Walchand College of Engineering (Government Aided Autonomous Institute)

Vishrambag, Sangli-416415



Course Content for S. Y. M. Tech. Mechanical (Design Engineering)

Semester - III and IV

2023-24

Anuestan ghill

	Walchand College of Engineering, Sangli							
	AY 2023-24							
	Course Information							
Progra	Programme M. Tech. (Mechanical Design Engineering)							
Class,	Semeste	er	Second Year M.	Tech., Sem III				
Cours	e Code		6DE645					
Cours	e Name		Dissertation Phas	e I				
Desire	d Requi	sites:	Concept knowled	lge of research methodo	logy, project	manag	gement,	
	-		mechanical engin	ieering			-	
	Teaching	g Scheme		Examination Sche	eme (Marks)			
Practi	cal	6 Hrs/ Week	LA1	LA2	Lab ESE		Total	
Intera	ction	-	100	0	0		100	
				Credits:	03			
		1	1					
			Cours	se Objectives				
1	To dev	elop the student t	to apply the knowl	edge gained to identify	problems for	resear	rch and provide	
	the solu	utions by self-stud	dy and interaction v	with stakeholders.				
2	Acquir	e knowledge to ta	ckle real world pro	blems of societal conce	erns			
3	Impart	flexibility to the	student to have inc	reased control over his/	her learning			
4	Teache	rs would serve as	mentor/facilitator	of inquiry and reflection	n rather than	as an i	nstructor	
5	Enhanc	e a students' lear	ning through increa	ased interaction with pe	ers and collea	agues.		
		Cours	e Outcomes (CO)	with Bloom's Taxonor	ny Level			
At the	end of th	ne course, the stud	dents will be able to	0,			1	
		C			Bloo	m's	Bloom's	
		Cou	rse Outcome State	ement/s	I axor	lomy	Laxonomy Description	
CO1	Search	the existing litera	ature and identifica	tion of research problen		7	Analyzing	
CO2	Design	and develop the	solution for comple	ex engineering problem		r	Evaluating	
CO3	Create	the new knowled	ge in the specialize	ed field	V	I	Creating	
	1							
			Cou	rse Content				
Studer	its are exi	pected to carry ou	t independent resea	arch work on the chosen	topic. In this	semest	er it is expected	
that th	e student	t has carried out	substantial research	n work including exhau	stive literatur	e surv	ev, formulation	
of the	research	problem, develo	opment/fabrication	of experimental set-up	(if any/requ	ired) a	and testing, and	
analys	is of initi	ial results thus ob	otained. In fourth se	emester, the students co	ntinue their o	lisserta	ation work. It is	
expect	ed that th	ne student has cor	npleted most of the	e experimental/computa	tion works ar	ıd anal	yzed the results	
so obt	ained as	proposed in the	synopsis. The wor	k should be completed	in all respec	cts this	s semester. The	
studen	ts are rec	uired to submit the	he dissertation wor	k in the form of report a	is per the inst	itute ru	ule	
			Т	extbooks				
1	As	per the research to	opic					
			R	eferences				
1	Nat	ional and Internat	tional Journals					
	1.44	ou//matal as is /:	Us	etul Links				
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$\frac{2}{2}$	nttp	s.//www.youtube	$\frac{110}{104}$	$v swcdz_jwateature=$	emo_imp_wo	Jyt		
3	http	s://nptel.ac.1n/cou	urses/110/104/1101	1040/3/				
· ·	https://nptel.ac.in/courses/110/107/110107081/							

CO-PO Mapping									
	Programme Outcomes (PO)								
	1	2	3	4	5	6			
CO1	1			1		2			
CO2	1		1		2	1			
CO3		2				1			
The stren	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.(min 40 %), LA1+LA2 should be min 40%								
Assessment	Based on	Conducted by	Typical Schedule	Marks				
	Lab activities,		During Week 1 to Week 8					
LA1	attendance,	Lab Course Faculty	Marks Submission at the end of	30				
	journal		Week 8					
	Lab activities,		During Week 9 to Week 16					
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30				
	journal		Week 16					
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19					
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40				
	performance	applicable	Week 19					
Week 1 indicat	es starting week	of a semester. Lab activiti	es/Lab performance shall include performance shall include performance shall include performance shall be performed as the performance shall be pe	erforming				
experiments, m	experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the							
related activitie	if any	o course. The experimental	ab shall have typically 8-10 experii	nems and				
related activitie	s ii airy.							

	Walchand College of Engineering, Sangli							
	AY 2023-24							
	Course Information							
Programme M. Tech. (Mechanical Design Engineering)								
Class,	Class. Semester Second Year M. Tech., Sem III							
Cours	e Code		6DE646					
Cours	e Name		Dissertation Phas	e II				
Desire	ed Requis	sites:	Concept knowled	ge of research methodolog	y, project ma	anagement,		
	_		mechanical engin	eering		-		
			1					
,	Teaching	s Scheme		Examination Scheme	e (Marks)			
Practi	cal	6 Hrs/ Week	LA1	LA2 Lat) ESE	Total		
Intera	ction	-	0	100	0	100		
				Credits: 03				
			Cours	se Objectives				
1	To deve	lop the student t	o apply the knowle	edge gained to identify pro	blems for re	search and provide		
	the solu	tions by self-stuc	ly and interaction w	with stakeholders.				
2	Acquire	knowledge to ta	ckle real world pro	oblems of societal concerns				
3	Impart f	lexibility to the	student to have inci	reased control over his/ her	learning			
4	Teacher	s would serve as	mentor/facilitator	of inquiry and reflection ra	ther than as	an instructor		
5	Enhance	e a students' lear	ning through increa	ased interaction with peers	and colleagu	ies.		
At the	and of th	Course the stud	e Outcomes (CO)	with Bloom's Taxonomy	Level			
At the		e course, me stud),	Bloom'	s Bloom's		
СО		Cou	rse Outcome State	ement/s	Taxonon	ny Taxonomy		
					Level	Description		
CO1	Search t	he existing litera	ture and identificat	tion of research problem	IV	Analyzing		
CO2	Design	and develop the	solution for comple	ex engineering problem	V	Evaluating		
CO3	Create t	he new knowled	ge in the specialize	d field	VI	Creating		
			Cour	rse Content				
Studen	its are exp	ected to carry ou	t independent resea	urch work on the chosen top	ic. In this ser	nester it is expected		
that th	e student	has carried out s	substantial research	work including exhaustiv	e literature s	survey, formulation		
of the	research	problem, develo	pment/fabrication	of experimental set-up (if	any/require	d) and testing, and		
analys	18 OI 11111	al results thus ob	tained. In fourth se	emester, the students contin	iue their diss	sertation work. It is		
expect	eu mat m	e student has con	synopsis. The wor	k should be completed in	all respects	this somester. The		
studen	ts are requ	uired to submit the	he dissertation wor	k in the form of report as n	er the institu	te rule		
studen	ts are req		ne dissertation wor	k in the form of report us p				
I extbooks 1 As per the research topic								
1	As p	er the research to	To pic	extbooks				
1	As p	er the research to	Topic	extbooks				
1	As p	er the research to	Teopic	extbooks eferences				
1	As p	onal and Internat	Te ppic Received a contract of the second se	eferences				
1	As p	er the research to	Teopic Dice Recional Journals	extbooks eferences				
1	As p	onal and Internat	Te opic Re tional Journals	extbooks eferences eful Links				
1 1 1 1	As p Nati	onal and Internat	Te opic Re ional Journals Use urses/121/106/1211	extbooks eferences eful Links 06007/				
1 1 1 1 2	As p Nati	onal and Internat s://nptel.ac.in/cou	Te opic Re ional Journals Use urses/121/106/1211 .com/watch?v=mA	extbooks eferences eful Links 06007/ .VswCbz_jM&feature=eml	b_imp_woyt			
1 1 1 2 3	As p Nati	onal and Internat s://nptel.ac.in/cou s://www.youtube	Te opic Re ional Journals Use urses/121/106/1211 .com/watch?v=mA urses/110/104/1101	extbooks eferences eful Links 06007/ VswCbz_jM&feature=em 04073/	b_imp_woyt			

