GOVERNMENT COLLEGE OF ENGINEERING KARAD

(An Autonomous Institute of Government of Maharashtra)



DEPARTMENT OF MECHANICAL ENGINEERING

CURRICULA FOR SECOND YEAR B.TECH MECHANICAL ENGINEERING AS PER NEP-2020 W.E.F AY 2024-25

SY B.TECH MECHANICAL ENGINEERING

COURSE SYLLABI

FOR

SEMESTER III

				Government College of Engineering, Karad	1							
			Seco	ond Year (Sem – III) B. Tech. Mechanical Engi	ineering							
			Μ	IE 3301: Mathematics for Mechanical Engine	ering							
Teac	hing S	Scheme	e]	Examination Sche	ne						
Lectu	ıres		02 Hrs/week		MSE	20						
Tuto	rials				ISE	20						
Total	Crec	lits	02]	ESE	60						
]	Duration of ESE	02 Hrs 30) Min					
Pre-I	Requi	site:										
Cour	se Ou	itcome	s (CO): student	s will be able to -		1 . 1	1					
COL	Solve	e Linea	r Differential ec	quations with constant coefficients arising in Engineer	ring domain using a	nalytical a	approach.					
CO2	To tr	ansform	n the time funct	tion to frequency function and vice-versa which is use	eful in solving mech	anical pro	blems					
CO3	O3 Solve Partial differential equations and apply it to solve engineering problems.											
CO4	Equi	pped w	ith different for	ms of Matrices which are useful in solving engineering	problems.	T	1					
	Course Contents											
Unit	Unit 1 Matrices:											
	t t	Quadra	tic Forms, Re mation Classifi	ication of Definiteness of Quadratic Forms	using Orthogona	1						
T T •4	<u> </u>	• •					(07)					
Unit	2 L	inear I	form complete	uations with Constant Coefficients:	ling complementer		(05)					
	U fu	eneral	Porticular Inter	arel Pules for finding particular integral	ing complementary	/						
	IU	inction,	, Farticular lines	grai, Rules for finding particular integral.								
Unit	3 1	Partial	Differential Ed	quations:		CO3	(05)					
		Solution	n of homogene	eous linear equations with constant coefficients,	Rules for finding	5						
TT •4	4			Differential Earrationer			(04)					
Unit	4	Applica Method	ations of Partia L of Separation	of variables Solution of Wave equation Solution	of One dimensiona		(04)					
	1	neat flo	w equations.	or variables, boration of wave equation , boration	of one unicipiona	- -						
Unit	5]	Fourie	r Transform:			CO2	(04)					
]	Fourier	Integral Theor	rem (without proof), Fourier Transform: Properties of	f Fourier Transform	-						
]	Lineari	ty, Shifting, Cha	ange of scale, Derivative.								
Unit	6]	Inverse	e Fourier trans	sform: Inverse Fourier Sine and Cosine transforms. I	Introduction to finite	e CO2	(03)					
]	Fourier	transform.									
Assig	nmer	nts										
1.	Evalı	uation o	of Laplace trans	form and inverse Laplace transforms								
2.	Solut	tion of	differential equa	ations related to mechanical domain								
3.	Usin	g Fouri	er Transform c	onvert time domain data to frequency domain data								
4.	Solut	tion of	Problems on wa	ave equation and heat equation								
5.	Use of	of matr	ix method to sol	lve linear differential equations, conversion from quad	lratic to canonical fo	orm etc.						
Text	xt Books											
1.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010,2016											
2.	H.K	.DASS	"Advance Engi	ineering Mathematics" S.Chand publications. Fifteent	th revised edition 20	06.						
3.	B.S.	Grewa	ıl, Higher Engin	eering Mathematics, Khanna Publishers, 43 rd Edition,	, 2000.							
4.	Deb	ashis D	atta "Textbook	of Engineering Mathematics" 'New Age Internationa	al Publication revise	dsecond e	edition.					
Refere	ence E	Books			44							
1.	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 th Reprint, 2010.											
2.	Erw	in Krey	szig, Advanced	Engineering Mathematics, 9th Edition, John Wiley &	& Sons, 2006.							
3.	Vee	raraian	T., Engineering	g Mathematics for first year, Tata McGraw-Hill. New	Delh1.2008.							

