Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)



Course Contents (Syllabus) for

Second Year M. Tech. Civil (Environmental Engineering) Sem – III to IV

AY 2020-21

Title of the Course:								L	Т	Р	Cr
Dissertation Phase I (3EV690) & Phase II (3EV691 & 3EV692)								-	-	20	10
Pre-Requisite Courses: Core courses in Environmental Engineering											
References:											
1. Nati	onal and Inte	ernationa	al journ	als in E	nvironr	nental E	Ingineer	ring			
a	a. Journal of Indian water works association,										
b. Journal of environmental science and engineering (NEERI),											
c. Journal of environmental engineering (ASCE),											
d. Water research,											
e. Water science and technology,											
f Iournal of Water supply. Research and technology-AOUA											
σ	Journal of en	vironme	ental ma	nageme	ent	morogy		,			
b. 5. 5.	Journal of w	aste man	agemei	nt	Jiit,						
i .	Water science	a and ta	chnolog	ny Wat	or supp	1.7					
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J 1.	Journal of A				ation,						
К		F	water v	vorks as	sociatio)11.					
	Building and	Energy	(Elsevi	er)							
Course Ob	jectives :						C				
I. Prov	1. Provide in-depth knowledge to tackle real world problems of societal concerns.										
2. Imp	art flexibility	to the s	tudent	to have	increas	ed contr	ol over	h1s/ he	r learn	ing.	
3. Enh	ance student	's learnn	ng thro	ugh inci	reased i	nteractio	on with	peers a	and col	leagues.	
Course Learning Outcomes:											
After the completion of the course the student should be Bloom's Cognitive											
CO	After the co	ompletio	n of the	e course	the stu	dent sho	ould be		Bloo	m's Co	gnitive
СО	After the co able to	ompletio	n of the	e course	the stu	dent sho	ould be		Bloo Level	m's Cog De	gnitive scriptor
СО	After the co able to Defend the	ompletio	n of the	e course	the stu ertation	dent sho	ould be	nd	Bloo Level II	m's Cog De Unde	gnitive scriptor erstanding
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with guide.

ISE 2 is based on the progress made during the semester for the objectives defined in the synopsis and the report submitted by the students. It shall be evaluated through progress seminar(s) at the end of the semester. The parameters for evaluation include extent of work done, results and discussion/publication efforts, quality of presentation, quality of report, interaction during presentation and interaction with guide.

ISE shall be conducted by Departmental Post-Graduate Committee (DPGC).

ESE shall be conducted at the end of semester by a duly constituted examination panel composed of Chairman, internal examiner (guide) and external examiner.

Course Contents:

The third semester is completely devoted to dissertation work which is defined based on the interest of the students to specialize in a particular area.

Students are expected to carry out independent research work on the chosen topic.

In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained.