CO-PO Mapping									
	Programme Outcomes (PO)								
	1	2	3	4	5	6			
CO1	1			1		2			
CO2	1		1		2	1			
CO3		2				1			
The stron	oth of monning	is to be written as	1 2 2. Where 1.1	Ju 2. Madium	2.U. ah				

Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ESE	is a separate head	of passing.(min 40 %), LA	1+LA2 should be min 40%					
Assessment	Based on	Conducted by	Typical Schedule	Marks				
	Lab activities,		During Week 1 to Week 8					
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	journal		Week 8					
	Lab activities,		During Week 9 to Week 16					
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30				
	journal		Week 16					
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19					
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40				
	performance applicable Week 19							
Week 1 indicat	tes starting week	of a semester. Lab activiti	es/Lab performance shall include p	erforming				
experiments, m	ini-project, prese	ntations, drawings, progran	nming, and other suitable activities,	as per the				

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 and related activities if any.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)									
	AY 2023-24								
	Course Information								
Progra	Programme M. Tech. (Mechanical Design Engineering)								
Class,	Semeste	er	Second Year M.	Tech., Sem III					
Cours	e Code		6DE647						
Cours	e Name		Dissertation Phas	e III					
Desire	d Requi	sites:	Concept knowled	lge of research methodo	ology, project	management,			
			mechanical engin	eering					
	Teachin	g Scheme		Examination Sch	eme (Marks)	-			
Practi	cal	8 Hrs/ Week	LA1	LA2	Lab ESE	Total			
Intera	ction	-	00	00	100	100			
				Credits	: 04				
			Cours	se Objectives					
1	To dev	elop the student t	o apply the knowle	edge gained to identify	problems for	research and provide			
	the solu	itions by self-stud	ly and interaction v	with stakeholders.					
2	Acquire	e knowledge to ta	ickle real world pro	oblems of societal conc	erns				
3	Impart	flexibility to the	student to have inci	reased control over his/	her learning				
4	Teache	rs would serve as	mentor/facilitator	of inquiry and reflection	n rather than a	as an instructor			
5	Enhanc	e a students' lear	ning through increa	ased interaction with pe	eers and collea	gues.			
At the	and of th	Cours course the stur	e Outcomes (CO)	with Bloom's Taxono	my Level				
At the		ie course, the stud	ients will be able to),	Bloor	n's Bloom's			
СО		Cou	rse Outcome State	ement/s	Taxon	omy Taxonomy			
					Lev	el Description			
CO1	Search	the existing litera	ture and identification	tion of research problem	n IV	Analyzing			
CO2	Design	and develop the	solution for comple	ex engineering problem		Evaluating			
CO3	Create	the new knowled	ge in the specialize	d field	VI	Creating			
		Course Content							
Studen	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						semester it is expected			
that th	its are exp e student	pected to carry ou has carried out	Cou t independent resea substantial research	rse Content arch work on the choser a work including exhau	topic. In this s	emester it is expected e survey, formulation			
that the	ts are exp e student research	pected to carry ou has carried out s problem, develo	Cou t independent resea substantial research opment/fabrication	rse Content arch work on the chosen a work including exhau of experimental set-up	topic. In this s istive literature (if any/requi	semester it is expected e survey, formulation red) and testing, and			
that the of the analys	tts are exp e student research is of initi	pected to carry ou thas carried out s problem, develo al results thus ob	Cou t independent research substantial research opment/fabrication ptained. In fourth se	rse Content arch work on the chosen a work including exhau of experimental set-up emester, the students co	topic. In this s stive literature (if any/requi ontinue their d	semester it is expected e survey, formulation red) and testing, and issertation work. It is			
that the of the analysi expect	tts are exp e student research is of initi ed that th	pected to carry ou has carried out s problem, develo al results thus ob the student has cor	Cou t independent resea substantial research opment/fabrication otained. In fourth se npleted most of the	rse Content arch work on the chosen a work including exhau of experimental set-up emester, the students co e experimental/compute	topic. In this s stive literature (if any/requi ontinue their d ation works and	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results			
that th of the analys expect so obta	tts are exp e student research is of initi ed that th ained as	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The wor	rse Content arch work on the chosen a work including exhau of experimental set-up emester, the students co e experimental/computa k should be completed k in the form of report	topic. In this s stive literature o (if any/requi ontinue their d ation works and 1 in all respec	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The			
that the of the analysis expect so obta	its are exp e student research is of initi ed that th ained as ts are req	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the quired to submit the	Cou t independent resea substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The wor he dissertation wor	rse Content arch work on the chosen in work including exhau of experimental set-up emester, the students co e experimental/computa is should be completed k in the form of report	topic. In this s istive literature o (if any/requi ontinue their d ation works and i in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that th of the analys expect so obta studen	its are exp e student research is of initi ed that th ained as ts are req	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the puired to submit the	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The wor he dissertation wor	rse Content arch work on the chosen of experimental set-up emester, the students co e experimental/computa k should be completed k in the form of report	topic. In this s stive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
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that th of the analys expect so obta studen	ts are exp e student research is of initi ed that th ained as ts are req As p	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the quired to submit the per the research to	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The wor he dissertation wor Transformer	rse Content arch work on the chosen of experimental set-up emester, the students co e experimental/computa k should be completed k in the form of report extbooks	topic. In this s stive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that the of the analysis expect so obta studen	ts are exp e student research is of initi ed that th ained as ts are req As p	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the quired to submit the per the research to	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The work he dissertation work The copic	rse Content arch work on the chosen a work including exhau of experimental set-up emester, the students co e experimental/computa k should be completed k in the form of report extbooks eferences	topic. In this s istive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that th of the analys expect so obta studen	ts are exp e student research is of initi ed that th ained as ts are req As p As p	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the quired to submit the per the research to ional and Internat	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The wor he dissertation wor Transformer Depic	rse Content arch work on the chosen in work including exhau- of experimental set-up emester, the students con- e experimental/computa- ik should be completed k in the form of report extbooks eferences	topic. In this s istive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that the of the analysis expect so obtain studen	tts are exj e student research is of initi ed that th ained as ts are req As j Nati	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the quired to submit the per the research to ional and Internat	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The work he dissertation work The opic Retional Journals	rse Content arch work on the chosen a work including exhau of experimental set-up emester, the students co e experimental/computa k should be completed k in the form of report extbooks eferences	topic. In this s istive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that the of the analys expect so obta studen	ts are exp e student research is of initi ed that th ained as ts are req As p Nati	pected to carry ou has carried out s problem, develo al results thus ob the student has cor proposed in the juired to submit the per the research to ional and Internat	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The wor he dissertation wor Transformer be dissertation wor Copic	rse Content arch work on the chosen in work including exhau- of experimental set-up emester, the students con- e experimental/computa- ick should be completed k in the form of report extbooks eferences eful Links	topic. In this s istive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that th of the analys expect so obta studen	its are exp e student research is of initi ed that th ained as ts are req As p Nati	pected to carry ou thas carried out s problem, develo al results thus ob the student has cor proposed in the juired to submit the per the research to ional and International s://nptel.ac.in/cou	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The work he dissertation work The opic Rest tional Journals Use urses/121/106/1211	rse Content rse Content arch work on the chosen a work including exhau- of experimental set-up emester, the students con- e experimental/computa- is should be completed k in the form of report extbooks eferences eful Links .06007/	topic. In this s istive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that the of the analys expect so obta studen	tts are exj e student research is of initi ed that th ained as ts are req As j As j Nati	pected to carry ou thas carried out s problem, develo- al results thus ob- ne student has cor proposed in the quired to submit the per the research to ional and Internat s://nptel.ac.in/cou	Count t independent research substantial research opment/fabrication otained. In fourth se npleted most of the synopsis. The work he dissertation work Transformer Depic Rest tional Journals Use urses/121/106/1211	rse Content rse Content arch work on the chosen a work including exhau- of experimental set-up emester, the students con- e experimental/computa- k should be completed k in the form of report extbooks eferences eful Links .06007/ VswCbz_jM&feature=	topic. In this s istive literature o (if any/requi ontinue their d ation works and in all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			
that the of the analysis expect so obtained studen	its are exp e student research is of initi ed that th ained as ts are req As p As p Nati	pected to carry ou thas carried out s problem, develo al results thus ob he student has cor proposed in the juired to submit the per the research to ional and Internat s://nptel.ac.in/con s://www.youtube	Count t independent research substantial research opment/fabrication otained. In fourth se mpleted most of the synopsis. The wor he dissertation wor T opic R tional Journals Us urses/121/106/1211 c.com/watch?v=mA	rse Content arch work on the chosen a work including exhau of experimental set-up emester, the students con- e experimental/computa- k should be completed k in the form of report extbooks eferences eful Links .06007/ VswCbz_jM&feature= .04073/	topic. In this s istive literature o (if any/requi ontinue their d ation works and i n all respec as per the insti	semester it is expected e survey, formulation red) and testing, and issertation work. It is d analyzed the results ts this semester. The itute rule			

