale & Patki, Tata Mc Graw H	fill Pub.
4	National Building Code of India and SP-7.	
	Useful Links	
1	https://www.youtube.com/watch?v=pYLKA4YQMyI&list=PL46yD-wnVQqxZ8f-	
1	_g1PZaFjJIxnJWyFE	
2	https://www.youtube.com/watch?v=4kLXfCGB_RI&list=PL46yD-wnVQqxZ8f-	
	_g1PZaFjJIxnJWyFE&index=5	
3	https://www.youtube.com/watch?v=2tb1heySCx0	
4	https://www.youtube.com/watch?v=Y0Y8zuETHOQ	

	CO-PO Mapping													
	Programme Outcomes (PO)													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2													
CO2	2												1	

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

		Walc	hand College of E	ngineering, Sa	angli					
			AY 2023	-24						
			Course Infor	mation						
Progra	mme		B. Tech. (Civil Engine	ering)						
Class,	Semeste	r	Third Year B. Tech., S	Sem V						
Course	e Code		6OE302							
Course	e Name		Open Elective 1: Disas	ter Management						
Desire	d Requi	sites:	B. Tech. (Civil Engine	ering)						
[Feachin	g Scheme	E	xamination Schen	ne (Marks)					
Lectur	e	3 Hrs/week	MSE	ISE	ESE					
Tutoria	al	-	30	20	50	1	00			
Practic		l -								
Interac	ction	-	Credits: 3							
			Course Obi	ectives						
	Tamm			n un denstan din a Di	aaatana Man mu	de Hee	anda an d			
1	Vulne	abilities.	necessary knowledge h	n understanding Di	sasters, Man-ma		ards and			
2	To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)									
3	To devareas.	elop rudimentary	ability to respond to the	ir surroundings wi	th potential disas	ster resp	oonse in			
		Course Outco	mes (CO) with Bloom?	's Taxonomy Leve	el					
At the e	nd of th	e course, the stu	dents will be able to,			1				
	Explai	n disasters, man-n	hade hazards and vulner	abilities.	• 1•	Un	derstand			
02	Apply inform	ation, warnings, a	nd raising public aware	ness about disaster	risks.		Apply			
CO3	Assess	vulnerability and	various methods of risk	reduction measure	28.	Ev	aluate			
	•			•						
Modul	le		Modu Conte	ile nts			Hours			
	Μ	odule 1: Introdu	ction to Disaster Mana	gement						
Ι	De an ch	efinition, scope, an d man-made): – aracteristics, Histo	d objectives of disaster i Earthquake, Landslic prical perspectives on di	nanagement, Type le, Flood, Droug sasters and lessons	s of disasters (na ht, Fire, and learned.	tural their	6			
	M	odule 2: Disaster	Risk Assessment and	Management						
П	UI W ma La	derstanding disas ater, Food, Sanitat apping, and asses nd-use planning a	ter risk and vulnerability ion, Shelter, Health, Wa sment techniques, Risk nd zoning.	 V, Components of I ste Management, I analysis and risk 	Disaster Relief: Hazard identifica reduction strate	tion, gies,	7			
	M	odule 3: Disaster	Response and Recover	ŗy						
III	In op	cident command serations, medical	systems and emergency response and triage, Ten	operations center nporary sheltering	s, Search and re and logistics.	scue	6			
	Module 4: Mitigation and Resilience									
IV	St di	ructural and non- caster risk reduces	structural measures for ction, Climate change	disaster mitigation adaptation strat	n, Community-b tegies, Post-dis	ased aster	7			
	M	odule 5: Technol	ogy and Innovation in	Disaster Manager	nent					
	G	cospatial technolog	gies and remote sensing	applications.						
	In	formation manage	ment systems and decisi	on support tools.						
	Us	e of drones, mobi	le applications, and soci	al media in emerge	encies.					

	Module 6: Case Studies and Field Works	
VI	Land Slide, Earthquake, Drought, Storm, Flood, Forest fire, Space Based Inputs for	6
	Disaster Mitigation, Management and field works related to disaster management.	

	Textbooks
1	Singhal J.P. Disaster Management, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2	Bhattacharya Tushar, Disaster Science and Management, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
3	Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
	References
1	Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005.
2	Karlene Roberts and Donald D. H. Chávez "Disaster Risk Management: Systems Analysis and Tools"
	Useful Links
1	

	CO-PO Mapping													
	Programme Outcomes (PO)													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1						2								
CO2						2								
CO3						2								

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

		A.Y	. 2023-2	24 (Even Semester)									
		Walo	hand Coll	lege of Engineering, Sangli									
			(Government	Aided Autonomous Institute)									
	Course Information												
Progr	amma		B Tech (Civ	vil Engineering)									
Class	Somosto	r	D. Teell. (CIV	B Tech Sem VI									
Cours	e Code	1	6CV321										
Cours	e Name		Waste Mana	agement and Pollution Control									
Desire	d Requi	sites:	Water Suppl	ly and Treatment Technology Environmental Sc	ience								
Desire													
Teaching Scheme Examination Scheme (Marks)													
Lectu	cture 3 Hrs/week ISE MSE ESE Total												
Tutor	ial 20 30 50 100												
Practi	cal	-											
Intera	ction	-	Credits: 3										
			1										
			C	ourse Objectives									
1	1 To introduce concepts of wastewater engineering, solid waste processing, air and noise pollution control.												
2	To prov	ide pertinent kn	owledge for th	he design and operation of waste management fa	cilitie	s.							
3	To prep	pare students for	higher studies	s and research in the field of waste management a	and po	ollution							
4	To mak	e students aware	of recent adv	vances in waste management.									
4		~											
At the	and of th	Course	Outcomes (C	CO) with Bloom's Taxonomy Level									
At the	Explain	n collection and	characteristics	s of wastewater and solid waste: monitoring air									
COL	quality	and meteorolog	vical impact.	treatment/processing/control technologies for	Und	erstand							
	prevent	ion of pollution	associated wit	th wastewater, solid waste, air and noise.									
	Analyz	e and Solve the	problems or	n wastewater and solid waste associated with									
CO2	generat	ion, characteris	tics, collection	on and treatment/processing; air and noise	An	alyse/							
	pollutic	on.	,	1 0,	A	pply							
CO3	Design	sewerage and w	astewater trea	tment system.	C	reate							
Modu	ıle		l	Module Contents		Hours							
	Wa	stewater and Co	ollection		.								
т	Was	stewater: Sources	s, Flow rate an	d variations, Quantitative estimation, Characteris	tics	6							
1	stati	on	tion system.	Nomenciature, Mannole, inverted siphon, Fump	ning	U							
	Des	ign of sanitary a	nd storm sewe	er, Computer application SEWERCAD									
	Intr	oduction to Wa	stewater trea	atment									
	Was	stewater treatmen	nt: Philosophy	v, Unit operations and unit processes		_							
	Prin Bio	hary treatment: S	creening, Gri	t removal, Settling Fundamentals of aerobic and anaerobic treatm	ont	5							
		sification	y treatment.	rundamentals of aerobic and anaerobic freatm	ent,								
	Aer	obic Wastewate	r treatment										
	Aer	obic suspended	growth: Co	onventional Activated Sludge Process (ASP)	and								
III	mod	lifications, Proce	ess design and	l operating parameters (ASP), Operational proble	ems	9							
	(AS	P), Process desi	gn of oxidati	ion ditch and Waste stabilization pond, Biolog	ıcal								
		auon											

IV	Decentralized treatment and Disposal Decentralized treatment: Concept, Septic tank and soakage pit, Anaerobic baffled reactor (ABR), Anaerobic filter (AF), Constructed wetland (CW), Typical system Advances in wastewater treatment : Moving bed bioreactor (MBBR), Membrane bioreactor (MBR), Cyclic ASP Disposal of wastewater: Methods, Effluent standards Stream pollution: Self-purification (Stream rejuvenation), DO sag curve, Streeter Phelp's equation for point source, Stream classification	8
V	Solid waste Sludge: Characteristics, thickening, dewatering, digestion, disposal Solid Waste: Characteristics, Generation, Collection and transportation Engineered systems for solid waste processing: Mechanical, Thermal, Biological Sanitary land fill: Location, Components, Design	6
VI	Air and Noise pollution Air Pollution: Meteorological parameters, Ambient air quality monitoring, Air quality standards Air pollution control: Approaches and equipment for particulate and gaseous pollutants Noise pollution: Permissible limits of noise pollution, measurement of noise, Control of noise pollution.	6
1	Nathanson, J. A., "Basic Environmental Technology", PHI Learning private limited, 5 ^{ar} 2009.	Edition,
2	Modi, P. N., "Wastewater Engineering" Standard Book House, 6th Edition, 2018.	
3	Peavy H, S, Rowe D, R, and Tchobanoglous G, "Environmental Engineering", McGrav Book Company, Indian Edition, 2017.	v-Hill
	References	
1	Hammer M, J and Hammer M, J, "Water and Wastewater Technology", PHI learning limited, 7th Edition, 2018.	private
2	"Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Housing and Affairs Development, Govt., of India, New Delhi, 2013.	l Urban
3	"Manual on Municipal Solid Waste Management", CPHEEO, Ministry of Housing and Affairs Development, Govt., of India, New Delhi, 2016.	Urban
4	Hammer M, J and Hammer M, J, "Water and Wastewater Technology", PHI learning limited, 7th Edition, 2018.	private
	Useful Links	
1	https://nptel.ac.in/course.html	

CO-PO Mapping															
	Programme Outcomes (PO) PSO														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3			1	1		3						2	3	
CO2		3		1		3	3						3	3	
CO3			3	1			3						3	3	
The strength of mapping is to be written as 1.2.3: Where 1.Low 2.Medium 3.High															