Title of the Course: Professional Elective 4 L									Т	Р	Cr	
Project M	lanagement (3	gement (3EV611)							-	-	3	
Pre-Requ	isite Courses:	Nil										
Textbook	s:											
1. Jac	ck Gido, Jame	s P Cle	ments,	Project	t Mana	gement,	Cenga	ge Lea	rning I	ndia P	vt. Ltd., 2 nd	
Re	print 2011, ©2	2007	,	5	·	<i>,</i>	00		0		,	
Reference	es:											
1. Jol	hn Adair, Strat	egic Le	adershi	p, Koga	n Page	Ltd., 1 st	ed. 201	10.				
2. Project Management, Achieving Competitive Advantage, Jeffrey K. Pinto, Dorling												
Kindersley India Pvt. Ltd. Ed. 2009.												
3. B.C. Punmia and Khandelwal, Project Planning and Control with PERT and CPM, Lakshmi												
Publications Pvt. Ltd., 4 th Edition, 2008												
4. K. Nagarajan, <i>Project Management</i> , New Age Int., 2 nd ed. 2004.												
Course O	bjectives :											
1. To	develop a ho	listic, ir	ntegrate	d appro	bach to	manage	projec	ts, exp	loring	both te	chnical and	
ma	nagerial challe	enges in	enviro	nmenta	l / struc	tural en	gineerir	ig proje	ects.			
2. To	inculcate lead	lership,	and eth	ical qua	alities in	n dealin	g with r	eal life	projec	et envir	onment and	
de	velop positive	attitude	toward	ls indivi	idual re	sponse-l	oility in	project	t execu	tion.		
3. To	induce qual	ities fo	r supp	orting	industr	y's life	-long l	earning	g prog	rams,	working in	
int	erdisciplinary	and c	ross fi	inctiona	al team	ns with	effecti	ive co	mmuni	cation	skills and	
ma	inagerial challe	enges.										
Course L	earning Outco	omes:										
CO	After the con	pletion	of the	course t	the stud	ent shou	uld be a	ble	Bloom's Cognitive			
	to	-						-	Lev	el	Descriptor	
	Perceive c	ritically	the	projec	t chai	acteristi	ics. pi	roject	201			
CO1	management	princip	les and		them in	n the co	ontext to	o real	III		Applying	
	world proble	ms.									11 5 8	
	Formulate a	nd sol	ve proj	ects in	contex	t of sch	neduling	g and				
001	controlling	with ti	me an	d cost	as co	nstraint	s using	the the	111		Ampleting	
02	imparted know	owledge	e of ne	etwork	schedu	ling tec	hniques	and	111		Applying	
	applications	using so	ftware.			-	-					
	Demonstrate	e leader	ship ski	ills and	commu	inicate e	effective	ely in				
CO3	convincing	various	stake	eholders	s to	accomp	lish pi	roject	III		Applying	
	objectives eth	nically.										
CO-PO M	lapping:								_			
		PO	1	2	3	4	5	6				
		CO1					3					
		CO2		2								
		CO3		3			2					
Assessme	nts:											
Teacher A	Assessment:											
Two comp	ponents of In S	Semeste	er Evalu	uation (ISE), O	ne Mid	Semest	ter Exa	minati	on (MS	E) and one	
End Seme	ster Examinati	on (ESI	E) haviı	ng 20%	, 30% a	nd 50%	weight	s respe	ctively			
		Asse	essmen	t			Ma	rks				
		Ι	SE 1				10)				
		Ν	MSE				30)				
		Ι	SE 2				10)				
]	ESE				50)				
ISE 1 and	ISE 2 are base	d on as	signme	nt/decla	red test	/quiz/se	minar e	tc.				
MSE: Ass	essment is bas	ed on 5	0% of c	course c	ontent (Normal	ly first	three m	odules	3)		

ESE: Assessment is based on 100% course content with 60-70% weightage for course content

(normally last three modules) covered after MSE.						
Course Contents:						
Module 1: Project Management Concepts	6 Hrs.					
Factors Governing Modern Business, Effective Project Management, definition of project, Attributes of Project, Strategic Planning, Project Life Cycle, considerations for RFP, Project Process, Project Balancing, Project Environment, Programme and Portfolio.						
Module 2: Project Planning and Schedule						
WBS, Responsibility matrix, Devp. of non-network and network schedules, Activity duration estimates, Schedule calculations, Probability considerations, PMS.						
Module 3: Schedule control	6 Hrs.					
Project control process Updating schedule, Approaches to schedule control, Resource considerations.						
Module 4: Cost Planning and Performance	8 Hrs.					
Project cost estimates, Budget, Actual cost, Cost Forecasting, Managing cash flows.						
Module 5: Project Manager and Project Team	6 Hrs.					
Responsibilities and skills, Delegation, Managing Change, Devp. and effectiveness of project team, Ethics, Conflicts on Projects, Time Management.						
Module 6: Project communication and Documentation	6 Hrs.					
Personal communication, Effective listening, Meeting, Presentations and Report preparation, Types of Project organizations- their merits and demerits, SWOT analysis.						
Module wise Outcomes:						
At end of each module students will be able to						
1. Explain basic properties of projects; differentiate between project management practices and traditional business functions, project life cycle and concepts of project success.						
2. Grasp the key scheduling terminologies, apply logic for developing network schedules, perform duration calculations and identify critical paths and floats.						
3. Interpret the various steps involved in project control process, apply the changes in updating networks leading to new schedules in consideration to various resources.						
4. Outline baseline budget, analyzing cost performance index, Cost forecasting.						
5. Practice the responsibilities of project manager and develop skills and techniques to ethically manage and control projects with effective delegation.						
6. Explain the characteristics of organizational structures, develop the art of enhancing personal communication, handle effective project presentations and prepare project reports.						