Useful	Links
1.	http://nptel.iitm.ac.in

$PO \rightarrow CO \downarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	2	5	5
Understand	3	5	10
Apply	5	5	15
Analyse	5	5	10
Evaluate	5	-	20
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad Second Vear (Sem – III) B. Tech. Mechanical Engineering												
	Second Year (Sem – III) B. Tech. Mechanical Engineering ME3302: Engineering Thermodynamics												
		ME3302: Engineering Thermodynamics											
Teaching	Scheme	Examination S	cheme										
Lectures	03 Hrs/week	MSE	20										
Tutorials		ISE	20										
Total Cre	dits 03	ESE	60	20.24									
D D		Duration of ES	E = 02 Hrs	s 30 Min									
Pre-Requ	isite: Nil	11 11											
Course O	• Outcomes: students will be able to -												
	Understand the concepts of entropy, available and unavailable energy.												
CO2	Apply concept of ste	am generation and analyze vapor power cycle.											
CO3	Analyze and evaluat	e concepts in steam nozzles and steam turbine.											
CO4	Illustrate in air comp	pressor and Jet propulsion.											
	1												
		Course Contents		CO	Hours								
Unit 1	Recapitulation of F	undamentals											
	The Clausius Inequ	ality, Entropy, increase in entropy principle, Entropy balance	e, Entropy	CO1									
	generation, Evaluat	ion of the entropy change, 1-ds relation, entropy change of ideal gases. Third law of thermodynamics Au	r solid and	COI	(6)								
	Inquius, entropy ch Unavailable energy	lange of ideal gases, finite law of thermodynamics, Ava	mable and										
Unit 2	Pure Substances												
Unit 2	Definition of Pure	substance Ideal Gases and ideal gas mixtures. Real gases a	nd real gas										
	mixtures. Compress	ibility charts- Properties of two-phase systems - Const. temp	erature and	~~~	-								
	Const. pressure heat	ing of water; Definitions of saturated states; P-v-T surface; U	se of steam	CO2	(7)								
	tables, Saturation t	ables; Superheated tables; Identification of states & deterr	nination of										
	properties, Mollier's	s chart.											
Unit 3	Vapour Power Cyc	les :											
	Vapor power cycles	Rankine cycle with superheat, reheat and regeneration, exerg	gy analysis.										
	Supercritical and ul	tra-super-critical Rankine cycle- Gas power cycles, Air sta	ndard Otto,	CO2	(7)								
	Diesel and Dual c	ycles-Air standard Brayton cycle, effect of reheat, regene	eration and	002	(,)								
	intercooling- Combi	ned gas and vapor power cycles- Vapor compression refrigera	tion cycles,										
TT •4 4	refrigerants and their	r properties.											
Unit 4	Steam Nozzle :	Critical processory notion. Maximum discharge condition. Effect	of fastion										
	Design of throat a	nd exit areas Nozzle efficiency Velocity coefficient Co	of faction,	CO3	(7)								
	discharge Supersati	urated flow Degree of under-cooling and degree of super	saturation	0.05	(7)								
	Effects of super satu	ration.	saturation,										
Unit 5	Steam turbine:			1									
	Introduction, Classi	fication of turbine Difference between Impulse and reac	tion steam	002									
	turbine, Velocity di	agrams, Flow through impulse reaction blades, Velocity di	agram, and	003	(7)								
	degree of reaction, F	Parson's reaction turbine.											
Unit 6	Air Compressors	Uses of compressed air, Classification of compressor. Air	compressor										
	terminology, Recip	procating compressors, Ideal single stage air compress	or, Rotary										
	compressors – Centr	ifugal and axial type.		~~ .									
	Gas turbine and Je	t propulsion		CO4	(6)								
	Introduction, Classi	fication – Constant pressure gas turbine, Constant volume gas	turbine, Jet										
	(For unit 6 Descript	ive treatment only)											
	(For unit 0 -Descript	ive deathent only)		L	I								
Toyt Dool	76												
1 D	K Nag Engineering T	hermodynamics. Tata McGraw Hill Publications 6 th edition	2017										
$\frac{1}{2}$ Th	ermodynamics and Th	ermal Engineering J. Rajaduraj New age international 1st editi	on 2018										
$\begin{array}{c c} \underline{2} & \Pi \\ \hline 3 & \Pi \\ \hline \end{array}$	ermal Engineering M	ahesh M. Rathore Tata McGraw Hill Publications First edition	2010										
J. 11	ermai Engineering, M		, 2010										