ISE: Assignment on real-life problem pertaining to modules 1 to 3 and evaluated by test/quiz/presentation/oral; Field visit to water treatment plants and evaluated by test/quiz/presentation/oral. MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)											
		(0)	AY	2023-24							
			Course	Information							
Program	me		B.Tech. (Civi	l Engineering)							
Class. Se	mester		Third Year B	. Tech Sem V							
Course C	Code		6CV322								
Course N	lame		Quantity Surv	vev and Valuatio	on						
Desired I	Requisites:	•	Building Mat	erials and Const	ruction. Building	Planning a	nd D	esign			
	<u>u quisites</u>	•				, i iunning u		001811			
T	eaching So	cheme		Examinat	tion Scheme (Ma	rks)					
Lecture		3 Hrs/week	ISE	MSE	ESE	T	otal				
Tutorial		_	20	30	50	1	00				
Practical											
Interaction - Credits: 3											
			I								
			Cours	e Obiectives							
-	To prov	ide students wi	th necessarv kr	nowledge and sk	cills in specification	on writing.	estim	nating.			
	costing,	methods of ex	ecution of worl	<u> </u>	-F-2110411						
2	To make	e students awai	e of prevailing	professional pra	actices.						
3	To prov	ide a sound une	derstanding of o	concepts and pri	inciples of valuation	ion of imme	ovabl	e			
	properti	es.	0 4								
At the en	d of the co	ursa studante v	Course Course	Jutcomes (CO)							
CO1	Explain	elements of es	stimating and v	aluation of imm	ovable properties		Inder	stand			
	Construct specifications and quantity sheets for various items of										
CO2	traditional as well as unconventional civil works.										
CO3	Analyze rates and estimate costs of different civil works; and identify an Apply &										
	appropri	iate method for	execution of a	civil work.			Anal	yse			
CO4	Apprais	se the different	methods for va	aluation and val	ue the different	A	Analy	rse &			
	ımmova	ible properties.					Evalu	uate			
M. Jl.			M. J					TT			
Module	Flore on to	af Estimatin	NIOU and Costing	ule Contents				Hours			
	Mooning	S OI ESUMALINS	g and Costing	as Various ta	minologias in E	etimotina	and				
Ι	Costing (Concept of item	of work Units	s and modes of t	measurement Int	roduction to	b IS	4			
	1200.	concept of item	for work, end	, and models of f	incusurement, int	louuenon te					
	Specifica	tions and Qua	ntity Sheets								
	Necessity	and Types	of specificatio	ns, Essential r	requirements of	specificatio	ons,				
II	Contents	of detailed spe	cifications, Spe	ecifications for v	various items of w	vorks,		10			
	PWD me	thod, Measurer	ment and Abstr	act Sheets, Lon	g Wall and Short	Wall Meth	od,				
	Bar Bend	ing Schedule (BBS), Quantity	sheets for build	lings.						
	Rate Ana	alysis Domos Luc	n enterne Erect		. D	D - 4 - A 1					
III	Categorie	n, Purpose, Im	portance, Facto Rate analysis	ors affecting rat	of work: PCC	Rate Analy	sis,	6			
	Column.	Beam. Lintel. S	Slab). Brick Ma	isonry. Plasterin	g. Flooring.		ing,				
	Elements	s of Valuation	s	, , ,	8,8.						
	Purposes	of valuation. f	factors affecting	g valuations. Co	oncept of value.	price and c	ost.				
IV	various ty	pes of values a	and essential ch	aracteristics of	market value.		,	6			
	Freehold and leasehold properties. Different types of leases. Different types of rents.										
	Depreciat	tion, different n	nethods, sinkin	g fund, obsolesc	cence, land as a re	eal estate.	,				
	Computa	ational param	eters and Phys	sical Method of	valuation						
	Years Put	rchase, Single 1	ate and dual ra	te, reversion val	ue of land, net yie	eld, capitali	zed				
V	value, Va	lue, Valuation tables.									
	Valuation	n of properties	including land	and building, V	aluation of large	e plots of la	ind,				
	Belting m	nethod of valua	tion								

	Rental, Profits and Development Method of Valuation	
	Gross rent, outgoings, net rent, capitalized value and Deferred value of land, Rental	
VI	method of valuation	8
V I	Gross profit, outgoings, net profit, Profit based method of valuation	0
	Types of developments, Plotting scheme, hypothetical building scheme, Cost of	
	development, Development method of valuation	
	Text Books	
1	Dutta, B. N., "Estimating & Costing in Civil Engineering," UBS Publishers, 28th Revised	Edition,
-	2016.	
2	Chakraborti M., "Estimating, Costing, Specification & Valuation In Civil Engin	eering",
	Dhanapat Rai Sons, 20 th Edition, 2010.	2017
3	Patil B. S., "Civil Engineering Contracts & Estimates", Orient Longman Ltd., 4 th Edition	n, 2015.
4	Rangwala "Estimating, Costing and Valuation", Charotar Publishing House, 17 th Editio	on: 2020
	References	
1	Indian Standard 1200 (Part I to XXX) BIS, New Delhi	
2	Standard Specification Vol. I & II", PWD Maharashtra.	
3	State Schedule of Rate, PWD Maharashtra for the recent year.	
4	Khan Z. A., "Engineering Economy", New Delhi: Dorling Kindersley, 1 st Edition, 2012	
	Useful Links	
1	https://www.youtube.com/watch?v=ofkpm4lhJcg	
2	https://www.youtube.com/watch?v=	
4	IcmigyqQcEw&list=PLQyaYNzUhXMYbV752AWdvYN_NtCsnYOs8	
3	https://www.youtube.com/watch?v=ZYJhky9pqpA	
4	https://www.youtube.com/watch?v=3BAj3CABySo	

CO-PO Mapping															
		Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3												1	2	
CO2			2										1		
CO3		2											1		
CO4	3													2	
Whore 1	Iow	$2 \cdot M_{od}$	ium 2	Uigh											

- The assessment is based on MSE, ISE, and ESE. •
- MSE shall be typically on modules 1 to 3. •
- ISE shall be taken throughout the semester in the form of a teacher's assessment. Mode of • assessment can be field visits, assignments, etc., and is expected to map at least one higherorder PO.
- ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
- For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% • marks in ESE are needed. (ESE shall be a separate head of passing).

Walchand College of Engineering, Sangli										
			AY 202	23-24						
			Course Inf	ormation						
Progra	amme		B.Tech. (Civil Engi	neering)						
Class,	Semes	ter	Third Year B. Tech.	, Sem VI						
Cours	e Code		6CV323	,						
Cours	e Nam	e	Foundation Enginee	ring						
Desire	d Reg	uisites:	Soil Mechanics, Soi	1 Mechanics Laborat	tory					
	-		· · ·							
	Teachi	ing Scheme		Examination Sche	ne (Marks)					
Lectur	re	3 Hrs/week	ISE	MSE	ESE	To	otal			
Tutori	ial		20	30	50	1	00			
Practi	cal				1					
Interaction - Credits: 3										
					-					
			Course Ol	biectives						
This co	ourse a	ims at developing s	tudent's ability to app	bly principles of soil	mechanics to an	alvsis				
of geot	technic	al structures. Stude	nts are expected to ge	t introduced with the	e profession of f	oundatio	n and			
retaini	ng wall	designs								
			Course Outc	omes (CO)						
At the	end of	the course, students	s will be able to,	1 1		TT 1	. 1			
CO1	Desci	Describe various subsurface exploration techniques and select a suitable technique Understand								
to investigate for a given geotechnical structure.										
	Analy	vse and Design shal	low and deep foundat	ions from the geotec	hnical aspect	Analys				
CO3 CO3 Evaluate 2 congristiante a decipito and accepito and and geotechnical aspect.										
	1					Livuluu				
Modu	le		Module	Contents		Livuluu	Hours			
Modu	le Ir	troduction :Role c	Module of civil engineer in the	Contents e selection, design an	d construction of	of	Hours			
Modu	lle Ir fo	troduction :Role of undation of civil e	Module of civil engineer in the ngineering structures.	Contents e selection, design an , brief review of soi	d construction of 1 mechanics pri	of	Hours			
Modu	le Ir fo us	troduction :Role of undation of civil e and in foundation er	Module of civil engineer in the ngineering structures, ngineering.	Contents e selection, design an , brief review of soi	d construction of 1 mechanics pri	of nciples	Hours 6			
Modu	le Ir fo us St	troduction :Role of undation of civil e ed in foundation er ib-surface investig	Module of civil engineer in the ngineering structures, ngineering. gations :Drilling bore penetration tests	Contents selection, design an brief review of soi holes, sampling, p	d construction of 1 mechanics pri late load test, st	of nciples	Hours 6			
Modu	le Ir fo us St pe	troduction :Role of undation of civil e ed in foundation er ib-surface investig enetration and cone arth Pressure on 1	Module of civil engineer in the ngineering structures, ngineering. gations :Drilling bore penetration tests Retaining structures	Contents selection, design an brief review of soi holes, sampling, p	d construction of 1 mechanics pri late load test, st 10mb's Earth P	of nciples andard	Hours 6			
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2	Ranjan G. and Rao A.S.R. "Basic and Applied Soil Mechanics", New Age International Publishers, 3rd Edition, 2016
3	Murthy, V. N. S., "Geotechnical Engineering: Principles and practices of Soil Mechanics and Foundation Engineering ", Marcel Dekker Inc., New York 2003
	References
1	IS 1888 : 1982," Method of load test on soils (Second Revision)", IS 1892 : 1979" Code of practice for subsurface investigation for foundations (First Revision)"
2	IS 1080 : 1985," Code of practice for design and construction of shallow foundations in soils (Other Than Raft, Ring And Shell) (Second Revision)", IS 2911," Design and construction of pile foundations"
3	Couduto, Donald P. "Geotechnical Engineering – Principles and Practices", Prentice-Hall.,2nd Edition, 2017,
	Useful Links
1	https://nptel.ac.in/courses/105/101/105101083/
2	https://www.youtube.com/watch?v=H6_J8LuTa-M&list=PLA4019BB0B0CF6518

CO-PO Mapping															
	Programme Outcomes (PO)											PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1			3									2	2	
CO2		3											3	3	
CO3			3										3	3	

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. Mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