Title of the Course: Professional Elective 4									L	Т	Р	Cr
Operation and Maintenance of Environmental Facilities (3EV612)								3	-	-	3	
Pre-Requisite Courses: Courses on Water and Wastewater Treatment, Air pollution, Solid Waste												
Management												
Textbooks	: 		1 1 1		1 771	G (11)	7 .				** 1	
1. Quasim S. R., Motley E. M. and Zhu G., "Water works engineering", PHI learning private												
2 War	ieu, ∠ ∙k K	And Wa	arner C	F "Aiı	r Polluti	on" H	R Publ	ication	1 st Edi	tion 19	978	
References				.,	1 011401	,	101 001		1 24			
1. "Ma	nual	on wate	er suppl	y and T	reatme	nt", CP	HEEO,	Ministr	y of U	rban D	evelopn	nent, Govt.
of India, New Delhi, 1999.												
2. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development,												
Gov	t. of I	India, N	ew Dell	ni, 1993	3.							
1 Prov	jecuv vide i	es : in_denth	know	edge o	of opera	tion ar	nd main	tenance	of ir	fractru	ctural f	acilities in
envi	ironm	ental en	gineeri	ng.	n opera	uion ai	ia mam	licitatice	01 11	masnu		denities in
2. To	enhan	ice the	technic	al com	petency	and ap	oply the	acquir	ed kno	wledge	e for re	search and
deve	elopm	ent, ind	lustry, a	nd cons	sultancy	activiti	ies.					
Course Lea	arnin	g Outco	omes:									
CO	Afte	r the co	mpletio	n of the	e course	the stu	dent sho	ould be		Bloo	m's Co	gnitive
	able	to								Level	De	scriptor
CO1	Exp envi	lain co ronmen	oncepts tal facil	of o _] ities.	peration	and	mainter	nance f	for	Π	Und	erstanding
CO2	App	oly the	imparte	d know	ledge t	o effect	tively o	perate t	he	III	A	pplving
	syste	em.	tion on	d main	tononoo	nrohlar	m 00000	istad w	ith			
CO3	real	life env	ironme	u mann ntal fac	ility	probler		Taleu w	IUI	V	Ev	aluating
CO-PO Mapping:												
	••	U	PO	1	2	3	4	5	6			
			CO1			2						
			CO2				3			_		
	4		CO3				2		3			
Assessmen Teacher As	lS: ssessr	nent•										
Two compo	onents	s of In S	Semeste	r Evalı	uation ()	ISE). O	ne Mid	Semest	er Exa	minatio	on (MS	E) and one
End Semest	ter Ex	aminati	on (ESI	E) havii	ng 20%,	30% a	nd 50%	weights	s respe	ctively.	· · · · · · · · · · · ·	
			Asse	essmen	t			Mai	rks			
			Ι	SE 1				10)			
			<u> </u>	MSE				30)			
			1	SE 2				I()			
ISE 1 and I	SE 2 -	are hase	d on as	ESE signme	nt/decla	red test	/auiz/se	J(minar e) to			
MSE: Asse	ser 2 a	nt is base	ed on 50	0% of c	course co	ontent (Normal	lu first t	three n	nodules)	
ESE: Asses	ssmer	nt is ba	sed on	100%	course	conten	t with	60-70%	weig	htage f	for cour	se content
(normally la	ast thr	ree mod	ules) co	vered a	after MS	E.			e	e		
Course Co	ntent	s:										
Module 1:	Intro	duction	1									5 Hrs.
Need of Op	eratio	on and I	Mainten	ance ((J&M)	, Basic	princip	les, corr	rective	and pr	eventive	
Mod-1-2			ialis, dra	iwings,	operati	on man	uais, co	inputer	usage	in O an	u IVI.	0 TT
woaute 2:	vv ate	er Supp	iy Syste									ð Hrs.