Refer	rence Books								
1.	Engineering Thermodynamics, J.B. Jones and Dugan, Prentice –Hall Of India, 1st edition, Reprint in India 2006								
2.	Y. Cengel& Boles: Thermodynamics – An Engineering Approach 9 th edition Reprint 2017								
3.	Fundamental of Engineering Thermodynamics, Rathakrishnan, Prentice –Hall Of India, 2nd edition, 2005								
4.	S. Domkundwar, C. P. Kothandaraman, Anand Domkundwar, A course in Thermal Engineering, Dhanpat Rai								
	Publishers 3rd edition, 2017								
Usefu	l Links								
1.	https://onlinecourses.nptel.ac.in/noc20_ce27/preview (IIT Madras)								
2.	https://onlinecourses.nptel.ac.in/noc23_me65/preview (IIT Delhi)								
3.	https://onlinecourses.swayam2.ac.in/nou23_me01/preview (Indira Gandhi National Open University)								

$PO \rightarrow CO \downarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	1	1	1	-	1	1	-	-	-	-	2	3	2	2
CO 2	3	1	1	1	-	1	1	-	-	-	-	2	3	2	2
CO 3	3	2	2	2	-	1	1	-	-	-	-	2	3	3	3
CO 4	3	1	1	1	-	1	1	-	-	-	-	2	3	2	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	10
Understand	10	5	10
Apply	5	5	15
Analyse	-	5	10
Evaluate	-	-	15
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad										
		Seco	ond Yea	ar (Sem – III)	B. Tech. Mech	hanical	Engineer	ing			
			1	ME 3303: 1	Material Engin	neering					
Teaching	Schem	e					Examinati	ion Schem	e		
Lectures		03 Hrs/week					MSE	20)		
Tutorials		-					ISE	20)		
Total Cre	dits	03					ESE	60)		
							Duration o	f ESE 02	2 Hrs	s 30 Min	
Pre-Requ	isite: N	il									
Course O	utcome										
CO1	Understand basic of solidification, different types of nucleation, cooling curve and draw phase diagra										
CO2	Comp	rehend the kno	owledge	about ferrous, 1	non-ferrous metal	l and the	ir heat trea	tment proc	ess		
CO3	Outlin	e and appreciat	te the ad	vancements in	materials enginee	ering rela	ated to com	posites, ce	rami	ics, and p	olastics
CO4	Analy	ze and select m	naterials	for specific app	olications.			-			
				Cours	e Contents					CO	Hours
Unit 1	Intro	duction to Mat	terials a	nd Phase Diag	ram						
	Meta	lic and Non-r	metallic	materials and	its classification	on(metal	s/alloys, r	olymers a	nd		
	comp	osites), Crystal	systems			× ·	J / 1	2			
	a) Ty	pes of Dislocation	tions; Sli	ip Systems; Pla	stic Deformation	n by Slip	and Twin	ning in sin	gle		
	crysta	and polycry	ystalline	material, Str	ain hardening	Cold w	orking, R	lecovery a	ind	CO1	$\langle 0 \rangle$
	Recry	stallization	•		C		C C	•		COI	(8)
	b) So	lid solutions and	d interm	ediate phases,	Gibbs phase rule						
	c) All	oy formation by	y crystal	llization, Nucle	ation and growth,	, Coolin	g curves,				
	d) Co	onstruction of e	equilibriu	um diagrams fr	om cooling curv	ves, Ison	norphs syst	tem, Eutec	tic,		
	Partia	l solubility, Lev	ver arm	principles.	-						
Unit 2	Engi	neering Materi	ials								
	Ferre	ous materials									
	Introd	luction to Fe-Fe	e3C equi	ilibrium diagraı	n, Steel, Plain ca	rbons ste	eel, Alloy	steel			
	a) Fre	e cutting steels.	s, HSLA	high carbon lov	w alloy steels, Ma	araging	steels, Cree	ep resisting		CO2	(6)
	steels	, Stainless steel	ls-differe	ent types. Tool	steels-types, HSS	5					
	b) Sp	ecifications base	sed on -I	S, BS, SAE, AI	SI						
	Cast	lrons-Classifica	ation, pro	operties and pro	duction process						
Unit 3	Non-	ferrous materia	ials								
	a) Co	pper based allog	ys brass	es Cu-Zn, Bron	zes Cu-Sn, Cu-B	e, and C	u-Ni.				
	b) Al	uminium based	l alloys A	Al-Cu (Duralum	in)Al-Si (Modifi	ication).				CO2	(6)
	c) Pb	-Sn (Solders and	d fusible	e alloys)						002	(0)
	d) Sn	-Sb alloys (Bab	obits)								
	e) T1	(T1-6Al-4V)									
Unit 4	Princ	riples of heat tr	reatmen	t							
	Trans	formation of au	ustenite	into Pearlite, B	ainite and Marter	nsite on	cooling. T	TT –Diagr	am		
	and C	CT -Diagrams	-signific	cance, Effect of	alloying element	ts on T'T	T diagram.				
	a) He	at treatment of	of steels	. 1 10 1	1 1.						
	I. Ani	healing – I ypes-	-Full, Pa	irtial and Sub ci	ritical annealing						
	II. N	ormalizing-Purp	poses, H	lardening and I	empering Types,	,				CO2	(7)
		Themical heat	ig -Flam	e and induction	handaning Ca	mbaaniaina	Nituidin	a Cumidi			
	LIV. Corbe	netriding	. ueaun	ents for case	naruening -Cal	LOUIISINE	s, initialiti	ig, Cyllidi	ng,		
	\mathbf{b} $\mathbf{H}_{\mathbf{d}}$	of treatment o	of Non_f	orrous Allovs							
	I An	ai ii caiment 0 pealing_Stress r	relief Do	crystallization	and Process anno	aling					
		cinitation hard	lening _F	Arystanization	nts Stages Com	umon alle	WS				
Unit 5		nco Motoriala	iennig -L	asic requireme	nis, Stages, Colli		<i>y</i> s				
Unit 5	Cere	mics : Ceramics	s Types	and application	is of ceramics						
	Polvr	ners :-Introduct	tion to F	olymers Class	ification of Polyn	mers Th	ermonlaste			CO3	(7)
	Therr	nosets Elastom	ners	orymers, Class	incarion of 1 oryi		ermoptusts	,			
	Inch	nosets, Liastom									