Walchand College of Engineering, Sangli										
			(Government Alded	1 Autonomous Institut 7073_74	<i>e)</i>					
			Course	Information						
Progr	amme		B Tech (Civil E	ngineering)						
Class.	Semester		Third Year B Te	ch Sem VI						
Cours	e Code		6CV324							
Cours	e Name		Design of Reinfo	rced Concrete Struc	rtures					
Desire	d Requisi	tes:	Solid Mechanics	Concrete Technolo	ogy Structural Ar	nalvsis				
	u nequisi		bolic incentines,		, structurur ru	larybib				
	Teaching	Scheme		Examination S	cheme (Marks)					
Lectu	re	3 Hrs/week	MSE	ISE	ESE		Fotal			
Tutor	ial		30	20	50		100			
			Credits: 3							
			Course	Objectives						
1	To introc	luce the fundam	ental concepts of l	imit state method f	or the design of 1	reinforce	d concrete			
	compone	nts.			1 120					
2	To impar	t knowledge for	strength determina	tion of different kin	ds of RC compor	nents usin	ig IS code.			
3	code.	te knowledge lo	or design of the vari	ious structural mem	bers in the building	ng system	li as per 15			
		Course	Outcomes (CO) w	rith Bloom's Taxor	omy Level					
At the	end of the	course, the stud	ents will be able to),						
CO1	Apply th	e concept of lim	it state for design of	of reinforced concre	te components.	A	pply			
CO2 Calculate the strength of reinforced concrete members. Evalu										
03	Design v	arious compone	CO3Design various components of reinforced concrete structures.Cree							
Madula Madula Contenta										
Modu	le		Modul	e Contents			Hours			
Modu	lle Intro	duction	Modul	e Contents			Hours			
Modu	lle Intro Desig	duction m Philosophies-	Modul Working Stress M	e Contents Aethod, Ultimate L	oad Method, Lin	nit State	Hours			
Modu	lle Intro Desig Meth	duction in Philosophies- od, Limit state of	Modul Working Stress M of collapse, Charac	e Contents Aethod, Ultimate L eteristic strength, Cl	oad Method, Lin haracteristic load	nit State , Partial	Hours 3			
Modu	le Intro Desig Meth safety Provi	duction on Philosophies- od, Limit state of factors, Stress-	Modul Working Stress M of collapse, Charac strain curves for co	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin	oad Method, Lim haracteristic load nit state of service	nit State , Partial eability,	Hours 3			
Modu	lle Intro Desig Meth safety Provi	duction m Philosophies- od, Limit state of factors, Stress- sions in IS code	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin	oad Method, Lim haracteristic load nit state of service	nit State , Partial eability,	Hours 3			
Modu	lle Intro Desig Meth safety Provi Desig a) Si	duction on Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforc ngly reinforced	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect	oad Method, Lim haracteristic load nit state of service ion, Under- reii	nit State , Partial eability,	Hours 3			
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Modu I II	lle Intro Desig Meth safety Provi Desig a) Si se Si	duction on Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforc ngly reinforced ction and ove ngly rectangula	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns.	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des	nit State , Partial eability, nforced sign of	Hours 3 8			
I I II	lle Intro Desig Meth safety Provi Desig a) Si se Si b) M	duction in Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be	nit State , Partial eability, nforced sign of ams.	Hours 3 8			
Modu I II	Ile Intro Desig Meth safety Provi Desig a) Si se Si b) M c) De	duction on Philosophies- od, Limit state of actors, Stress- sions in IS code gn of Reinforc ngly reinforced ction and ove ngly rectangula oment of resist	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be eams.	nit State , Partial eability, nforced sign of ams.	Hours 3 8			
I I II	lle Intro Desig Meth safety Provi Desig a) Si se Si b) M c) De Shear	duction n Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist esign of doubly r, Bond, and To	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be cams.	nit State , Partial eability, nforced sign of ams.	Hours 3 8			
Modu I II III	Ile Intro Desig Meth safety Provi Desig a) Si se Si b) M c) Desig a) Si se Si b) M c) Desig a) Si se Si b) M	duction an Philosophies- od, Limit state of a factors, Stress	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam	e Contents Method, Ultimate L tereistic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be n for shear accordin Bond stress. Stand	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be eams. g to IS code.	nit State , Partial eability, nforced sign of ams.	Hours 3 8 7			
Modu I II III	Ile Intro Desig Meth safety Provi Desig a) Si se Si b) M c) De Sheat a) She b) Bo c) To	duction n Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist esign of doubly r, Bond, and Te ear: Truss analog nd: Bond and de rsion: Design of	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according t	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be cams. g to IS code. ard hooks, Ancho o IS code.	nit State , Partial eability, nforced sign of ams.	Hours 3 8 7			
Modu I II III	lle Intro Desig Meth safety Provi Desig Alban a) Si se Si b) M c) Desig a) Si se Si b) M c) Desig a) Si se Si b) M c) Desig a) Si se C) Desig a) Si se Si b) M c) Desig Meth se Si b) M c) Desig Meth se Si b) M c) Desig Meth se se Si b) M c) Desig Meth safety Provi	duction an Philosophies- od, Limit state of a factors, Stress	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to Way Slab	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. einforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according t	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be eams. g to IS code. ard hooks, Ancho o IS code.	nit State , Partial eability, nforced sign of ams.	Hours 3 3 8 7 7			
Modu I II III	Ile Intro Desig Meth safety Provi Desig a) Si se Si b) M c) De Sheat a) She b) Bo c) To One a) De	duction m Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist sign of doubly r, Bond, and Te ear: Truss analog nd: Bond and de rsion: Design of Way and Two-V	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to Way Slab pan, continuous and	e Contents Method, Ultimate L tereistic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according t	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be ams. g to IS code. ard hooks, Ancho o IS code.	nit State , Partial eability, nforced sign of ams.	Hours 3 3 8 7 7 7 7			
Modu I II III IV	Ile Intro Desig Meth safety Provi Desig Alban Safety Provi Desig Alban Safety Provi Desig Alban Safety Provi Desig Alban Safety Provi Sheat Alban Sheat Sheat Alban Sheat Shea	duction an Philosophies- od, Limit state of a factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist esign of doubly r, Bond, and Te ear: Truss analog nd: Bond and de rsion: Design of Way and Two-V sign of single sp sign of two-way	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectan orsion gy, Design of beam evelopment length, beam subjected to Way Slab pan, continuous and y slab by IS code m	e Contents Method, Ultimate L tereristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. einforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according t d cantilever one way nethod.	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be eams. g to IS code. ard hooks, Ancho o IS code. / slab.	nit State , Partial eability, nforced sign of ams.	Hours 3 3 8 7 7 7 7			
Modu I II III IV	Ile Intro Desig Meth safety Provi Desig Alter Safety Provi Desig Alter Sheat Sheat Alter Sheat Alter Sheat S	duction n Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist sign of doubly r, Bond, and Te ear: Truss analog nd: Bond and de rsion: Design of Way and Two-V sign of single sp sign of two-way sign of dog legg mps	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to Way Slab pan, continuous and y slab by IS code m ged staircase	e Contents Method, Ultimate L tereistic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according t l cantilever one way tethod.	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be ams. g to IS code. ard hooks, Ancho o IS code. y slab.	nit State , Partial eability, nforced sign of ams.	Hours 3 3 8 7 7 7 7			
Modu I II III IV	IdeIntroDesigMethsafetyProviDesiga) SiseSib) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Dec) Deb) Dec) Dec) DeLoad	duction in Philosophies- od, Limit state of a factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist esign of doubly r, Bond, and To ear: Truss analog nd: Bond and de rsion: Design of Way and Two-V sign of single sp sign of two-way sign of dog legg mns carrying capa	Modul Working Stress M of collapse, Charac strain curves for co	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. einforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according t l cantilever one way ethod.	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be eams. g to IS code. ard hooks, Ancho o IS code. y slab.	nit State , Partial eability, nforced sign of ams. orages.	Hours 3 3 8 7 7 7 7			
Modu I II III IV V	Ile Intro Desig Meth safety Provi Desig Alternation Desig a) Si se Si b) M c) De Sheat a) She b) Bo c) To One a) De b) De c) De Colut Load Recta	duction m Philosophies- od, Limit state of factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist sign of doubly r, Bond, and Te ear: Truss analog nd: Bond and de rsion: Design of Way and Two-V sign of single sp sign of two-way sign of dog legg mns carrying capa ngular and circ	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to Way Slab oan, continuous and y slab by IS code m ged staircase	e Contents Method, Ultimate L tereistic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according to l cantilever one way nethod.	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be ams. g to IS code. ard hooks, Ancho o IS code. y slab.	hit State , Partial eability, nforced sign of ams. orages.	Hours 3 3 8 7 7 7 7 7 7			
Modu I II III IV V	IleIntroDesigMethsafetyProviDesiga) SiseSib) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Dec) Deb) Dec) Deb) Dec) DeColumLoadRectacomb	duction In Philosophies- od, Limit state of factors, Stress sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist esign of doubly r, Bond, and To ear: Truss analog nd: Bond and de rsion: Design of Way and Two-V sign of single sp sign of two-way sign of dog legg mns carrying capa ngular and circ ined axial load a	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to Way Slab pan, continuous and y slab by IS code m ged staircase	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. einforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according to l cantilever one way ethod. baded column, sh sign according to I ng, P-M interaction	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be eams. g to IS code. ard hooks, Ancho o IS code. y slab.	nit State , Partial eability, nforced sign of ams. orages. orages.	Hours 3 3 8 7 7 7 7 7 7			
Modu I II III IV V	IleIntroDesigMethsafetyProviDesigMethsafetyProviDesiga) SiseSib) Mc) Desigc) DesigSheata) Sheata) Sheatb) Boc) ToOneSheata) DesigDesigb) DesigColumLoadRectacombDesig	duction In Philosophies- od, Limit state of a factors, Stress- sions in IS code gn of Reinforce ngly reinforced ction and ove ngly rectangula oment of resist sign of doubly r, Bond, and Te ear: Truss analog nd: Bond and de rsion: Design of Way and Two-V sign of single sp sign of two-way sign of dog legg mns carrying capa ngular and circe ined axial load a p of Footing m of source (a st	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to Way Slab oan, continuous and y slab by IS code m ged staircase city of axially le pular columns, Des and uniaxial bendir	e Contents Method, Ultimate L tereistic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. reinforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according to l cantilever one way nethod. baded column, sh sign according to I ng, P-M interaction	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be ams. g to IS code. ard hooks, Ancho o IS code. y slab. ort and long co S, Column subje diagram.	hit State , Partial eability, nforced sign of ams. orages.	Hours 3 8 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7			
Modu I II III IV V VI	IleIntroDesigMethsafetyProviDesiga) SiseSib) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Mc) Deb) Dec) Deb) Dec) Deb) Dec) DeColumLoadRectacombDesigDesig	duction In Philosophies- od, Limit state of factors, Stress	Modul Working Stress M of collapse, Charac strain curves for co ed Concrete Bea d rectangular bea r-reinforced sect ar, T and L sectio ance for doubly r reinforced rectar orsion gy, Design of beam evelopment length, beam subjected to Way Slab pan, continuous and y slab by IS code m ged staircase city of axially le ular columns, Des and uniaxial bendir angular isolated fo	e Contents Method, Ultimate L eteristic strength, Cl ncrete and steel, Lin ms m, Balanced sect ion, Moment of ns. einforced rectang ngular, T and L be n for shear accordin Bond stress, Stand torsion according to a cantilever one way tethod. baded column, sh sign according to I ng, P-M interaction oting, Design of raf	oad Method, Lim haracteristic load nit state of service ion, Under- rein resistance, Des ular, T and L be eams. g to IS code. ard hooks, Ancho o IS code. y slab. ort and long co S, Column subje diagram. t foundation.	nit State , Partial eability, nforced sign of ams. orages. orages.	Hours 3 8 7 7 7 7 7 7 7 7 7 7 7 7			

1	Punmia, B. C., Jain A. K., Limit state design of reinforced concrete, Laxmi Publication, 4th
1	Edition, 2016.
2	Shah, V. and Karve, S., Limit state theory and design of reinforced concrete, Structures
	Publications, 8 th Edition, 2017.
2	Varghese, P. C., Limit state design of reinforced concrete structures, Prentice Hall, 4 th Edition,
5	2010.
	References
1	IS 456:2000 (Reaffirmed in 2021) – Code of practice for plain and reinforced concrete, BIS and
1	SP 34-1987 – Handbook on concrete reinforcement and detailing.
2	Pillai, S. V. and Menon. D, "Reinforced concrete design", Tata McGraw Hill Book Co., 5th
2	Edition, 2006.
3	Ramamruthm, S., Design of reinforced concrete structures (confirming to IS 456), Dhanpat Rai
	Publishing, 18 th Edition, 2011.
	Useful Links
1	https://onlinecourses.nptel.ac.in/noc23_ce79/preview
2	

CO-PO Mapping														
	Programme Outcomes (PO) PSO													
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												1	1
CO2		3											2	2
CO3			3										3	3
1: Low, 2: Medium, 3: High														

The assessment is based on MSE, ISE, and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of a teacher's assessment. Mode of assessment can be questions on the basis of field visits, quiz, assignments, etc., and is expected to map at least one higher-order PO.