Intakes, pumps, transmission pipes, water treatment process control, Quantity and quality monitoring.						
Module 3: Water Distribution and Sewerage System						
Water distribution system: Loss of carrying capacity of pipes, pipe breaks and leakages, leak detection, record keeping, O and M of Appurtenances, Use of network models in O and M, Corrosion control. Sewerage system: Maintenance, Inspection methods, Manual and television, Cleaning and rehabilitation, Safety in sewer inspection.						
Module 4: Wastewater Treatment Plant	8 Hrs.					
Wastewater treatment plant: O and M of wastewater treatment plant, Monitoring and operational problems, Corrective measures. Performance: Plant performance, Need for upgradation, Process reliability, Odour management.						
Module 5: Air Pollution Control Facilities	7 Hrs.					
Air pollution control facilities: Regular inspection of devices, SPM control equipment, Gravity settlers, Cyclone separators, Bag filters, Scrubbers, Electrostatic precipitator, Gaseous control devices, incinerators and their trouble shooting.						
Module 6: Planning and Management	5 Hrs.					
Organizational structure, work planning, preparation and scheduling, Cost estimates.						
Module wise Outcomes:						
At end of each module students will be able to						
 Explain principles of operation and maintenance. Apply operational and maintenance principles for solving problems of water supply system. 						
3. Apply operational and maintenance principles for solving problems of water distribution and sewerage system.						
4. Solve the operational problems of sewage treatment plant.						
5. Apply operational and maintenance principles for solving problems of air pollution control facilities.						
6. Explain and devise organizational structure of operation and maintenance cell and schedule the activities.						

Title of the Course: Dissertation Phase III (3EV693) & Phase IV									Т	Р	Cr	
(3EV694 & 3EV695)									-	32	16	
Pre-Requisite Courses: Core courses in Environmental Engineering												
References:												
1. National and International journals in Environmental Engineering												
a. Journal of Indian water works association,												
b. J	b. Journal of environmental science and engineering (NEERI),											
c. J	2. Journal of environmental engineering (ASCE),											
d. V	d. Water research,											
e. V	e. Water science and technology,											
f. J	f. Journal of Water supply: Research and technology-AQUA,											
g. J	g. Journal of environmental management,											
h. J	ournal of wa	ste man	agemei	nt,								
i. V	Vater science	e and tec	chnolog	gy –Wat	ter supp	oly,						
j. J	ournal of Wa	ater Reu	se and	Desalin	ation,	•						
k. J	ournal of An	nerican	water v	vorks as	sociatio	on.						
1. E	Building and	Energy	(Elsevi	er)								
Course Obi	ectives :	25	· ·	,								
1. Prov	ide in-depth	knowle	dge to t	ackle re	eal worl	d proble	ems of s	ocietal	conce	rns.		
2. Impa	rt flexibility	to the s	tudent	to have	increas	ed contr	ol over	his/ he	r learn	ing.		
3. Enha	ince student'	s learnii	ng thro	ugh inci	reased i	nteractio	on with	peers a	and col	leagues		
Course Lea	rning Outco	mes:	-8					r		8		
	After the co	mpletio	n of the	course	the stu	dent sho	ould be		Bloo	m's Co	gnitive	
CO	able to	1						1	Level	De	scriptor	
	Execute	the	study	th	ough	cond	uct	of			r	
CO1	analytical/E	xperime	ental wo	ork to a	chieve t	he object	ctives.		III	Applying		
	,	1				5			III	A	pplying	
CO2	Analyze, in	alvze, interpret and critique the findings of the study								Aı	nalvzing	
00-		F		1				, -	V	Ev	Evaluating	
	Defend the	outcor	nes of	the d	issertati	on thre	ough se	lf-	·			
CO3	learning and	1 iustif	v the r	project	work a	s per a	ppropria	ite	V	Ev	aluating	
000	standards of	docum	entation	n and pr	esentat	ion.	rrr		·			
CO-PO Ma	pping:			··· · I								
	rr8.	PO	1	2	3	4	5	6	1			
		CO1	2		_	3	2	3				
		CO2				3	2		-			
		CO3		3	3		2					
Assessment	s•	000		5	5		2					
Teacher As	sessment:											
In Semester	Evaluation (ISE) and	d End S	Semeste	r Evalu	ation (E	SE)					
		Asse	ssment	t			Mar	ks				
		IS	SE 1				100	C				
		IS	SE 2				100	0				
		I	ESE				100	C				
ISE 1 is bas	sed on the w	ork don	e by th	e stude	nt durin	ng fourt	h semes	ter. It	shall	be evalu	ated using	