CO-PO Mapping									
	Programme Outcomes (PO)								
	1	2	3	4	5	6			
CO1	1			1		2			
CO2	1		1		2	1			
CO3		2				1			
The stron	oth of monning	is to be written as	1 2 2. Where 1.1	Ju 2. Madium	2.U. ah				

Assessment								
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ESE	is a separate head	of passing.(min 40 %), LA	1+LA2 should be min 40%					
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	Lab activities,		During Week 9 to Week 16					
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30				
	journal		Week 16					
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			Course l	Information		
Progra	Programme M. Tech. (Mechanical Design Engineering)					
Class,	Semeste	r	Second Year M.	Tech., Sem III		
Cours	e Code		6DE611			
Cours	e Name		Advanced Finite	Element Method		
Desire	d Requi	sites:				
	Teachin	g Scheme		Examination Scheme	(Marks)	
Lectur	re	3 Hrs/week	MSE	ISE	ESE	Total
Tutori	ial	-	30	20	50	100
				Credits: 3	1	
		1	1			
			Course	Objectives		
1	Studen	t will be able to de	evelop his own FE	formulation for static prob	olems.	
2	Studen	t will be able to de	ecide the best suited	d method for transient ana	lysis.	
	Studen	will be able to at	opreciate the amour	nt of computational efforts	required to so	lve non
3	Linear	problem.	· · · · · · · · · · · · · · · · · · ·	r		
4	Studen	will understand	mathematical mode	lling technique for beams	and plate.	
	Student will be able to apply various beam and plate theories to develop FE model					
5	5 Through course project student will apply his understanding of FE in his/ her own field					eld
	111002	Course	Outcomes (CO) w	ith Bloom's Taxonomy I	evel	
At the	end of th	e course, the stud	lents will be able to),		
					Bloom's	Bloom's
CO		Cours	se Outcome Staten	nent/s	Taxonomy	Taxonomy
001	<u> </u>				Level	Description
	Solve r	on-linear problem	ns using FEM.	1 1 11 1		Applying
CO2	Analys	e structural analys	sis using beam, plat	e and shell elements	IV	Analysing
<u>CO3</u>	Evalua	te the given design	n problem using FE	ÊM		Evaluating
	-			-		
Modu	le		Module (Contents		Hours
I	Lin	ear static analys	is :			6
	We	ighted residual for	rmulation, shape fu	nctions, numerical integra	tions.	_
	Sol	ution methods to	solve linear trans	ient problems:		
II	Exp	licit and implicit	methods, Newman	rk family of methods, co	nditional and	7
	unc	onditionally stable	e methods and dete	rmination of correct time	step.	
	Noi	i-linear finite Ele	ement Method:			
III	Wa	ys of non-lineariti	es, mathematical tr	eatment, Picard's method,	, Newton's	7
	met	hod, advantages a	and limitations of ea	ach method, snap through	problem.	
	Ana	alysis of beams:	.1	1 1 1 5 5		
IV	Eul	er Bernoulli bean	h theory, Timoshen	iko beam theory, Formula	ation of beam	7
	eler	nent using both a	bove theories, the	ir advantages and limitat	ions, solution	
	stra	tegies to overcom	e limitations.			
	Ana	alysis of plates ar	nd shells:			
V	Bas	ics of plate theor	y, thin and thick pl	lates, FE formulation base	ed on various	7
	plate theories, plate elements, continuity requirements.					

	Course Project – self learning:				
	The student is expected to define his/ her own problem which involves				
X 7X	substantial Complications in terms of geometry, boundary conditions etc. in any	ć			
VI	field and then try to solve the same either by developing own code or using	6			
	commercially available software's. Difficulties will be discussed in class in				
	common or individually.				
	Textbooks				
1	Cook, R. D., Malkus D. D. and PleshaM. E., "Concepts and Applications of I	Finite Element			
1	Analysis", 4th edition, 2001.				
2	Bathe, K. J., "Finite Element Procedures",1st edition,2008				
2	Hughes, T. J. R., "The Finite Element Method – Linear Static and Dynamic Finite				
3	Analysis", 2012.				
	References				
1	Belytschko, T., Liu, W. K. and Moran, B., "Nonlinear Finite Elements for Contir	ua and			
1	Structures".				
2	Brebbia C. A. and Dominguez J. "Boundary Elements an Introductory Course				
	Useful Links				
1	https://www.youtube.com/watch?v=MldJ6WHCsvQ				
2	https://www.youtube.com/watch?v=cHiFQ-cESkg				
3	https://www.youtube.com/watch?v=URbiADhc_rA&list=PLD53819B88894AEI	OF			
4	https://www.youtube.com/watch?v=pCSpBYfbYYA				

CO-PO Mapping										
		Programme Outcomes (PO)								
	1	2	3	4	5	6				
CO1	2		2	2						
CO2	3				3					
CO3						3				
The sture	ath of monuting		1 2 2. W/h area 1.L	and D.M. dimme ?).TT: _1.					

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.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)							
	AY 2023-24						
			Course]	Information			
Progra	amme		M. Tech. (Mecha	nical Design Engineering)			
Class,	Semest	er	Second Year M.	Tech., Sem III			
Cours	e Code		6DE612				
Cours	e Name	9	Multi body Dyna	mics			
Desire	ed Requ	isites:	Dynamics of mac	chine, Kinematics and The	ory of machine	9	
			-				
	Teachi	ng Scheme		Examination Scheme	(Marks)		
Lectu	re	3 Hrs/week	MSE	ISE	ESE	Total	
Tutor	ial	-	30	20	50	100	
				Credits: 3	I		
		1	1				
			Course	Objectives			
	Derive	equations of moti	on for interconnect	ed bodies in multi-body sy	stems with thr	ee dimensional	
1	Motio	n.	si isi merebineti	see could in manifered by	stering with the	ee annensional	
2	Write	programs to solve	constrained differe	ntial equations for analyzi	ng multi-hody	systems	
	Lead	eam projects in ac	ademic research o	r the industry that require	modelling and	d simulation of	
3	multi-	body systems	ducinie researen o	r the mutastry that require	moderning and	a simulation of	
	mann	Course	Outcomes (CO) w	vith Bloom's Taxonomy I	evel		
At the	end of	he course, the stud	lents will be able to).			
				,	Bloom's	Bloom's	
СО		Course Outcome Statement/s			Taxonomy	Taxonomy	
					Level	Description	
CO1	Imple	mplement and analyze methods of formulating equations of IV				Analysing	
	motio	n for Interconnecte	d bodies.				
CO2	Simul	ate and analyze all	types of static and dynamic behaviours of		Ш	Applying	
	the m	ılti-body systems i	ncluding the kineto	o-static analysis.			
CO3	Demo	nstrate an improve	d technical writing	and presentation skills.	VI	Creating	
						1	
Modu	ıle		Module	Contents		Hours	
	In	troduction:					
I	Th	The method of constraints for planar kinematic analysis. Revolute, prismatic,					
-	ge	gear and cam pairs are considered together with other 2 degrees-of-freedom					
	typ	types of constraints.					
	Ba	sic principles for	analysis of multi-	body systems:			
п	Th	e automatic assem	bly of the systems	of equations for position,	velocity and	6	
	ac	acceleration analysis. Iterative solution of systems of nonlinear equations.					
	Ge	ometry of masses	~				
	Dy	namics of Planar	Systems:		11 0		
	Dy	namics of planar	systems. Systemat	tic computation and assen	nbly of mass	_	
	ma	trix. Computation	of planar general	ized forces for external fo	brces and for	7	
		uator-spring-damp	er element. Simpl	e applications of inverse	and forward		
	dy	namic analysis. Nu	imerical integration	1 OI IIrst-order initial value	problems.		
		nematics of rigid	bodies in space:	1 1	1 - 1		
IV	Re	terence trames for	the location of a	body in space. Euler angl	es and Euler	6	
	pa	ameters. The for	mula of Rodrigue	es. Screw motion in space	ce. Velocity,		
	ac	acceleration and angular velocity.					