ESE shall be on all modules with around 30 - 40% weightage on modules 1 to 3 and 60 -70 % weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
			AY 2023-2	24					
			Course Inform	nation					
Progra	amme		B. Tech. (Civil Enginee	ering)					
Class,	Semester		Third Year B. Tech., Se	emester VI					
Cours	e Code		6CV371						
Cours	e Name		Sewerage and sewage t	reatment laborator	ry				
Desire	d Requisit	tes:	Engineering Chemistry	Laboratory, Wate	er Quality Analys	sis Laboratory			
			and Sewage Treatment	Technology					
	Teaching	Scheme	Ex	amination Schem	ne (Marks)				
Le	cture	-	LA1	LA2	Lab ESE	Total			
Tu	Tutorial - 30 30 40 100								
Pra	actical	2 h/week							
Inte	raction	-	Credits: 1						
			Course Objec	ctives					
1	To provid	le the students h	ands-on practice for sew	age characterizati	on.	1			
2	10 develo	op the skills req	uired for applying know	ledge to design so	ewage collection	and treatment			
	system.		Course Outcom	es (CO)					
At the	end of the	course, students	s will be able to,						
CO1	Apply the the qualit	e analysis techn y of mixed lique	iques to determine organ	ic content of sewa	age and assess	Apply			
CO2	Analyze stream.	and interpret th	ne results of settleability	and effect of sewa	ige disposal on	Apply & Analyse			
CO3	Design se	ewerage and sev	vage treatment system fo	r real-life conditio	on.	Create			
			List of Experiments /	Lab Activities					
List of	Experime	ents:							
15	. Characte	eristics of sewa	ige						
	i. E	Bio-chemical o	xygen demand (BOD)						
	ii. C	Chemical oxyg	en demand						
	ііі. Т	Total kjeldahl r	nitrogen						
16	. Estimati	on of BOD rat	e constant						
17	. Determin	nation of mixe	d liquor suspended soli	ids, mixed liquo	r volatile suspe	nded solids			
18	. Determin	nation of sludg	ge volume index and slu	udge density ind	ex				
19	. Sludge c	characterization	1						
	i. N	Moisture conte	nt						
ii. Total, fixed and volatile solids									
20	. Effect of	f sewage dispo	sal on stream						
21	. Design o	of sewerage sys	stem for a housing colo	ony/Part of city					
22	. Decentra	alized treatmen	t system for a househo	ld/Apartment/ho	ousing colony				

	Text Books				
1	Metcalf and Eddy, "Wastewater Engineering Treatment and Reuse", Tata McGraw Hill Publication, 5 th Edition, 2014.				
2 Sawyer. C. N. And McCarty. P. L., "Chemistry for Environmental Engineers", Tata McGraw- Hill Publishing Company Limited, 5 th Edition, 2003.					
	References				
1	IS 3025 (Relevant parts), Bureau of Indian Standards.				
2	Standard Methods for the Examination of Water and Wastewater, APHA, 23 rd Revised Edition,				
-	2017.				
_	2017.				
_	2017. Useful Links				

	CO-PO Mapping													
		Programme Outcomes (PO)							PS	0				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1			2			1	1		1			2	2
CO2				2			1	1		1				
CO3			3	2	2	1	1	1		1			2	2

	Assessment									
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.										
Assessment Based on Conducted by Typical Schedule (for 26-week Ser										
τ. Α. 1	Lab activities,	Lab Course	During Week 1 to Week 6	20						
	attendance, journal	Faculty	Marks Submission at the end of Week 6	50						
1.4.2	Lab activities,	Lab Course	During Week 7 to Week 12	20						
	attendance, journal	Faculty	Marks Submission at the end of Week 12	50						
Lab ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40						
	attendance, journal	Faculty	Marks Submission at the end of Week 18	40						

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

			Walchand Colleg	e of Engineering	a Sanali						
			(Government Aide	ed Autonomous Ii	nstitute)						
			ΑΥ	Y 2023-24	,						
			Course	e Information							
Program	mme		B. Tech. (Civil Engineering)								
Class, S	Semes	ster	Third Year B. Te	Third Year B. Tech. Sem. VI							
Course Code 6CV341											
Course	Nam	e	Mini-Project-2 E	Estimating and Co	osting in Civil Engineering	5					
Desired	l Req	uisites:	Quantity Survey	Quantity Survey and Valuation							
,	Teach	ning Scheme		Examination Scheme (Marks)							
Lecture	e	-	LA1	LA2	ESE	Total					
Tutoria	al	-	30	30	40	100					
Practic	al	2 Hrs./week									
Interac	tion	-		(Credits: 1						
			1								
			Cours	se Objectives							
1	То	develop the skills red	quired for formula	ting specification	ns and carrying out rate and	alysis.					
2	2 To provide students hands-on practice for estimating cost of civil works.										
3	То	impart training to us	e computer for est	imating and cost	ing.						
	_	Course	Outcomes (CO)	with Bloom's Ta	axonomy Level						
At the en	nd of t	he course, students wil	l be able to,		-						
CO1	Fo	rmulate specificatior	ns and determine q	uantities of diffe	rent items of work.	Ana Cr	llyze, eate				
CO2	Est	timate costs of the	different civil v	works by <i>Demo</i>	nstrating application of	Aŗ	oply				
	con	nputer for estimating	and costing.			Ana	alyze				
CO3	Va	lue the different imm	novable properties			Eva	luate				
						-					
Module	e		Mod	ule Contents			Hours				
The min	ni-pro	ject to be completed	for the course shall	ll comprise of two	o parts as specified below						
Part 1.	Estin	nate of Residential B	Building				10				
	Prepa	ration of a report inco	orporating								
i.	Gener	al description of the	work, Drawings, o	data and assumption	ions						
ii.	Detail	led Estimate of Two-	story residential b	uilding							
iii.	Detail	led Specifications: M	linimum 3 traditio	onal items of wor	k and Minimum 1 nontrad	litional					
items of work pertaining to the estimate in ii											
iv. Preparation of Bar Bending Schedule (BBS) for a part of the above work											
V.	Refer	ences					1.0				
Part 2.	Rate	analysis of Resident	tial Building				10				
	Prepa	ration of a report incomplusion for the items	orporating	Davet 1							
1. ;;	Nate a	manysis for the above	e work	alt 1.							
11. ;;:		a all conditions of	wulk	abova work and	I datailed drefting of an	thread					
111.	cond:	g an conditions of $contract$ for t	he above work	above work and	i uctaneu uranning or any	unee					
117	Dofor	and the contract for t									
IV.	Neier										

	Preparation of a report incorporating							
i.	Valuation of residential building by any two suitable methods of valuation							
ii.	References							
	Text Books							
1	Dutta, B. N., "Estimating & Costing in Civil Engineering," UBS Publishers, 28th Revised Edition,							
1	2016.							
2	Chakraborti M., "Estimating, Costing, Specification & Valuation In Civil Engineering", Dhanapat							
² Rai Sons, 20 th Edition, 2010.								
3 Patil B. S., "Civil Engineering Contracts & Estimates", Orient Longman Ltd., 4 th Edition, 2015.								
4	4 Rangwala "Estimating, Costing and Valuation ", Charotar Publishing House, 17 th Edition: 2020							
	References							
1	I.S. code 1200 (Part I to XXX) B.I.S., Delhi							
2	"Standard Specification Vol. I & II", PWD Maharashtra.							
3	"State Schedule of Rate", PWD Maharashtra for the recent year.							
4	Khan Z. A., "Engineering Economy", New Delhi: Dorling Kindersley, 1st Edition, 2012							
	Useful Links							
1	https://www.youtube.com/watch?v=ofkpm4lhJcg							
2	https://www.youtube.com/watch?v=IcmigyqQcEw&list=PLQyaYNzUhXMYbV752AWdvYN_NtC							
2	snYOs8							
3	https://www.youtube.com/watch?v=ZYJhky9pqpA							
4	https://www.youtube.com/watch?v=3BAj3CABySo							

6

Part 3. Valuation of Existing Residential Building

						CO-P	O Map	ping						
	Programme Outcomes (PO)								PSO					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		3	3			1		1	2	2		1	2	2
CO2			3		2	1		1	2	2	2	1	1	2
CO3					2	1		1	2	2		1	2	

Assessment								
There are three components of lab assessment, LA1, LA2 and Lab ESE.								
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.								
Assessment	Based on	Conducted by	Typical Schedule (for 13-week Sem)	Marks				
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	20				
	attendance, journal	Faculty	Marks Submission at the end of Week 6	50				
L A C	Lab activities,	Lab Course	During Week 7 to Week 12	20				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
Lab ESE	Lab activities,	Lab Course	During Week 13 to Week 18	40				
	attendance, journal	Faculty	Marks Submission at the end of Week 13	40				
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 13-								
week semester. The a	actual schedule shall b	e as per academic	calendar.					

Walchand College of Engineering, Sangli											
	AY 2023-24										
		Course I	oformation								
Programme		B Tech (Civil En	B. Tech. (Civil Engineering)								
Class Semester	•	Third Year B. Tech., Sem VI									
Course Code		6CV342	6CV3/2								
Course Name		Mini-Project-3: St	eel Structures Design	n and Drawings							
Desired Requis	ites:	Engineering Mech	anics Solid mechani	ics Design of steel	structures						
	Engineering weenames, solid meenames, Design of steel struc										
Teaching	Scheme		Examination Scheme (Marks)								
Lecture	-	LA1	LA2	Lab ESE	Total						
Tutorial	_	30	30	40	100						
Practical	2 hrs/week				100						
Interaction	-	Credits: 1									
		or curtor i									
		Course (Objectives								
1 To impa	rt the knowledge	of analysis and des	ign of various steel r	nembers and their c	onnections						
2 To demo	onstrate the design	in of practical steel	structures such as ind	lustrial sheds, steel	buildings etc.						
3 To provi	de the knowledg	ge of detailing of ste	el structural drawing	s.	U						
	Course	Outcomes (CO) wi	th Bloom's Taxonol	ny Level							
At the end of the	e course, the stuc	lents will be able to,	,								
CO1Estimate various types of loads such as Dl, LL, WL, etc. acting on steel structures.Apply											
CO2 Calculat	CO2 Calculate design forces in members of steel structures for various combinations of loads using modern tools.										
CO3 Design various types of practical steel structures and develop detailed structural											
drawing	S.										
		List of Experime	nts / Lab Activities								
List of Experim	ents:				6						
Part 1. Indust	trial shed										
a. Roof tr	uss, purlin, and	connections.									
b. Gantry	girder.										
c. Colum	ns and column b	ases									
Part 2. Buildin	g Frames										
a. Second	dary and main l	beams.			0						
b. Colum	in and column l	bases.			9						
c. Beam-	to- beam conn	ection.									
d. Colum	in- beam conne	ction.			0						
a Influen	ce lines				9						
b. Cross t	eam.										
c. Main tr	uss.										
d. Raker.											
e. Joint details.											
f. Suppor	f. Support details.										
Welded Plate	Girder										
a. Stiffene	rs										
b. Curtailn	nent of Flange pl	ates									
Part 4. Analysis results	of the first prob	lem of industrial sh	ed shall be compared	l with the results by	, 4						
any standard software package.											