	Composite material:-Introduction to Composite, Classification of composites,		
	, Mechanical properties of composites		
	Bio- Materials:-Classes of materials used in medicine ,and Application of materials in		
	medicine		
	Smart materials:- classification, specific types : Shape Memory Alloys, Piezoelectric		
	Materials, Magnetostrictive Materials, Magneto-Rheological Fluids, Electro-Rheological		
	Fluids		
Unit 6	Properties of materials and its selection		
	Properties of materials :- Mechanical Properties, Electrical properties, Thermal properties,		
	Magnetic properties, Optical properties,		
	Material selection for engineering Materials	CO4	(6)
	Exploring materials using materials property charts, Materials selection process:		
	Translation, Screening ,Ranking , Supporting information, Selecting materials: materials		
	indices, Case studies		
Assignme	nt:- Assignment based Selection of material for specific application		
Text Book	is a second s		
1.	V.D. Kodgire, "Material science and metallurgy for engineers", Everest Publishers Pune,44 th 20	018	
2.	W. D Callister, "Material science and engineering", Wiley India Pvt. Ltd., 5 th Edition.		
3.	T.V. Rajan / C.P. Sharma, "Heat Treatments Principles and Practices", Prentice Hall of Ind	lia Pvt L	td, New
	Delhi		
Reference	Books		
1.	R.A. Higgins, "Engineering Metallurgy", Viva Books Pvt. Ltd., New Delhi, 1 st Edition,		
2.	S.H. Avner, "Introduction to physical metallurgy", Mcgraw Hill Book Company Inc, 2 nd edition	n (1 July	2017)
3.	Michael F. Ashby "Materials Selection in Mechanical Design" Fourth Edition • 2011 Butterv	vorth-He	inemann
	publication		
4.	D. S. Clark, W. R. Varney, "Physical Metallurgy for Engineers", AN East West Press Pvt. Ltd	., New D	Delhi, 2 nd
	Edition,1962	41-	
5.	V Raghwan, "Material Science and Engineering", Prentice Hall of India Pvt. Ltd., New Delhi,	6 th Editio	n, 2015.
6.	J L Smith and SC Bhatia, "Heat Treatment of Metals", CBS Publishers and distributors, New	Delhi, 1	st edition,
	2008.		
Useful Lin	lks		
1.	https://archive.nptel.ac.in/courses/113/102/113102080/		
2.	https://archive.nptel.ac.in/courses/112/108/112108150/		