	Kinematic analysis of spatial systems:				
X 7	Basic kinematic constraints. Joint definition frames. The constraints required for	7			
V	the description in space of common kinematic pairs (revolute, prismatic,	/			
	cylindrical and spherical). Equations of motion of constrained spatial systems.				
	Computation of Forces:				
VI	Computation of spatial generalized forces for external forces and for actuator-	6			
	spring-damper element				
	Textbooks				
1	Wittenburg, J., Dynamics of Systems of Rigid Bodies, B.G. Teubner, Stuttgart, 1	977.			
2	Kane, T.R, Levinson, D.A., Dynamics: Theory and Applications, McGraw-Hill F	Book Co., 1985			
2	Nikravesh, P.E., Computer Aided Analysis of Mechanical Systems, Prentice-Hal	l Inc.,			
3	⁵ Englewood Cliffs, NJ, 1988				
	References				
1	Roberson, R.E., Schwertassek, R., Dynamics of Multibody Systems, Springer-Ve	erlag, Berlin,			
1	1988.				
2	Haug, E.J., Computer-Aided Kinematics and Dynamics of Mechanical Systems-I	Basic Methods,			
2	Allyn and Bacon, 1989.				
3	Huston, R.L., Multibody Dynamics, Butterworth-Heinemann, 1990.				
4	Schielen, W. ed., Multibody Systems Handbook, Springer-Verlag, Berlin, 1990				
	Useful Links				
1	https://www.youtube.com/watch?v=hik3wGrz8Ws&list=PL9-				
-	f9hWLZS60x5tV2kffJ8OZm8ds2IEZJ				
2	https://www.youtube.com/watch?v=fEdz91oWrts				
3	https://www.youtube.com/watch?v=tdkFc88Fw-M				

	CO-PO Mapping								
s (PO)	rogramme Out								
4 5 6	3	2	1						
2			2	CO1					
1 3			2	CO2					
2			2	CO3					
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High									
1 2 Medium, 3:High	2,3; Where, 1:Lc	; is to be written as	2 2 gth of mapping	CO2 CO3 The streng					

Assessment

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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.

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	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)						
AY 2023-24							
			Course I	nformation			
Progr	amme		M. Tech. (Mecha	nical Design Engineering)		
Class,	Semester		Second Year M. 7	Гесh., Sem III			
Cours	e Code		6DE613				
Cours	e Name		Experimental Stre	ess Analysis			
Desire	d Requisit	tes:	Strength of mater	ial, Material Science			
			1				
	Teaching	Scheme		Examination Scheme	(Marks)		
Lectu	re	3 Hrs/week	MSE	ISE	ESE	Total	
Tutor	ial	-	30	20	50	100	
				Credits: 3			
			1				
			Course	Objectives			
1	To make	the student fam	iliar with technique	s of experimental stress a	nalysis.		
2	To study	strain gauge bri	dge configurations	and related instrumentati	on to take rea	lings.	
	To use	different polar	riscope arrangeme	ents along with auxilia	ry equipmer	t required for	
3	photoelas	ticity.		-		-	
	1 -	Course	Outcomes (CO) w	ith Bloom's Taxonomy	Level		
At the	end of the	course, the stud	ents will be able to	,			
		~	e Outcome Statement/s		Bloom's	Bloom's	
CO		Cours			Taxonomy	Taxonomy	
C01	Analyze	he photoelastic	data by various me	thods	III	Analysing	
CO2	Determin	e the strains an	d stresses in photo	elastic coating by using		Evaluating	
	Determin	e the strams an	a suesses in photo	enable counting by using	V	Draidading	
	reflection	polariscope			v		
CO3	reflection	polariscope.	nd instrumentation	for strain measurement	v III	Applying	
CO3	reflection Apply va	polariscope. rious methods a	nd instrumentation	for strain measurement.		Applying	
CO3	Apply va	polariscope. rious methods a	nd instrumentation	for strain measurement.		Applying	
CO3 Modu	Apply va	polariscope. rious methods a	nd instrumentation Module (for strain measurement.		Applying Hours	
CO3 Modu	Ile Introd	polariscope. rious methods a duction to ESA	nd instrumentation Module (: Advantages of ESA	for strain measurement.	V III	Applying Hours	
CO3 Modu	Ile Introc method	duction to ESA,	nd instrumentation Module (: Advantages of ESA	for strain measurement. Contents A techniques, Necessity of a by ESA Introduction of	f various ESA	Applying Hours 6	
CO3 Modu I	Ile Introc of Met	duction to ESA, bods, methodolog chanics of mate	nd instrumentation Module (: Advantages of ESA y of problem solvin crials	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of	III f various ESA	Applying Hours 6	
CO3 Modu I	Introd Introd Methodd Methodd Methodd Methodd Me	duction to ESA duction to ESA, duction to ESA, ods, methodolog chanics of mate	nd instrumentation Module (: Advantages of ESA y of problem solvin rials	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of	f various ESA	Applying Hours 6	
CO3 Modu I	Ile Intro Intro Intro Intro Intro Photo Theor	duction to ESA duction to ESA, buction to ESA, ods, methodolog schanics of mate belasticity: v of Photo Ela	nd instrumentation Module (: Advantages of ESA y of problem solvin trials sticity. Optics relat	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C	TIII f various ESA f few concepts prdinary light	Applying Hours 6	
CO3 Modu I	Ile Intro Introc of Me Photo Mono	duction to ESA duction to ESA, duction to ESA, duction to ESA, ods, methodolog chanics of mate Elasticity: y of Photo Elas chromatic light.	nd instrumentation Module (: Advantages of ESA y of problem solvin prials sticity, Optics relat , polarized light, na	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin	III III f various ESA few concepts ordinary light ordinary light ordinary Stress	Applying Hours 6	
CO3 Modu I	Ile Intro Introc of Me Photo Mono optic	duction to ESA duction to ESA, buction to ESA, ods, methodolog chanics of mate Elasticity: y of Photo Elas chromatic light, law in two dime	nd instrumentation Module (: Advantages of ESA y of problem solvin erials sticity, Optics relat , polarized light, na ensions abnormal ir	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin incidence, material fringe	f various ESA f various ESA few concepts ordinary light, ngence, Stress value in terms	Applying Hours 6	
CO3 Modu I	Ile Introd Apply va Ile Introd Introd of Mee Photo Theor Mono optic of str	duction to ESA duction to ESA, duction to ESA, duction to ESA, ods, methodolog chanics of mate Elasticity: y of Photo Elas chromatic light, law in two dime ess function. E	nd instrumentation Module (: Advantages of ESA y of problem solvin erials sticity, Optics relat , polarized light, na ensions abnormal ir ffect of stressed r	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin acidence, material fringe	TIII f various ESA f ew concepts ordinary light ngence, Stress value in terms pe–Isoclinics.	Applying Hours 6 7	
CO3 Modu I	Ile Intro Intro of Me Photo Optic of str Isoch	duction to ESA duction to ESA duction to ESA, duction to ESA, ods, methodolog chanics of mate Elasticity: y of Photo Elas chromatic light, law in two dime ess function, E comatics, Crite	nd instrumentation Module (: Advantages of ESA y of problem solvin prials sticity, Optics relat , polarized light, na ensions abnormal in ffect of stressed r rion for selection	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin ncidence, material fringe nodel in plane polarisco of model materials.	TIII f various ESA f ew concepts ordinary light ngence, Stress value in terms pe–Isoclinics. Properties of	Applying Hours 6 7	
CO3 Modu I	Ile Introd Apply va Ile Introd Introd of Med Photo Theor Mono optic of str Isoch comm	duction to ESA duction to ESA, buction to Elasticity: buction to Elasticity, buction, E comatics, Criter buction, employed	nd instrumentation Module (: Advantages of ESA y of problem solvin rials sticity, Optics relat , polarized light, na ensions abnormal in ffect of stressed r rion for selection photo elastic mate	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin noidence, material fringer nodel in plane polarisco of model materials, rials, Casting technique a	III III f various ESA few concepts ordinary light ngence, Stress value in terms pe–Isoclinics Properties of nd machining	Applying Hours 6 7	
CO3 Modu I	Ile Intro Introc Of Me Of Me O	duction to ESA duction to ESA duction to ESA, duction to ESA, duction to ESA, dos, methodolog achanics of mate Elasticity: y of Photo Elas chromatic light, law in two dime ess function, E comatics, Crite nonly employed del, Conclusion	nd instrumentation Module (Advantages of ESA y of problem solvin prials sticity, Optics relat , polarized light, na ensions abnormal in ffect of stressed r rion for selection photo elastic mate s pertaining to mat	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin nodel and artificial birefrin nodel in plane polarisco of model materials, rials, Casting technique a erial	III IV IV IV IV IV IV IV IV IV	Applying Hours 6 7	
CO3 Modu I	reflection Apply va Ile Intro Intro of Me Photo Theor Mono optic of str Isoch comm of mo	duction to ESA duction to ESA duction to ESA, buction to ESA, ods, methodolog chanics of mate Elasticity: y of Photo Elas chromatic light, law in two dime ess function, E comatics, Crite- nonly employed del, Conclusion ods of Analysis	nd instrumentation Module (: Advantages of ESA y of problem solvin rials sticity, Optics relat , polarized light, na ensions abnormal in ffect of stressed r rion for selection photo elastic mate s pertaining to mat	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin noidence, material fringer nodel in plane polarisco of model materials, rials, Casting technique a erial	III IV F various ESA f ew concepts ordinary light, ngence, Stress value in terms pe–Isoclinics, Properties of nd machining	Applying Hours 6 7	
CO3 Modu I	reflection Apply va	duction to ESA duction to ESA duction to ESA, duction to Elasticity: duction, E duction,	nd instrumentation Module (: Advantages of ESA y of problem solvin erials sticity, Optics relat , polarized light, na ensions abnormal ir ffect of stressed r rion for selection photo elastic mate s pertaining to mate : ction of Principal s	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin- nodel in plane polarisco of model materials, rials, Casting technique a erial tresses at given point. De	III III f various ESA f various E	Applying Hours 6 7	
CO3 Modu I II	Ile Intro Introd Mono of Me Photo Theor Mono optic of str Isoch comm of mo Meth Deter exact	duction to ESA duction to ESA duction to ESA, buction to Esa, buction, E comatics, Criter buction of dire fringe order N	nd instrumentation Module (: Advantages of ESA y of problem solvin erials sticity, Optics relat polarized light, na ensions abnormal in ffect of stressed r rion for selection photo elastic mate s pertaining to mate : ction of Principal s and the principal	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin- nodel in plane polarisco of model materials, rials, Casting technique a erial tresses at given point, Der- stress difference (σ1- σ2	III f various ESA f various ESA f ew concepts ordinary light, ngence, Stress value in terms pe–Isoclinics. Properties of nd machining termination of) at the giver	Applying Hours 6 7	
CO3 Modu I II	reflection Apply va Ile Intro Intro of Me Photo Theor Mono optic of str Isoch comm of mo Meth Deter exact point	duction to ESA duction to ESA duction to ESA, duction to Esa, duction, E duction, E	nd instrumentation Module (: Advantages of ESA y of problem solvin rials sticity, Optics relat , polarized light, na ensions abnormal in ffect of stressed r rion for selection photo elastic mate s pertaining to mate : ction of Principal s and the principal thods: Method bas	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin- nodel in plane polarisco of model materials, rials, Casting technique a erial tresses at given point, Der stress difference (σ1- σ2 ed on Hook's Law, Elec	III IV IV IV IV IV IV IV IV IV	Applying Hours 6 7 7 7	
CO3 Modu I II III	reflection Apply va lle Intro Introc metho of Me Photo Theor Mono optic of str Isoch comm of mo Meth Deter exact point, metho	duction to ESA duction to ESA duction to ESA, duction to EsA,	nd instrumentation Module (: Advantages of ESA y of problem solvin erials sticity, Optics relat polarized light, na ensions abnormal in ffect of stressed r rion for selection photo elastic mate s pertaining to mate : ction of Principal s and the principal thods: Method bas idence method. Sh	for strain measurement. Contents A techniques, Necessity of g by ESA. Introduction of ted to photo elasticity- C tural and artificial birefrin nodel in plane polarisco of model materials, rials, Casting technique a erial tresses at given point, Der stress difference (σ 1- σ 2 ed on Hook's Law, Elec ear difference method. S	III IV IV IV IV IV IV IV IV IV	Applying Hours 6 7 7	