	Text Books					
1	Duggal S. K., "Limit state design of steel structures", Tata McGraw-Hill Publications, New					
1	Delhi, 2nd Edition, 2014.					
2	Shiyekar, M. R., "Limit state design in structural steel", PHI learning Pvt. Ltd Publications 2nd					
	Edition 2013.					
3	Subramanian N., "Design of steel structures", Oxford University Press, 2010.					
References						
1	Dayaratnam, P., "Design of steel structures", S. Chand Publication, New Delhi, 2008.					
2	Gaylord, Edwin and Gaylord, Charles, "Design of steel structures", Tata McGraw Hill					
Z	Publishing Company Ltd., New Delhi, 3rd Edition, 2010.					
	IS 800-2007 "Code of Practice for General Construction in steel", and IS 875-1987 part 1 to 5;					
3	"Code of Practice for Design Loads (other than earthquake) for building structures",					
	Bureau of Indian Standards, New Delhi.					
4	SP: 6(1) - 1998, Hand Book for Structural Steel Sections.					
	Useful Links					
1						

						CO-PO) Map	ping						
		Programme Outcomes (PO) PSO												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
C01									1	1		1		2
CO2		3			2				1	1		1		2
CO3		3	3						1	1		1	3	3
Where 1.I	Where 1: Low 2: Medium 3: High													

Where, 1: Low, 2: Medium, 3: High

Assessment								
There are three components of lab assessment, LA1, LA2, and Lab ESE								
IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on all								
experiments/l	ab activities.							
Assessment	Based on	Conducted by	Typical Schedule	Marks				
LA1	Lab activities,	Lab Course	During Week 1 to Week 6	20				
	attendance, journal	Faculty	Marks Submission at the end of Week 6	50				
1.4.2	Lab activities,	Lab Course	During Week 7 to Week 12	20				
LAZ	attendance, journal	Faculty	Marks Submission at the end of Week 12	50				
Lob ESE	Lab Performance	Lab Course	During Week 13 to Week 18	40				
Lab ESE	and documentation faculty Marks Submission at the end of Week 18							
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering								
a 26-week ser	mester. The actual sch	edule shall be as p	per academic calendar. Lab activities/Lab per	formance				

shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

	Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)						
	AY 2023-24					
Course Information						
Programme	B. Tech. (Civil Engineering)					
Class, Semester	Third Year B. Tech. Sem. VI					
Course Code	6CV331					
Course Name	Professional Elective 2: Industrial and Biomedical Waste Management					
Desired Requisites:						

Teaching	Scheme	Examination Scheme (Marks)							
Lecture	2 Hrs./week	MSE	ISE	ESE	Total				
Tutorial	-	30	20	50	100				
		Credits: 2							

	Course Objectives							
1	To provide conceptual and field knowledge for the analysis and evaluation of processes of indus biomedical waste management.	strial and						
2	To enhance the technical competency to conduct research and address the problems of industr related to industrial and biomedical waste management.	y/society						
	Course Outcomes (CO) with Bloom's Taxonomy Level							
At the	end of the course, the students will be able to,							
CO1	Explain and apply concepts of industrial and biomedical waste management Under Ag	rstand ply						
CO2	Analyze the effluent treatment systems used in industrial and biomedical effluent Analy Analy							
CO3	Evaluate the effluent treatment waste processing alternatives used for industrial and Evaluate biomedical waste management							
Modu	le Module Contents	Hours						
Ι	Waste Management I Classification of wastes, Characterization of wastes, Principle of waste management, Segregation at source, Collection, Transfer and transport, Processing and disposal							
II	Segregation at source, Collection, Transfer and transport, Processing and disposal Waste Minimization Techniques Concept of waste minimization and Techniques of volume and strength reduction. Equalization: Process, Flow and quality, Location, Volume requirement and Design considerations. Reuse and recycling concepts, Process description, Objectives and Methods of Neutralization and Propertioning.							
III	Neutralization and Proportioning. Agro Based Industries Manufacturing processes, Water usage, Sources, Quantities and characteristics of effluents (process stream and combined), Pollution effects, Waste Reduction/ Reclamation/Byproduct recovery, Utilization, Alternative methods of treatment and disposal for Agro-based industries: Sugar, Distillery, Dairy and Textile Industry							
IV	Chemical Industries Manufacturing processes, Water usage, Sources, Quantities and characteristics of effluents (process stream and combined), Pollution effects, Waste Reduction/Reclamation/Byproduct recovery, Utilization, Alternative methods of treatment and disposal for Chemical industries:	5						

Petroleum and refineries, Fertilizer and Tannery Industry

	Handling of Biomedical Waste and Impact on Environment	
	Handling of waste from dental clinics, Laboratories, Blood banks, Patient care areas,	
VI	radioactive waste, Expired pharmaceuticals.	5
, , ,	Impact on environment of chemical in biomedical waste (viz. mercury, lead, cadmium,	5
	chromium), Disinfectants, Gaseous pollutants	
	Impact of biomedical waste on food and livestock, Water and aquifer, Marine ecosystem.	
	Textbooks	
1	Peavy H. S., Rowe D. R. and Tchobanoglous G., "Environmental Engineering", McGraw-Hi	ill Book
1	Company, 2017.	
2	Metcalf and Eddy "Wastewater Engineering Treatment and Reuse", Tata McGraw Hill Publ 2017	lication,
	Revnolds T. D. and Richards P. A., "Unit Operations and Processes in Environmental Engine	eering".
3	2 nd Edition, PWS Publishing Company, 1995.	,
4	Radhakrishan R., "Biomedical Waste Management", Sumit Enterprises, 2007	
	References	
1	Droste, Ronald L "Theory and Practice of Water and Wastewater Treatment", Wiley student 2009.	Edition,
2	Crites Ron and Tchobanoglous George, "Small and Decentralized Wastewater Management Sy	/stems",
Z	McGraw-Hill Book Company, 1998.	
3	Quasim, S. R., "Wastewater treatment plants planning, design and operation", CRC Press, 2 nd 2010.	Edition,
4	"Guidelines for Management of Healthcare Waste as per Biomedical Waste Management	t Rules,
	2016", CPCB and MoEF, 2016.	
	Useful Links	
1	https://www.youtube.com/watch?v=fHRxhuMQQnE&list=PLbRMhDVUMngdeOSgQOe399 xkxNCp	∂aBKqd
2	https://pubs.rsc.org/en/content/chapterhtml/2021/bk9781839162794-00001?isbn=978-1-8391	6-279-

CO-PO Mapping														
		Programme Outcomes (PO)										PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1						3							
CO2	1						3							
CO3	1						3							

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3. ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli										
			AY	2023-24	<i>(uic)</i>					
			Course	e Information						
Progr	amme		B. Tech. (Civil E	ngineering)						
Class,	Semester	•	Third Year B. Tech., Sem VI							
Cours	e Code		6CV332	-						
Cours	e Name		Professional Elec	tive 2: Advances i	n Urban Wa	ter Distribu	tion Sy	stem		
Desire	d Requis	ites:	Water Treatment	Technology, Hydr	aulics					
			1							
]	Feaching	Scheme		Examination	Scheme (Ma	arks)				
Lectu	re	2 Hrs/week	ISE	MSE	ESE		Total			
Tutor	ial	-	20	30	50		100			
Practi	cal	-		·,						
Intera	ction	-	Credits: 2							
		-								
			Cours	se Objectives						
1	To intro	duce concepts	on advances in wa	ater distribution ne	twork desig	n and 24 \times	7 (cont	tinuous)		
	To provide pertinent knowledge for the design and operation of Water Distribution System,									
2	pricing of water.									
3 To highlight the scope of automation in water supply system.										
A (1) -		Course	e Outcomes (CO)	with Bloom's Tax	onomy Lev	el				
At the end of the concepts on 24×7 water supply water quality calibration water										
CO1 Conserve the concepts of 2 where outputs, where quality, canceled and the Understa								rstand		
CO2 Solve the problems on water quality in WDS, water losses, and pricing of water. Apply								ply		
CO3 Design Water Distribution System.								eate		
			-			1				
Modu	le		Mod	lule Contents				Hours		
	Adv	ances in Wate	r Distribution Net	work Design						
	Adva	ances in Water	Distribution Netw	vork Design, 24×7	(Continuou	(s) Water S	upply			
I		version of Inter	mittent System into	×7 water Supply 0.24×7 Systems I	Systems, District Mete	Framewor red Area (I	$(\mathbf{M} \mathbf{A})$	5		
	for Z	coning in Water	Distribution Netw	orks, Software for	Water Distr	ibution Net	works			
	Desi	gn and Analysi	s	,						
	Wat	er Quality in V	VDS	~						
п	Wate	er quality in dis	stribution system, (Causes of variation	n, transport	of constitue	ents in	4		
	Wate	$\frac{1}{2}$ chemical read	×7 Water Supply S	vstems	source trac	e and wate	i age,			
	Cali	bration of WD	S	ystems						
	WDS	S testing: Funda	amentals, Pressure	and flow measurer	ment.					
III	Calil	oration: Overvi	ew of hydraulic an	d water quality cal	ibration app	roaches.		4		
	Appl	ication of com	puter models: WI	DS analysis and de	sign, Identif	ying and so	olving			
	Wat	er losses in W	DS	i wDS, Kenabilita	lon, Canora					
	Reas	ons and source	s, Categories, Fact	ors influencing, W	ater audit fo	r loss estim	ation,			
IV	Wate	er balance, Wa	ter loss performan	ce indicators, Wat	er loss detec	ction, Syste	ms of	5		
	wate	r leak detectio	n (conventional a	nd advanced), Le	ak managen	nent approa	aches,			
	Wate	er loss control r	neasures,	mart Watar Supp	- Systoma					
	Intro	duction to Sn	hart Water Supply	v Systems Feature	es of Smar	rt Water S	upply			
x 7	Syste	ems, Objective	of Smart Water	Supply, Elements	s of Water	Supply Sys	stems,			
V	Tech	nology Šolutio	ns for Smart Water	Systems, Smart M	letering and	Sensing De	vices,	4		
	IoT	and Automatic	n in Water Suppl	y, Supervisory C	ontrol and	Data Acqui	isition			
1	I (SCA	ADA) Systems,	Examples of Aut	omation and Smart	water Supp	ny Systems	5			

VI	Water Economics and Pricing Valuing Water (Economic Value of Water), Economics of Water Supply Projects, Components of Full Cost and Value of Water, Price Based Demand and Willingness to Pay, Price Elasticity of Water Demand, Procedures for Economic Analysis of Water Supply Projects, Capital and Operational Cost of Water Supply Systems, Pricing Water, Water Pricing Models	4				
Tutori	al: N/A					
	Text Books					
1	Walski, Chase and Savic, "Water Distribution Modeling", Haestad Press, First edition,	2007.				
	References					
1	"Manual on Water Supply and Treatment", CPHEEO, Ministry of Housing and Urban Development, Govt., of India, New Delhi, 1999.	Affairs				
2	Hammer M, J and Hammer M, J, "Water and Wastewater Technology", PHI learning limited, 7th Edition, 2018.	private				
Useful Links						
1	https://onlinecourses.nptel.ac.in/noc22 ce07					

CO-PO Mapping															
		Programme Outcomes (PO) PSC										PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3												2	3	
CO2		3			2								3	3	
CO3			3		2								3	3	
Where, 1:Lo	Where, 1:Low, 2:Medium, 3:High														

 Assessment

 ISE: Assignment on real-life problem pertaining to modules 1 to 3 and evaluated by test/quiz/presentation/oral; Field visit to water treatment plants and evaluated by test/quiz/presentation/oral.