the parameters extent of work done after phase II, quality of presentation, interaction during presentation, and interaction with guide.

ISE 2 is based on the work done during the semester and the report submitted by the students. It shall be evaluated through progress seminar(s) at the end of the semester. The parameters for evaluation include extent of work done, results and discussion/publication efforts, quality of presentation, quality of report, interaction during presentation and interaction with guide.

ISE shall be conducted by Departmental Post-Graduate Committee (DPGC).

ESE shall be conducted at the end of semester by a duly constituted examination panel composed of Chairman, internal examiner (guide) and external examiner.

Course Contents:

In fourth semester, the students continue their dissertation work.

It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis.

The work should be completed in all respects in this semester.

The students are required to submit the dissertation work in the form of report as per the institute rule.

Title of the Course:								L	Т	Р	Cr	
Summer Internship (3EV696)							-	-	-	1		
Pre-Requis	ite Courses	: Course	es taug	ht in Se	mesters	I and II		•	•			
Course Obj	jectives :											
1. To e	1. To expose the students to real life environmental engineering problems encountered in											
indu	industry/society.											
2. To p	rovide an op	oportunit	ty to we	ork in co	ollabora	ative and	l multid	liscipli	nary en	vironm	ent.	
Course Lea	rning Outc	omes:										
CO	After the co	ompletio	n of the	e course	the stu	dent sho	ould be		Bloom's Cognitive			
00	able to								Level	De	scriptor	
CO1	Perceive k multidiscip	nowledg linary w	ge of gi ork.	roup dy	namics	and con	ntribute	to	Π	Und	erstanding	
	Demonstra	ate knov	vledge	to solv	e socie	etal prol	olems a	nd				
CO2	apply it	for	efficier	nt mai	nageme	nt of	proje	cts	III	Α	Applying	
	independen	tly and i	n team	s.								
	Communio	cate	with	indus	stry/soc	iety	regardi	ng				
CO3	environmen	ntal en	gineeri	ng act	ivities	effecti	vely a	nd	II	Understanding		
	comprehen	nd and w	rite eff	fective r	eports.							
	Demonstra	ate ethic	al beh	avior w	vith pro	fessiona	al code	of				
CO4	conduct an	nd contr	ribute	to sust	ainable	develo	pment	of	III	A	pplying	
	society.											
CO-PO Ma	pping:								-			
		PO	1	2	3	4	5	6	_			
		COI					2		_			
		CO2				2			_			
		CO3		2					_			
		CO4					2					
Assessment	S:											
Teacher As	sessment:											
In Semester Evaluation (ISE)												
		Asse	essmen	t			Mai	rks				
			ISE				10	0				
ISE is based	l on extent of	of object	ives de	fined; w	vork do	ne at the	e organi	zation	, outcoi	ne of tr	aining, and	
quality of re	port. DPGC	shall ca	rry out	the eva	luation.							
Course Cor	ntents:											
The objecti	ve of this	training	is to	expose	the stu	idents t	o indus	try en	vironm	ent and	practices.	
Students are	e sent to lea	ding En	vironm	ental E	ngineer	ing orga	anizatio	ns/Res	earch 1	aborato	ries/Design	
Consultancy	v organizatio	ons to un	dergo	a rigoro	us train	ing for	a minin	num pe	eriod of	one mo	onth during	
summer terr	summer term/vacation.											