	Strain Measurement Using Strain Gauges:							
	Introduction, types, construction and material, Gauge factor, cross or transverse							
	sensitivity, correction for transverse strain effect, semiconductor strain gauge.							
IV	Selection and Mountings of Strain Gauges: Grid, backing, adhesive, mounting	1						
	methods, checking gauge installation, Moisture proofing. Strain							
	Gauge/Circuitry: Measurement of force or load, Measurement of torque							
	Application of Strain Gauges:							
	Introduction, Analysis of strain gauge data by analytical and graphical methods,							
V	Analysis when principal stress directions are known, Analysis when principal	6						
	stress directions are unknown, Delta rosette, Tee-rosette, Four element							
	rectangular rosette, Rectangular rosette – Two and three element							
	Brittle Coating and Moir Method:							
VI	Brittle coating method - merits, demerits and applications, Moiré fringe method	6						
V I	- merits, demerits and applications, Birefringent coating-principle and working	0						
	of reflection polariscope.							
	Textbooks							
1	Dally J. W., Riley W. F. "Experimental Stress Analysis", McGraw Hill, Third Ec	lition 1991.						
2	Dr.Sadhu Singh, "Experimental Stress Analysis", Khanna Publishers, Fourth Edi	tion, 2015.						
	P 4							
	References	V						
1	Srinath, L.S., Ragnava, M.R., Lingaian, K., Garagesna, G., Pant B., Ramachandra	l, K.,						
2	"Experimental Stress Analysis", Tata McGraw-Hill, New Deini, 1984.	097						
2	Abdul Muben, "Experimental Stress Analysis", DhanpatKat& Co, First edition, I	1002						
3	window A. L., "Strain Gauge Techniques", Springer Publications, Second editio	n, 1992.						
	Ucoful Links							
1	https://www.youtube.com/watch?v=Ujtv5NY4Sq8							
	https://www.youtube.com/watch?v=n5oP5CswTAY&list=PL16JJHgYPkvMyab	XO3RVs0						
2	YoqwSdMo4YT&index=8							
2	https://www.youtube.com/watch?v=ZTXYwdPznkA&list=PL16JJHgYPkvMyab	XO3RVs0						
3	YoqwSdMo4YT&index=27							
Δ	https://www.youtube.com/watch?v=OUSDiI8UOJA&list=PL16JJHgYPkvMyab	XO3RVs0						
4	YoqwSdMo4YT&index=30							