 MSE: Assessment is based on 50% of course content (Normally first three modules)

 ESE: A sum of the lage 100%

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
		(AY	2023-24						
			Course 1	Information						
Progr	amme		B.Tech. (Civil I	Engineering)						
Class.	Semeste	r	Third Year B. T	Tech., Sem VI						
Cours	se Code		6CV333	,						
Cours	se Name		Professional Ele	ective 2: Watershe	ed Management					
Desire	ed Requi	sites:	Open Chanel H	ydraulics and wat	er resources Eng	ineering				
				-						
]	Feaching	Scheme		Examination S	cheme (Marks)					
Lectu	re	2 Hrs/week	MSE	Tota	ıl					
Tutor	ial		30	20	50	100				
				Cred	lits: 2					
		1	1							
			Course	Objectives						
1	To prov	ide the technica	al know-how of a	nalyzing the degra	dation of soil and	d water r	esources			
	and imp	lementation of	the measures for	soil and water co	nservation.					
2 To provide a comprehensive treatise on the engineering practices of watershed manager										
	for reali	zing the higher	benefits of water	rshed managemen	it.					
		Course	utaamas (CO) w	rith Plaam's Tax	anamy Laval					
At the	end of th	e course the st	tudents will be ab	ole to						
CO1 Explain planning, management and water conservation pertaining to z_{2}										
	watersh	ed.	C		1 0	Unde	erstand			
CO2 <i>Apply</i> water conservation practice to the development of watershed. Apply										
CO3	Analyse	and develop	o a watershed	for appropriate	soil and water	Eva	aluate			
	conserv	ation								
Mod	10		Modu	la Contonts			Hours			
Iviout	Intr	aduction of W	atershed: Definit	ion concept Obi	actives Land ca	pobility	110015			
I		sification. prio	rity watersheds, 1	and resource region	ons in India	paointy	4			
	Wat	ershed Plannin	g: Planning princ	ciples, collection of	of data ,present la	and				
	use,	Preparation of	watershed devel	opment plan ,Esti	mation of costs a	ind				
II	bene	efits, Financial	plan, selection of	of implementation	agency, Monito	ring	5			
	and	evaluation sys	tem	•		U				
	Wat	ershed Manag	gement: Particip	atory watershed	Management,	un off	4			
	mea	agement, Facto	ors affecting runc	on, remporary &	Permanent guily	control	4			
	Wat	er conservati	on practices in	irrigated land	s, Soil and n	noisture				
IV	cons	servation pract	ices in dry lands	8	,		4			
		I	j							
	Wat	er Conservati	on Practices: In	-situ & Ex-situ	moisture conse	rvation				
v	prin	ciple and pra	ctices, Afforesta	tion principle, N	Aicro catchmen	water	4			
	harv	vesting								
	Gro	und water rec	harge nercolatio	n ponds Water	harvesting Farn	Pond				
		nlemental irrig	pation Evanorati	on suppression	Seenage reducti	on and				
VI	wate	ershed develop	ment programme		seepage reducti	unu unu	5			

	Textbooks
1	Suresh, R., "Soil and Water Conservation Engineering, Standard Publishers &
1	Distributors,", New Delhi, 2005.
2	Ghanashyam Das, "Hydrology and Soil Conservation Engineering", Prentice Hall of
۷	India Private Limited, New Delhi, 2000.
	References
1	Gurmel Singh et al, "Manual of soil and water conservation practices", Read Books,
1	2011. Oxford & IBH publishing Co. New Delhi.2004
2	Suresh, R. "Land and water management principles", Standard Publishers &
	Distributors, New Delhi, 2008.
2	Tripathi R.P. and H.P.Singh "Soil erosion and conservation," Willey Eastern Ltd., New
5	Delhi, 2002.
	Useful Links
1	
2	

CO-PO Mapping														
		Programme Outcomes (PO)											PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2												1	1
CO2		3											2	2
CO3			3										3	2
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High														
Each CO	of the o	course	must m	ap to a	t least c	one PO.								

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 2 and 60% weightage on modules 3 to 4.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

		Walc	hand College	of Engineeri	ing Sangli					
		v v u c	(Government Aid	ed Autonomous In	estitute)					
			AY	2022-23						
			Course	e Information						
Progr	amme		B.Tech. (Civil H	Engineering)						
Class,	Semester		Third Year B. T	ech., Sem VI						
Cours	e Code		6CV334							
Cours	e Name		Professional Ele	ective 2: Town and	d Country Planning					
Desire	d Requisi	tes:	Building Planning and Design							
				<u> </u>						
	Teaching	Scheme		Examination	n Scheme (Marks)					
Lectu	re	2 Hrs/week	ISE	MSE	ESE	Tot	al			
Tutor	ial	-	20	30	60	100)			
Practi	cal	_	I		I I					
Intera	ction	_	Credits: 2							
			Cours	e Objectives						
This c	ourse is d	esigned to be a	offered as elective	e to interested stu	idents who wish to	consider to	wn and			
countr	v planning	as their probab	ble career option.	It focuses on relev	ant practices in prer	baration of	RP. DP.			
TPS et	c. It also i	ncludes relevan	t legislations know	wledge required for	or a modern town pla	anner.	, ,			
			Course (Outcomes (CO)						
CO1Explain elements of regional plan(RP) and development plan(DP)Apply										
CO2 Comprehend different aspects a town planning scheme Understar										
CO3 Describe important provisions of different town planning legislations Appl										
Modu	le		Mod	lule Contents			Hours			
	Intro	duction		, • ,	1 1 41.01	• ,				
	- Obj	ective of town j	lanning, principles, stages in town development, brief history							
I	- gro multi	ple zone etc.)	and theories of d	evelopments (110	boll, sector zone, c	oncentric,	4			
	- Ins	titutional arran	vements in Maharashtra (CIDCO MMRDA MHADA SRA							
	TPVI	D etc.)	gements in train		, , , , , , , , , , , , , , , , , , , ,	, , , , ,				
	Regi	onal Plan (R.P))							
	- Nee	d of contents of	f Regional Plan							
	- Reg	ional Delimitat	ion							
II	- Sur	veys necessary	for Regional Plan				4			
	- Ana	lysis and Projec	ctions	4 6	D 1 D1 '					
	- Nec	essary Steps 10	r starting and end	ing the process of	Regional Planning					
	- Kela	lonment Plan ($(\mathbf{D} \mathbf{P})$	Jununigs						
	- Sur	vevs. types. dur	ation etc.							
	- Ana	1	ations							
		lysis and Project	cuons							
	- Den	nographic Projection	ections							
	- Den - Goa	nographic Projective nographic Projective	ections ections es, Public Particip	ation						
ш	- Den - Goa - Imp	lysis and Projection nographic Projective ils and objective lementation and	ections ections es, Public Particip d Financial Aspec	ation ts.			5			
III	- Den - Goa - Imp - Del	nographic Projection nographic Projective and objective lementation and ineation	ections ections es, Public Particip d Financial Aspec	ation ts.			5			
ш	- Den - Goa - Imp - Del - Rela	and Projection nographic Projective and objective lementation and ineation ation with R.P.	ections ections es, Public Particip d Financial Aspec	ation ts.			5			
ш	- Den - Goa - Imp - Del - Rela - Con	and Projection nographic Projective ils and objective ilementation and ineation ation with R.P. itent of DP and	etions ections es, Public Particip d Financial Aspec Planning norms	ation ts.			5			
III	- Den - Goa - Imp - Del - Rela - Con - Moo	lysis and Projection nographic Projective ils and objective lementation and ineation ation with R.P. itent of DP and difications, purc	ections ections es, Public Particip d Financial Aspec Planning norms chase notice	ation ts.			5			

IV	Town Planning Scheme - Concept of T.P.S - Legal Provision - Relation with D.P. - Original Plot, final Plot, Semi-final Plot - Incremental Contribution (Betterment charge) - Rational for charging Incremental Contribution - Function of Arbitrator - Advance Possession - Amenities, Partially beneficial - Cost of Scheme	5
V	Acts and Rules - Municipal Act - MR and TP Act 1966 - LA Act. 1894, and LARA 2013 - SEZ - DCR	4
VI	 Special Townships Special Township Policy Land requirement, procedures for locational clearance, salient feature Responsibilities of developer Hill station Policy few case studies 	4
	Text Books	
1	Hiraskar G. K., <i>"Fundamentals Of Town Planning</i> ", Dhanpat Rai Publication (p) Ltd., N Delhi, 17 th Edition, 2012	New
2	Rangawala S.C., "Town Planning", Charotar Publications, Pune ,27th edition, 2014	
3	Hiranmay Biswas, "Principles Of Town Planning And Architecture", VAYU Education India, 2012	ı of
	References	
1	MRTP Act 1966, Land Acquisition Act, UDPFI guidelines, ministry of urban affa employment, Govt. & India.	airs and
2	Michael Todaro, "Economic development in Third world", Orient Longman Publication	1
3	Koperdekar and Diwan, "Planning legislation "	
	Usoful Links	
1	https://nptel.ac.in/courses/124107158	

CO-PO Mapping															
		Programme Outcomes (PO)									PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	1		1										1		
CO2			2				2						2		
CO3			2			2							2		
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High															
Each CO of the course must map to at least one PO.															