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

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	AY 2023-24							
			Course I	Information				
Progra	amme	e	M. Tech. (Mecha	nical Design Engineerin	g)			
Class,	Seme	ester	Second Year M.	Гесh., Sem III				
Cours	e Cod	le	6DE614					
Cours	e Nar	ne	Product Lifecycle	Management				
Desire	ed Ree	quisites:	Concept knowled	ge of product design, ma	anagement			
	Teacl	hing Scheme		Examination Schem	e (Marks)			
Lectur	re	3 Hrs/week	MSE	ISE	ESE	Total		
Tutori	ial	-	30	20	50	100		
				Credits: 3	I			
			Course	Objectives				
1	Top	prepare students to de	velop products by	technical and manageria	l and software	skills.		
2	To r	nake the students fan	niliar with increase	d product complexity an	d to maintain p	product quality.		
3	Toc	levelop skills to ident	ify the gaps betwee	en current product devel	opment proces	s.		
		Course	Outcomes (CO) w	ith Bloom's Taxonomy	Level			
At the	end o	of the course, the stud	ents will be able to	,				
со		Course	e Outcome Statem	ent/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description		
CO1	Discuss the importance and the concept of Product Lifecycle II				II	Understanding		
CO2	Exp	loit the methodology	to set the Product	Lifecycle Management		Applying		
	Visi	on and Develop Prod	uct Lifecycle Man	agement strategy				
CO3	Ana	lyze the recent dev	elopments to perform product structure		IN /	Analysing		
	mod	lelling with relationsh	nip		IV			
Modu	le		Module C	ontents		Hours		
	I	Product life cycle -	- Introduction, gr	owth, maturity & dec	line, Product			
		Lifecycle, Management-Definition & Overview, Background for Product						
I		Lifecycle Management-corporate challenges, Need of Product Lifecycle						
		Management, Components/Elements of Product Lifecycle Management,						
		Emergence of Produc	t Lifecycle Management, Significance of Product					
	 T	Lifecycle Managemei	nt - life cycle probl	ems to be resolved.	11			
		Product Lifecycle Ma	f Dro du of Life cyc	le model- plan, design,	build, support			
		(CAD) engineering	dete menagement	(EDM) D roduct date	alded design			
		(PDM) computer int	uata management	(EDM), Floutet that	through into			
		Product I ifecucle	Management	omparison of Produc	e uneaus into			
п		Management to Eng	ineering resource	planning (FRP) Produ	uct Lifecycle	7		
		Management chara	incerning resource	ngularity cohesion	traceability			
		ranazonioni Unala reflectiveness Infor	mation Mirroring	Model External de	ivers scale			
		complexity avala t	mes globalization	n & regulation Interv	al drivers			
		omplexity, cycle ll productivity innove	tion collaboration	n & regulation. Intern	m drivers			
		ncome revenues δ_{r}	osts	i & quanty. Doard100	m unvers –			
	1	neome, revenues & c	000					

III	Collaborative Product Development, Mapping Requirements to specifications. Part Numbering, Engineering Vaulting, Product reuse, Engineering Change Management, Bill of Material and Process Consistency. Digital Mock up and	6				
	Prototype development. Virtual testing and collateral.					
	Introduction to Digital Manufacturing.					
	Product life cycle management system- system architecture, Information					
IV	models and product structure, Information model, the product information data	6				
	deployment of Product Lifecycle Management systems					
	Product Data issues – Access applications Archiving Availability Change					
	Confidentiality, Product Workflow, The Link between Product Data and					
	Product Workflow, Key Management Issues around Product Data and Product					
v	Workflow, Company's Product Lifecycle Management vision, The Product	7				
	Lifecycle Management Strategy, Principles for Product Lifecycle					
	Management strategy, Preparing for the Product Lifecycle Management					
	strategy.					
	Different phases of product lifecycle and corresponding technologies,					
	Foundation technologies and standards e.g. visualization, collaboration and					
VI	enterprise application integration, Core functions e.g., data vaults, document	7				
	and content management, workflow and program management, Functional	onal				
	applications e.g., configuration management. Human resources in product					
	lifecycle.					
	Textbooks					
	Grieves Michael, Product Lifecycle Management- Driving the Next Generation	of Lean				
1	Thinking, McGraw-Hill, 2006. ISBN 0071452303.					
2	Antti Sääksvuori, Anselmi Immonen, Product Life Cycle Management - Spring (Nov.5, 2003)	er, 1st Edition				
3	Stark, John. Product Lifecycle Management: 21st Century Paradigm for Product Springer- Verlag, 2004. ISBN 1852338105.	t Realization,				
4	Kari Ulrich and Steven D. Eppinger, Product Design & Development, McGraw International Edns, 1999.	Hill				
	References					
1	Product Design & Process Engineering, McGraw Hill – Kogalkusha Ltd., Toky	o, 1974.				
2	Effective Product Design and Development – by Stephen Rosenthol, Business (One Orwin,				
	Homewood 1992 ISBN 1-55623-603-4.					
3	Clement, Jerry; Coldrick, Andy; & Sari, John. Manufacturing Data Structures, J	ohn Wiley &				
	Solis, 1992. ISBN 0471152091 Claments Richard Barrett Chapter 8 ("Design Control") and Chapter 9 ("Docu	ment Control")				
4	in Quality Manager's Complete Guide to ISO 9000 Prentice Hall 1993 ISBN	013017534X				
	and a second the second to the second the second the second the second terms in terms in terms in terms in					
	Useful Links					
1	https://www.youtube.com/watch?v=MsnbqLWjlmA&list=PLeL2LKQLdbQvC	nx				
2	https://nptel.ac.in/courses/112/107/112107217/					
3	https://www.youtube.com/watch?v=NDcaDUKQutE&list=PLSGws_74K018y2	ZOnbSaqW				
4	https://www.youtube.com/watch?v=m-OMvTWf9mE					

CO-PO Mapping								
	Programme Outcomes (PO)							
	1	2	3	4	5	6		
CO1	1				1	2		
CO2			2	3		1		

CO3			2	3		1		
The strength of mapping is to be written as 1,2,3; Where, 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.

Walchand College of Engineering, Sangli								
AV 2023-24								
Course Information								
Progr	amme		M. Tech. (Mecha	nical Design Engine	eering	y)		
Class.	Semester		Second Year M.	Fech., Sem III		5/		
Cours	e Code		6IC602	· · · · · · · · · · · · · · · · · · ·				
Cours	e Name		Constitution of In	dia				
Desire	ed Reauisi	tes:						
	1							
	Teaching	Scheme		Examination So	chem	e (Marks)		
Lectu	re	2 Hrs/week	MSE	ISE		ESE	Total	
Tutor	ial	-	30	20		50	100	
				Credi	its: 0			
		1						
			Course	Objectives				
1	To review	w and create awa	areness on various	provisions in the co	nstitu	tion of India.		
		Course	Outcomes (CO) w	ith Bloom's Taxon	nomy	Level		
At the	end of the	course, the stud	ents will be able to	,			1	
		a				Bloom's	Bloom's	
CO		Course	e Outcome Statem	ent/s		Taxonomy	Taxonomy Description	
CO1	Explain	the premises in	forming the twin	themes of liberty	and	Level	Description	
	freedom	from a civil righ	ts perspective.			II	Understanding	
CO2	Address	the growth of	Indian opinion reg	arding modern Ind	dian			
	intellectu	als constitution	nal role and enti	tlement to civil	and			
	economi	c rights as well a	s the emergence of nationhood in the early		II	Understanding		
	years of I	Indian nationalis	om e					
CO3	Address	the role of socia	lism in India after	the commencemen	nt of			
	the Bols	hevik Revolutio	on in 1917 and its	impact on the in	itial	II	Understanding	
	drafting	of the Indian Co	nstitution					
Modu	ıle		Module C	ontents			Hours	
т	Histo	ry of Making	of the Indian	Constitution Dra	fting	Committee,	A	
1	(Com	position & Wor	king)					
п	Philo	sophy of the In	dian Constitution	:			4	
	Prear	nble, Salient Fea	ture				•	
	Cont	ours of Constitu	utional Rights:		_			
	Fund	amental Rights;	Right to Equality	y; Right to Freedo	om; ŀ	Right against		
	Explo	oitation; Right to	Freedom of Relig	ion; Cultural and E	ducat	ional Rights;	5	
	Right	to Constitution	al Remedies; Direc	tive Principles of Si	tate P	olicy;		
	Fund	amental Duties.						
		ns of Governar	tion Qualification	a and Diagonalification	tiona	Douvono an 1		
IV	Fund	inent, Composi	Brasidant Covern	s and Disquantical	lions,	Powers and	5	
		intment and Tra	nsfer of Judges Or	ulifications Power	isitis	Functions		
		Administratio	$\frac{1}{n}$		s anu	1 unctions		
	Distri	ct"s Administ	n. ation head Rol	and Importance	<u>ь</u> М	unicipalities		
	Intro	luction Mayor	and role of Flecter	d Representative	\sim , wi	of Municipal		
w v	Corp	oration Pachava	ti rai. Introduction	PRI: 7ila Pachava	t Fle	cted officiale	5	
V	and	their roles O	EO ZilaPachavat	Position and re	n Die Die I	Block level	5	
	Orga	nizational Hiers	rchy (Different d	epartments) Villa	ne. le	vel· Role of		
1		induitional filolo	ung (Different u	eparamento), vinag	50 10			

	Election Commission:					
VI	Election Commission: Role and Functioning. Chief Election Commissioner					
V I	and Election Commissioners. State Election Commission: Role and					
	Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.					
	· · · ·					
	Textbooks					
1	Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.					
2	M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014					
3	D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015					
	·					
	References					
1	The Constitution of India, 1950 (Bare Act), Government Publication					
	Useful Links					
1	https://en.wikipedia.org/wiki/Constituent_Assembly_of_India					
2	https://nptel.ac.in/courses/129/106/129106003/					
3	https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-1w02/					
4	https://eci.gov.in/about/about-eci/the-functions-electoral-system-of-india-r2/					

	CO-PO Mapping								
	Programme Outcomes (PO)								
	1	2	3	4	5	6			
CO1			1						
CO2	2								
CO3		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 course n	nust 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 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.

AY 2023-24 Course Information									
Course Information		AY 2023-24							
	Course Information								
Programme M. Tech. (Mechanical Design Engineering)									
Class, Semester Second Year M. Tech., Sem IV									
Course Code 6DE691									
Course Name Dissertation Phase IV									
Desired Requisites:									
Teaching Scheme (Hrs) Examination Scheme (Marks)								
Practical 10 LA1 LA2 ESE		Total							
Interaction - 100 0 0		100							
Credits: 5									
Course Objectives									
To develop the student to apply the knowledge gained to identify problem for re	esearch pro	ovide the							
solutions by self-study and interaction with stake holders	1								
2 Acquire knowledge to tackle real world problems of societal concerns									
3 Impart flexibility to the student to have increased control over his/ her learning.									
4 Teachers would serve as mentor/facilitator of inquiry and reflection rather than a	as an instru	uctor							
5 Enhance student's learning through increased interaction with peers and colleag	ues.								
Course Outcomes (CO) with Bloom's Taxonomy Level									
At the end of the course, students will be able to,	Rloom's	Bloom's							
CO Course Outcome Statement/s Ta	axonomv	Taxonomy							
	Level	Description							
CO1 Search the existing literature and identification of research problem	IV	Analysing							
CO2 Design and develop the solution for complex engineering problem	V	Evaluating							
CO3 Create the new knowledge in the specialized field	VI	Creating							
Course Contents									
Students are expected to carry out independent research work on the chosen top	pic. In this	semester it is							
expected that the student has carried out substantial research work including exha	austive lite	erature survey,							
and testing and analysis of initial results thus obtained. In fourth semester, the	sel-up (11	any/required)							
dissertation work. It is expected that the student has completed most of the ex	xperimenta	1/computation							
works and analyzed the results so obtained as proposed in the synopsis. The wo	ork should	be completed							
in all respects in this semester. The students are required to submit the dissertat	tion work	in the form of							
report as per the institute rule.									
Text Books									
1 As per the research topic									
D_£									
Keierences 1 National and International Journals									
Ucoful Links									
1 https://nptel.ac.in/courses/110/104/110104073/									
1 mtps.// nptc1.ac.m/codises/110/104/110104075/									

	CO-PO Mapping								
			Programme O	utcomes (PO)					
	1 2 3 4 5 6								
CO1	1			1		2			
CO2			1		2				

CO3		2				2
The strengt	h of mapping is	to be written as	1,2,3; Where, 1:	Low, 2:Medium	, 3:High	
Each CO of	f the course mus	t map to at least	one PO.			

Assessment									
There are thre IMP: Lab ES	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 Sem)	Marks					
ТА1	Lab activities,	Lab Course	During Week 1 to Week 6	20					
LAI	attendance, journal Faculty Marks Submission at t		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					
Lab ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40					
LauESE	attendance, journal 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 semester. Th	e actual schedule	shall be as per academic calendar. Lab activit	ities/Lab					
performance	shall include performi	ng experiments, n	nini-project, presentations, drawings, program	nming					

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								
	AV 2023-24								
	Course Information								
Progra	amme		M. Tech. (Mechanical D	esign Engineering)					
Class Samester Second Vear M Tech Sem IV									
Course	e Code		6DE692						
Cours	e Name		Dissertation Phase V						
Desired Requisites.									
	u nequisi								
Tea	ching Sch	eme (Hrs)	Exa	amination Scheme (M	(arks)				
Practi	cal	10	LA1	LA2	ES	SE	Total		
Intera	ction	-	0	100	()	100		
				Credits: 5		-			
			Course Obje	ectives					
	To devel	op the student	to apply the knowledge ga	ained to identify proble	m for rese	arch provi	de the		
1	solutions	s by self-study	and interaction with stake	holders		1			
2	Acquire	knowledge to	tackle real world problems	s of societal concerns					
3	Impart fl	exibility to the	student to have increased	control over his/ her le	earning.				
4	Teachers	s would serve a	as mentor/facilitator of inq	uiry and reflection rath	er than as	an instruct	or		
5	Enhance	student's learn	ang through increased into	eraction with peers and	colleague	S			
At the	end of the	course studer	ts will be able to	Ioom s raxonomy Le	vei				
			its will be uble to,			Bloor	n's		
СО		Course Outco	me Statement/s	Bloom's Taxonomy	y Level	Taxon Descrij	omy ption		
CO1	Search the	he existing lite ch problem	erature and identification	IV		Analy	sing		
CO2	Design a engineer	and develop tl	he solution for complex	V		Evalua	ıting		
CO3	Create t	he new know	ledge in the specialized	VI		Creat	ing		
	<u> </u>		Course Con	itents	<u> </u>	x .11			
	Students	are expected f	to carry out independent re	esearch work on the ch	osen topic	. In this se	mester		
	literature	e survey form	lation of the research prob	substantial research	vork filer	experiment	ausuve		
	up (if an	y/required) and	d testing, and analysis of i	nitial results thus obtai	ned. In for	urth semes	ter, the		
	students	continue their	dissertation work. It is ex	pected that the student	has comp	leted most	t of the		
	experime	ental/computat	ion works and analyzed th	ne results so obtained a	is propose	d in the sy	nopsis.		
	The wor	k should be co	mpleted in all respects in	this semester. The stuc	lents are r	equired to	submit		
	the disse	ertation work in	the form of report as per	the institute rule.					
			Text Roo	ks					
1	As pe	er the research	topic						
			•						
			Reference	es					
1	Natio	onal and Intern	ational Journals						
		// . 1	Useful Lin	nks					
1	https://	://nptel.ac.in/co	ourses/110/104/110104073	5/					
			CO-PO May	nning					

Programme Outcomes (PO)

C01				1		
CO2	1		1		2	2
CO3		2				2
The strengt	h of manning is	to be written as	1 2 3· Where 1·	·Low 2. Medium	3.High	

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	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	30					
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 activities,	Lab Course	During Week 15 to Week 18	40					
Lab ESEattendance, journalFacultyMarks Submission at the end of Week 1840									
Week 1 indic	ates starting week of a	semester. The typ	bical 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 l	Information				
Progra	amme		M. Tech. (Mechai	nical Design Engineering	g)			
Class,	Semester		Second Year M. 7	Гесh., Sem IV				
Cours	e Code		6DE693					
Cours	e Name		Dissertation Phase	e VI				
Desire	d Requisi	tes:						
Теа	ching Sch	neme (Hrs)		Examination Schem	e (Marks)			
Practi	cal	12	LA1	LA2	ESE	Total		
Intera	ction	-	0	0	100	100		
				Credits: 6				
		1						
			Course	Objectives				
1	To devel	op the student to	o apply the knowled	dge gained to identify pr	oblem for rese	earch provide the		
1	solutions	by self-study a	nd interaction with	stake holders		-		
2	Acquire	knowledge to ta	ckle real world pro	blems of societal concer	ns			
3	Impart fl	exibility to the s	student to have incr	eased control over his/ h	er learning.			
4	Teachers	would serve as	mentor/facilitator	of inquiry and reflection	rather than as	an instructor		
5	Ennance	Student's learni	ng through increase	ith Bloom's Taxonomy	and colleague	es.		
At the	end of the	course student	s will be able to		Levei			
		course, student	s will be uble to,		Bloom's	Bloom's		
СО		Cours	e Outcome Statem	nent/s	Taxonomy	Taxonomy		
					Level	Description		
CO1	Search th	e existing litera	ture and identificat	ion of research problem	IV	Analysing		
CO2	Design a	nd develop the	solution for comple	x engineering problem	V	Evaluating		
<u>CO3</u>	Create th	e new knowled	ge in the specialize	d field	VI	Creating		
			0	0 4 4				
	<u><u> </u></u>	. 1.	Course	e Contents	1 ()	T (1)		
	Students	are expected to	carry out independ	lent research work on the	e chosen topic	. In this semester		
	literature	survey formula	ation of the research	n problem development/	fabrication of	experimental set-		
	up (if any	y/required) and	testing, and analysi	s of initial results thus o	btained. In for	irth semester, the		
	students	continue their d	issertation work. It	is expected that the stud	lent has comp	leted most of the		
	experime	ental/computation	on works and analy	zed the results so obtain	ed as proposed	1 in the synopsis.		
	The worl	k should be com	pleted in all respec	cts in this semester. The	students are re	equired to submit		
	the disse	rtation work in	the form of report a	is per the institute rule.				
			Тех	t Books				
1	As pe	er the research to	opic					
	P		. .					
			Ref	erences				
1	Natio	nal and Internat	ional Journals					
			Usef	ul Links				
1	https:	//nptel.ac.in/cou	urses/110/104/1101	04073/				