- The assessment is based on MSE, ISE, and ESE.
- MSE shall be typically on modules 1 to 3.
- ISE shall be taken throughout the semester in the form of a teacher's assessment. Mode of assessment can be field visits, assignments, etc., and is expected to map at least one higher-order PO.
- ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6. For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

Walchand College of Engineering, Sangli									
			(Government Aided Auto	nomous Institute	?)				
			Course Infor	-24 mation					
Progr	ommo		B Tech (Civil Engine	mation (vring)					
Class	Somostor	•	D. Tech. (Civit Engliee Third Vear B. Tech. S.	em VI					
Cours	e Code		6CV335						
Cours	e Name		Professional Flective 2	· Design of Ma	sonry Structures	2			
Desire	d Requis	ites·	Building Materials and	Construction	Strength of Mat	, erials			
Desire	u Kequis	1105.	Dunding Waterials and	construction,	Strength of Mat				
,	Teaching	Scheme	Ex	amination Scl	heme (Marks)				
Lectur	re	2 Hrs/week	MSE	ISE	ESE	Tot	al		
Tutori	ial	-	30	20	50	10	0		
Practi	cal	-							
Intera	ction	-		Credit	ts: 2				
	1		Course Obje	ectives					
1	Introduc	the rational th	eoretical basis for predic	tion of structur	al masonry.				
2	Underst	and and apply th	e structural design of ax	ial and laterally	y loaded masonr	y walls.			
3	Educate theories	and carry out ap	plied research on structu	ral masonry bas	sed on modern ar	nd proven s	structural		
		Course	Outcomes (CO) with B	Bloom's Taxon	omy Level				
At the end of the course, the students will be able to,									
	Perceive the properties of various building units/mortar and within the available								
COI	alternati	ves make qua	itative judgment with	appropriate c	hoices for stru	ctural f	valuate		
	Analyze	design and estiv	nate the strength of mase	nry under verti	cal and lateral lo	ading 4	analyse		
CO2	conditio	ns.	nute the strength of muse	ing anaor vora			Create		
CO3	Apply t	he concepts of	reinforced and containe	d masonry and	l impart ductilit	y and	Apply		
	earthqua	tke resistance to	masonry buildings.						
Modu	le		Module Co	ontents			Hours		
	Intro	oduction on Ma	sonry Materials	1 1. 6	Na . • .• .				
	Histo	ory of Masonry,	Masonry units, materia	Is and types, C	haracteristics of	bricks in	_		
1	Foot	a, stolles, nould	nortice of mesoner units	Classification	and properties of	G DIOCKS,	5		
	Test	ing procedures a	s per IS codes Epergy c	onsiderations	and properties of	i wortais,			
	Reh	aviour of Maso	nry under Compression	1					
	Fact	ors influencing	masonry compressive	strength, Effec	ts of bed mate	rials, unit			
II	heig	ht, hollow block	units, type of bond, wall	types, direction	n of loading, wor	kmanship	5		
	facto	ors, workmansh	p and construction deta	uls, Deformati	on properties of	f masonry			
	unde	er compression,	compression failure theo	ries.					
	Inter	facial bond stre	ngth, tensile bond strer	ss 19th. flexural h	oond strength, s	trength of			
	mase	onry in shear, H	Failure modes, Masonry	under biaxial	stress, Shear m	odulus of	5		
	mase	onry.	-						
	Desi	gn Analysis of	unreinforced Masonry		• •	T , 1			
	Struc	ctural adequacy	of masonry walls, types	of walls, Desi	gn consideration	is, Lateral	5		
1 1 1	cons	considerations. Structural design as per codal provisions. Computations of permissible							
	stres	ses, Application	of reduction factors, As	sessment of eco	centricity.				
	Prac	tical Application	ons and Case studies						
	Code Joint	Codes of practice, Planning, detailing and construction techniques, Joints with slabs, Joints with roof structure, Reinforcement, Expansion joints, Tolerances, Case studies.							

	Reinforced masonry for seismic resistance	
	Seismicity and buildings, Design philosophy, Performance and vulnerability of	4
VI	masonry structures, Typical failure at Bhuj and Latur earthquakes, Structural	4
	configuration, BIS codal provisions, Concept of confined masonry, Minimum wall	
	density, Construction Guidelines, New Research trends in contained Masonry.	
	Text Books	
1	Structural Masonry, K. S. Jagadish, I. K. International Publishing House, New Delhi, 20	015.
2	Brick and Brick Reinforced Structures, P. Dayaratnam, Oxford and IBH publishing Hou	use,
	References	
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<u> </u>	Structural Masonry, A. W. Hendry, Macmillan Press Ltd, 1998, London.	
1 2	Structural Masonry, A. W. Hendry, Macmillan Press Ltd, 1998, London.Structural Design of Masonry, Andrew Orton, Longman, 1992 second edition	
1 2 3	Structural Masonry, A. W. Hendry, Macmillan Press Ltd, 1998, London.Structural Design of Masonry, Andrew Orton, Longman, 1992 second editionStructural Masonry, Sven Sahlin, Prentice Hall, 1971.	
1 2 3	 Structural Masonry, A. W. Hendry, Macmillan Press Ltd, 1998, London. Structural Design of Masonry, Andrew Orton, Longman, 1992 second edition Structural Masonry, Sven Sahlin, Prentice Hall, 1971. Alternative Building Materials and Technologies, K. S. Jagadish, B. V. Venkatrama Re 	ddy, K.
1 2 3 4	 Structural Masonry, A. W. Hendry, Macmillan Press Ltd, 1998, London. Structural Design of Masonry, Andrew Orton, Longman, 1992 second edition Structural Masonry, Sven Sahlin, Prentice Hall, 1971. Alternative Building Materials and Technologies, K. S. Jagadish, B. V. Venkatrama Re S. Nanjunda Rao, New Age International. 	eddy, K.
1 2 3 4	 Structural Masonry, A. W. Hendry, Macmillan Press Ltd, 1998, London. Structural Design of Masonry, Andrew Orton, Longman, 1992 second edition Structural Masonry, Sven Sahlin, Prentice Hall, 1971. Alternative Building Materials and Technologies, K. S. Jagadish, B. V. Venkatrama Re S. Nanjunda Rao, New Age International. Structural Masonry designer's Manual, Curtin, Shaw and Beck, BSP Professional 	eddy, K. Books,
1 2 3 4 5	 Structural Masonry, A. W. Hendry, Macmillan Press Ltd, 1998, London. Structural Design of Masonry, Andrew Orton, Longman, 1992 second edition Structural Masonry, Sven Sahlin, Prentice Hall, 1971. Alternative Building Materials and Technologies, K. S. Jagadish, B. V. Venkatrama Re S. Nanjunda Rao, New Age International. Structural Masonry designer's Manual, Curtin, Shaw and Beck, BSP Professional Second edition 6. IS 1905, Indian standard code of practice for structural use of unrei 	ddy, K. Books, nforced

	CO-PO Mapping														
		Programme Outcomes (PO)								PSO					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		3													
CO2			3												
CO3				2											
Where, 1:	Where, 1:Low, 2:Medium, 3:High														

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of a teacher's assessment. The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli							
			(Government A	Ataea Autonomo A V 2023-24	ous Institute)		
			Cou	rse Informati	on		
Progr	ammo		B Tech Civi	l engineering	0II		
Class	Semester		Third Year I	R Tech Sem	VI		
Cours	e Code		6CV336	D. Teen., Sem			
Cours	e Name		Professional	Flective 2. A	dvanced Stru	ctural Analysis	1
Desire	d Requisi	tes•	Solid Mecha	nics Structura	l analysis Stri	ictural Mechan	
Desire	u Requisi		Solid Meena	ines, Budetaid	ir unury 515, Dut		
	Teaching	Scheme		Exami	nation Schem	e (Marks)	
Lectu	re	2 Hrs/week	MSE	ISE	ESE	Tot	al
Tutor	ial	_	30	20	50	10	0
Practi	cal	-					
Intera	ction	_	Credits: 2				
		1					
			Cou	urse Objectiv	es		
1	To impar	t the knowledge	e of advanced r	nethods of stru	uctural analysis	s.	
2	To provi	de knowledge fo	or analyzing sp	ecial types of	structures.		
3	To apply	advanced stru	ictural analysi	is techniques	to various civ	vil engineering	structures.
			-				
A / /1	1 6 41		Outcomes (CO	D) with Bloon	n's Taxonomy	Level	
At the	end of th	e course, the s	tudents will b	e able to,			Apply
C01	Appry at Calculat	e forces and dis	n and a second sec	special struct	ures		Appiy Evaluate
	Evaluat	e external and	l internal for	ces in frames	and beams u	sing relevant	Evaluate
CO3 Software.							
	sonware	•					L'unuite
Modu			Mo	dule Content	<u>s</u>		Hours
Modu	lle Influ	ence line Diag	Mo rams for Inde	dule Content eterminate S	s tructures		Hours
Modu	lle Influ Mullo	ence line Diag er Breslau prin	Mo rams for Inde ciple, qualitat	dule Content eterminate S ive and quant	s tructures titative Influer	nce line diagra	Hours 1ms 5
Modu	Ile Influ Mulle for re	ence line Diag er Breslau prin eactions, Shear	Mo rams for Inde ciple, qualitat force and ben	dule Content eterminate S ive and quant iding moment	s tructures titative Influen 's for propped	nce line diagra	Hours Hours Ked 5
Modu	Ile Influ Mulla for re beam	ence line Diag er Breslau prin eactions, Shear and continuou roximate Meth	Mo rams for Inde ciple, qualitat force and ben is beams. Prac	dule Content eterminate S ive and quant iding moment tical applicati	s tructures titative Influer s for propped ons of influen	nce line diagra l cantilever, fiz ce lines.	Hours Hours Ked 5
Modu I II	Ile Influ Mullo for re beam Appi Porta	ence line Diag er Breslau prin eactions, Shear and continuou coximate Meth 1 and Cantileve	Mo rams for Inde ciple, qualitat force and ben is beams. Prac tods er methods fo	dule Content eterminate S ive and quant iding moment tical applicati or analysis of	s tructures titative Influen s for propped ons of influen building fra	nce line diagra l cantilever, fiz ce lines. umes subjected	Hours Hours Ked 5 I to 4
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Modu I II	Ile Influ Mullo for re beam Appi Porta latera Bean Assu	ence line Diag er Breslau prin eactions, Shear and continuou coximate Meth 1 and Cantileve al loads. Axial f ns on Elastic F mptions Types	Mo rams for Inde ciple, qualitat force and ben is beams. Prac ods er methods fo force, Shear fo coundations	dule Content eterminate Se ive and quant iding moment tical applicati or analysis of prce and Bend	s tructures titative Influen 's for propped ons of influen building fra ing moment d	nce line diagra l cantilever, fiz ce lines. umes subjected iagrams.	Hours Hours Steed 5 I to 4
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Modu I II III IV V VI VI	Ile Influ Mulle for re beam Appi Porta latera Bean Assu Foun and b and b Bean Assu Foun and b Bean Assu Foun and b Bean Analy subje mom Seco Cause of sec tensic Fixed Type semi- at an	ence line Diag er Breslau prin eactions, Shear and continuou coximate Meth l and Cantileve d loads. Axial f ms on Elastic F mptions, Types dation, Analysi boundary condi- bending momen ns Curved in F ysis of staticall cted to loads not ents and twistin ndary Stresses es of secondary condary stresses on coefficient n l Arches s of arches, El- circular fixed a y section of an eani. V.N. & Rat y C. S., "Basic arkar S. B., "N	Mo rams for Indeciple, qualitat force and ben is beams. Pract ods er methods for force, Shear for oundations of beams on itions, deflecting of beams on iti	odule Content eterminate Si ive and quant iding moment tical applicati or analysis of orce and Bend elastic elastic found ion curve, pro- and indetern of beam using agrams. nge in angles mes, Analysis Method, Analy il Thrust, Rad Text Books Advanced The nalysis", Tata Structures V	s tructures titative Influen 's for propped ons of influen building fra ing moment d ation subjecte essure distribut ninate structur g strain energy , deflection ar of pin jointed ysis of parabo ial Shear and eory of Structur McGraw hill Vol. I'', Chart	nce line diagra l cantilever, fiz ce lines. mes subjected iagrams. d to various lo ition; shear fo res curved in p method. Bend agles and analy l space frames olic and circula Bending Mom res", Khanna P , 7 th Edition, 1 or House pub	Hours Hours Hours Hours Hours Hours Hours Hours Steel I to A Adds S I to A I to A S I to A S I to A A A A A B