CO-PO Mapping									
	Programme Outcomes (PO)								
	1	1 2 3 4 5 6							
CO1	1			1		2			
CO2	1		1		2	2			

CO3		2				2
The strengt	h of mapping is	to be written as	1,2,3; Where, 1:	Low, 2:Medium	, 3:High	
Each CO of	f the course mus	t map to at least	one PO.			

Assessment									
There are thre IMP: Lab ES	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 Sem)	Marks					
ТА1	Lab activities,	Lab Course	During Week 1 to Week 6	20					
LAI	attendance, journal Faculty Marks Submission at t		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					
Lab ESE	Lab activities,	Lab Course	During Week 15 to Week 18	40					
LauESE	attendance, journal 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 semester. Th	e actual schedule	shall be as per academic calendar. Lab activit	ities/Lab					
performance	shall include performi	ng experiments, n	nini-project, presentations, drawings, program	nming					

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 Aldea Autonomous Institute)											
Course Information											
Programme M Tech (Mechanical Design Engineering)											
Class. Semester			Second Year M. Tech., Sem IV								
Cours	e Code		6IC601								
Cours	e Name		Value Education								
Desire	d Requisi	tes:									
	Teaching	Scheme		Examination Schen	ne (Marks)						
Lectur	re	2 Hrs/week	MSE ISE 1		ESE	Total					
Tutori	ial	-	30	20	50	100					
			Course	Objectives							
1	To impar	t knowledge on	value of education	and self- development.							
2	To imbib	e good values ir	n students.								
3	To highli	ght importance	of character.	:th Dloom's Toyonomy	. L aval						
At the	end of the	course students	s will be able to	ith bloom's raxonomy							
		course, student			Bloom's	Bloom's					
СО		Course	e Outcome Statem	ent/s	Taxonomy	Taxonomy					
	F 1 ·	1 0 1	1 10 1 1		Level	Description					
COI	Explain v	alue of education	on and self-develo	pment.		Understanding					
CO2	developn	int.	of good chara	cier, and Benaviour	V	Evaluating					
Modu	le		Module C	ontents		Hours					
Modu	le Value	es and self-deve	Module C elopment –Social v	ontents values and individual at	ttitudes. Work	Hours					
Modu I	le Value ethics	es and self-deve , Indian vision d	Module C clopment –Social v of humanism, Mora	ontents values and individual at and non- moral valuat	titudes. Work ion. Standards	Hours 6					
Modu I	le Value ethics and p	es and self-deve , Indian vision or rinciples, Value	Module C clopment –Social v of humanism, Mora judgments.	contents values and individual at and non- moral valuat	ttitudes. Work ion. Standards	Hours 6					
Modu I II	le Value ethics and p Impor confid	es and self-deve , Indian vision of rinciples, Value rtance of cultiva lence, Concent	Module C elopment –Social v of humanism, Mora judgments. ation of values, Se ration. Truthfulnes	contents values and individual at al and non- moral valuat ense of duty. Devotion, ss. Cleanliness, Honest	titudes. Work ion. Standards Self-reliance, ty, Humanity.	Hours 6					
Modu I II	le Value ethics and p Impor confid Powe	es and self-deve , Indian vision of rinciples, Value rtance of cultiva dence, Concent r of faith, Nation	Module C clopment –Social v of humanism, Mora judgments. ation of values, Se ration. Truthfulnes nal Unity, Patriotis	contents values and individual at and non- moral valuat ense of duty. Devotion, ss, Cleanliness, Hones m, Love for nature, Disc	ttitudes. Work ion. Standards Self-reliance, ty, Humanity, cipline.	Hours 6 6					
Modu I II	le Value ethics and p Impor confid Powe Perso	es and self-deve , Indian vision of rinciples, Value rtance of cultiva dence, Concent r of faith, Nation nality and Behav	Module C elopment –Social v of humanism, Mora judgments. ation of values, Se ration. Truthfulnes nal Unity, Patriotis viour Development	contents ralues and individual at al and non- moral valuat ense of duty. Devotion, ss, Cleanliness, Honest m, Love for nature, Disc - Soul and Scientific att	titudes. Work ion. Standards Self-reliance, ty, Humanity, cipline. itude. Positive	Hours 6 6					
Modu I II	le Value ethics and p Impor confid Powe Perso Think	es and self-deve , Indian vision of rinciples, Value rtance of cultiva dence, Concent r of faith, Nation nality and Behav ing. Integrity an	Module C clopment –Social w of humanism, Mora judgments. ation of values, Se ration. Truthfulnes nal Unity, Patriotis viour Development ad discipline, Punct	contents values and individual at and non- moral valuat ense of duty. Devotion, ss, Cleanliness, Honest m, Love for nature, Disc - Soul and Scientific att uality, Love and Kindne	ttitudes. Work ion. Standards Self-reliance, ty, Humanity, cipline. itude. Positive ss, Avoid fault	Hours 6 6					
Modu I II	le Value ethics and p Impor confid Powe Perso Think Think	es and self-deve , Indian vision of rinciples, Value rtance of cultiva dence, Concent r of faith, Nation nality and Behav ting. Integrity an ting, Free from	Module C elopment –Social v of humanism, Mora judgments. ation of values, Se ration. Truthfulnes nal Unity, Patriotis viour Development ad discipline, Punct anger, Dignity of rue friendship. He	contents ralues and individual at al and non- moral valuat ense of duty. Devotion, ss, Cleanliness, Honest m, Love for nature, Disc - Soul and Scientific att uality, Love and Kindne of labour universal bro	titudes. Work ion. Standards Self-reliance, ty, Humanity, cipline. itude. Positive ss, Avoid fault otherhood and love for truth	Hours 6 6 7					
Modu I II III	le Value ethics and p Impor confid Powe Perso Think Think religio Awar	es and self-deve , Indian vision of rinciples, Value rtance of cultiva dence, Concent r of faith, Nation nality and Behav ting. Integrity an ting, Free from pous tolerance, T e of self-destruc	Module C elopment –Social w of humanism, Mora judgments. ation of values, Se ration. Truthfulnes nal Unity, Patriotis viour Development ad discipline, Punct anger, Dignity of True friendship, Ha etive habits, Associ	contents ralues and individual at al and non- moral valuat ense of duty. Devotion, ss, Cleanliness, Honest m, Love for nature, Disc - Soul and Scientific att uality, Love and Kindne of labour universal bro appiness vs. suffering, ation and Cooperation,	ttitudes. Work ion. Standards Self-reliance, ty, Humanity, cipline. itude. Positive ss, Avoid fault otherhood and love for truth, Doing best for	Hours 6 6 7					
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4	https://trudreadz.com/2019/09/10/blind-faith-in-religion-destroys-our-ability-to-critically-
	think-for-ourselves/

CO-PO Mapping										
	Programme Outcomes (PO)									
	1	2	3	4	5	6				
CO1	2				1	2				
CO2	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 course must map to at least one PO.										