4	Krishna Raju N., "Advanced Mechanics of Solids and Structures", McGraw-Hill						
	Education, 2018						
	References						
1	Mcquire and Gallghar. R. H. "Matrix Structural Analysis", John Wiley, 2 nd Edition, 2000						
2	Beaufit F.W et al. "Computer Methods of Structural Analysis", Prentice Hall, illustrated, 1970						
3	John L. and Meek, "Matrix Structural Analysis", McGraw Hill Book Company, illustrated, 1971						
1	Pandit G. and Gupta S., "Structural Analysis - A Matrix Approach2008", McGraw Hill						
4	Education; 1st edition						
	Useful Links						
1	https://nptel.ac.in/courses/105/105/105105108/						
2	https://nptel.ac.in/courses/105/101/105101086/						
3	http://engineeringvideolectures.com/course/281?pn=0#videolist						
4	https://nptel.ac.in/courses/105/105/105109/						

	CO-PO Mapping														
				Р	rograi	nme C	Outcon	nes (PO))					PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3												3	3	
CO2		3											3	3	
CO3		3											3	3	
Where, 1:	Where, 1:Low, 2:Medium, 3:High														

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of a teacher's assessment.

The mode of assessment can be field visits, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)												
			AY 20	23-24								
			Course Inf	formation								
Progra	amme	9	B. Tech. (Civil Eng	gineering)								
Class,	Seme	ester	Third Year B. Tecl	h., Sem V								
Cours	e Cod	le	6CV337									
Cours	e Nan	ne	Professional Electi	ve 2: Bridge Enginee	ering							
Desire	d Rec	quisites:	Transportation Eng	gineering								
		-										
	Teacl	hing Scheme		Examination Scheme (Marks)								
Lectur	:e	2 Hrs/week	MSE	ISE	ESE	То	tal					
Tutori	al	-	30	20	50	10)0					
Practi	cal	-										
Intera	ction	-	Credits: 2									
	I		Course O	bjectives								
1	To g and	give exposure to brid make familiar with s	dge hydrology, const ubstructure and super	ruction and maintenarstructure of bridges.	ance aspects of 1	bridges						
2	Imp	art the techniques of	planning and design	ing of the bridge.								
3	To r	nake conversant with	n various construction	n methods of bridges								
A 1	- 1	Course O	utcomes (CO) with l	Bloom's Taxonomy	Level							
At the e	At the end of the course, the students will be able to,											
CO1 Explain various components of bridges Understa						lerstand						
CO2	App	ly the planning and	design concepts for th	he construction of bri	dge.	A	pply					
CO3	Iden of b	tify and select approridge.	priate substructure ar	nd superstructure for o	different types	Ar	nalyze					
	1					1						
Modu	le		Module	Contents			Hours					
	I	Introduction of Brid	lge engineering: Cla	ssification of bridges	, selection of site	e,						
	I	Bridge Hydrology: D	etermination of desig	gn discharge, linear v	water way,econo	mical						
I	s	pan, location of pier	s and abutments, aff	lux, scour depth, des	ign problems on	above	5					
	t	opics.										
		Bridge loading:										
п		Standard Specification	on for Bridges: India	in Road Congress Br	idge Code. Wi	dth of	5					
	C	carriage-way and cle	earances, IRC loads,	Railway bridge load	ing, forces actin	ng on						
	s	super structure. Desi	gn considerations, a	esthetics of bridge de	esign.							
	1	Bridge foundation:										
ш	I	Bridge foundations,	Types and their suitab	oility, Bridge piers, A	butments,Wing	walls,	4					
Approaches. Construction of various types of bridges, launching, erection, bearings.												
		Maintenance and reh	abilitation of bridges									
IV	Bridge SuperstructureIVBridge decks – Structural forms and behavior, Choices of superstructure types						4					
	1	Bridge Substructure	9				- 					
	5	Substructure - Pier; A	Abutment, Wing walls	s, Importance of Soil	Structure Interac	ction -	A					
V]	Types of foundations	, Open foundation, P	ile foundation, well fo	oundation, simpl	у	4					
	s	supported bridge, Co	ntinuous Bridge									

	Bridge Bearings and Expansion Joints	
VI	Bearings and Expansion Joints - Different types of bridge bearings and expansion	4
	joints - Parapets and Railings for Highway Bridges	

							Text E	Books						
1	Bindra Public	Bindra S. P., "Principles and Practice of Bridge Engineering", Dhanpat Rai Publications, 8 th Edition, 2012.												
2	Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 2009.													
3	Victor	D. J.	, "Elen	nents o	f Bridg	ge Eng	ineerin	g", Ox	ford a	nd IBH	I, 5 th E	dition, 2	2001	
							Refere	ences						
1	Alagia House	a J. S. 2, 8 th H	., Rang Edition	gwala S , 1983	S. C., "	'Eleme	nts of	Bridge	Engir	neering	", Cha	rotar P	ublishing	
2	Ponnu	swan	ny , S.	" Bridg	ge Eng	ineerin	g" Mc	Graw-	Hill Ec	lucatio	n , Nev	w Delh	i , 2008	
CO-PO Mapping														
]	Progra	amme (Outco	nes (P	0)				PSC)
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												3	2
CO2	3		1										3	2
CO3	3	3	1										3	2
	The	e strei	ngth of	mappi	ng is to	o be wi	ritten a	s 1,2,3	; Wher	e, 1:Lo	ow, 2:N	/ledium	, 3:High	
				Each	CO of	the cou	irse mu	ıst map	to at 1	least or	ne PO.			
							Assess	ment						
The asse	ssment	is ba	sed on	MSE,	ISE an	d ESE	. MSE	shall b	e typic	cally or	n modu	iles 1 to	o 3.	
ISE shal	l be tak	en thi	rougho	ut the s	semest	er in th	torm	of a te	eacher	's asses	ssment	. The m	node of as	sessment
ESE sha	ll he on	us, asi all m	odules	with a	around	s expec 40% v	veighta	map a	modul	es 1 to	3 and	60% w	eightage o	n modules
4 to 6.	1 00 011	un 11	iouuio	, witii (unu	1070 0	, 51 <u>5</u> 110	50 011	mouur	05110	Junu	0070 W	erginuge o	in modulos
For pass	For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed, and Min. 40% marks in													
ESE are	needed	. (ES	E shall	be a se	eparate	e head o	of pass	ing)						

Walchand College of Engineering, Sangli						
			(Government Atded	2023-24	ie)	
			Course	Information		
Progr	amme		B.Tech. (Civil Er	igineering)		
Class.	Semester		Third Year B Te	ch Sem VI		
Cours	e Code		6CV372			
Cours	e Name		Elective Lab 1: A	dvanced Concrete	Technology Lab	
Desire	d Requisi	tes:	Concrete Techno	logy		
	1		<u> </u>			
	Teaching	Scheme		Examination S	cheme (Marks)	
Lectur	re	-	LA1	LA2	Lab ESE	Total
Tutor	ial	-	30	30	40	100
Practi	cal	2 hrs/week			•	·
Intera	ction	-	Credits: 1			
			Course	Objectives		
1	To give t	he exposure to a	advance characteris	ation and testing te	echniques for cem	nent concrete.
2	To develo	op ability to ana	lyse the properties	of cement concrete	e materials to dec	ide its suitability.
			Course O	utcomes (CO)		
At the	end of the	course, student	s will be able to,	(,		
CO1	Apply pr	actices to exam	ine the properties of	of cement concrete	materials	Apply
CO2 Interpret the test results of materials and judge the suitability in the cement Interpret						
<u> </u>	concrete. CO2 Deside descent full of item for a second data data data data data data data da					
	Decide d	Usage of plastic	iser for concrete an	a Analyse the con	crete durability.	Analyse
			List of Experime	ents / Lab Activiti	es	
List of	f Experim	ents:				
23	. Density	of Cement				
24	. Particle	Size Analysis	(Laser Diffraction	n)		
25	. Specific	Surface area of	of cement (Blaine)		
26	. Setting t	time of concret	te			
27	. Strength	Activity Test				
28	. Modifie	d Chappelle T	est			
29	. Marsh C	Cone Test				
30	. Mini Slu	ump Test				
31	. Freeze d	lrying test on C	Cement Paste			
32	. Thermal	l Analysis of C	Cement Paste			
	Make	D K and Davi	Tex	t Books	Dronoutics on 1	Matamial" MaCmarr
1	Hill F	rofessional 3 rd	Edition, 2009.	ne – wherostructure	t, rioperues and	viatenai , wicoraw
2	Nevil	le A. M. and Br	ooks J. J., "Concre	te Technology", Pe	earson Education	Limited, 1987
3	Shett	y M. S., "Concre	ete Technology", S	. Chand & Compar	iy Ltd. New Delh	1, / ^m Edition, 2013.
	IS 40'	31 Part_? (1000)	Methods of phy	sical tests for hydr	aulic cement_ per	t 2-Determination
1	of fin	eness by blaine	air permeability m	ethod." Bureau of]	Indian Standards	(BIS), New Delhi,

C	IS 16354. (2015). "Metakaolin for Use in Cement, Cement Mortar and Concrete
2	Specification." Bureau of Indian Standards (BIS), New Delhi, India.
2	ASTM C311. (2019). "Standard Test Methods for Sampling and Testing Fly Ash or Natural
3	Pozzolans for Use." ASTM International, West Conshohocken, PA, United States.
	Useful Links
1	https://www.digimat.in/nptel/courses/video/105106176/L01.html
2	

CO-PO Mapping														
	Programme Outcomes (PO)										PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2												2	2
CO2		3											2	2
CO3			3										2	2
The strength of manning is to be written as 1.2.3. Where 1: Low 2: Medium 3: High														

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.

		Assess	ment					
There are three components of lab assessment, LA1, LA2, and Lab ESE								
IMP: Lab ESE is a separate head of passing. Lab ESE is treated as End Semester Exam and is based on								
all experimer	nts/lab activities.							
Assessment Based on		Conducted by	Typical Schedule	Marks				
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30				
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30				
Lab ESE	Lab Performance and documentation	Lab Course faculty	During Week 13 to Week 18 Marks Submission at the end of Week 18	40				
Week 1 indi considering a performance and other sui	cates starting week of 26-week semester. Th shall include performi- table activities, as per	of a semester. The actual schedule ng experiments, not the nature and re-	ne typical schedule of lab assessments is shall be as per academic calendar. Lab activ nini-project, presentations, drawings, progr equirement of the lab course. The experim	shown, ities/Lab camming ental lab				

shall have typically 8-10 experiments.