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	2	2	1	1	-	-	-	-	-	-	-	2	2	-	-
CO 2	1	1	-	-	-	-	-	-	-	-	-	-	3	-	1
CO 3	2	2	1	1	-	-	-	-	-	-	-	2	1	-	2
CO 4	2	2	1	-	-	-	-	-	-	-	-	2	3	-	2

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	-	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

			Gove	ernment Co	ollege of	Engineering,	Karad				
		Sec	cond Yea	ar (Sem – I	III) Mech	anical Engine	eering M	linor			
			Μ	IE 3304: (N	MDM I)-	Material Scie	nce				
Teaching	Schem	e					Examin	ation Sch	eme		
Lectures		02 Hrs/week					MSE		20		
Tutorials		-					ISE		20		
Total Cre	dits	02					ESE		60		
							Duratior	n of ESE	02 Hr	s 30 Min	l
Pre-Requi	isite: N	il									
Course O	utcome	s: students will	be able t	0 -						1.	
<u>CO1</u>	Under	stand basic of s	solidifica	tion, differen	nt types of	nucleation, coc	oling curve	e and drav	v phase	diagram	S
<u>CO2</u>	Comp	rehend the kno	wledge a	bout ferrous	s, non-ferro	bus metal and th	eir heat tr	eatment p	rocess	· 1	1
CO3	Outlin	e and appreciat	te the adv	ancements 1	n material	s engineering re	lated to co	omposites	, ceram	ics, and j	plastics
C04	Analy	ze and select m	aterials fo	or specific a	pplications	8.					
				C	C	4				CO	TT
TI #4 1	Terdera	J	4	Cou	rse Conto	ents				CO	Hours
Unit I	Intro Motol	duction to Mai	terial Sci	ence motoriola	nd its als	acification(mat		nolumor	and		
	comp	osites) Crystal		materials a	nu ns cia	issification(meta	als/alloys,	porymer	s and	COL	(4)
	a) Ty	nes of Dislocati	ions: Slin	Systems P	Plastic Def	ormation by Sli	n and Tw	inning in	single	COI	(4)
	crysta	and polycryst	alline ma	terial Strain	hardening	Cold working		mining m	single		
Unit 2	Engi	neering Materi	ials			5 0 0 1 0 1 0 1 1 1 9					
0	Ferro	ous materials									
	Introc	luction to Fe-Fe	e3C equil	ibrium diagr	ram, Steel,	Plain carbons s	teel , Allo	by steel			
	a) Fre	e cutting steels,	, HSLA h	nigh carbon l	low alloy s	steels, Maraging	steels, C	reep resist	ing	CO2	(4)
	steels	, Stainless steel	s-differer	nt types. Too	ol steels-ty	pes, HSS		-	-		
	b) Sp	ecifications base	ed on -IS	, BS, SAE, A	AISI						
	Cast 1	rons-Classifica	tion, prop	perties and p	roduction	process					
Unit 3	Non-	ferrous materia	als							CO2	(4)
TT 1 (A	Study	of non-ferrous	materials	S						001	(-)
Unit 4	Princ	pies of heat tr	reatment		: f i						
		-Diagram and C	CI -Dia	grams -signi	incance					CO2	(5)
	h) He	at treatment o	of Non-fei	rrous Allov	S						
Unit 5	Adva	nce Materials	11011-101	rious Anoy	8						
	Com	posite material	:-Introdu	ction to Cor	nposite. C	lassification of a	composite	s.			
	, Mec	hanical properti	ies of con	nposites	1		I I I I				
	Bio-	Materials:-Cla	usses of 1	materials us	sed in me	dicine ,and Ap	plication	of materi	als in	CO2	(5)
	media	cine								COS	(5)
	Smar	t materials:-	classifica	tion, speci	ific types	: Shape Memo	ory Alloy	vs, Piezoe	lectric		
	Mater	rials, Magnetos	strictive	Materials, 1	Magneto-F	Rheological Flu	uids, Elec	ctro-Rheol	ogical		
TT b <i>c</i>	Fluid:	S									
Unit 6	Prop	erties of mater	ials and i	its selection	l 	F1	the The				
	Prop	erties of mater	Contical m	echanical Pr	roperties, I	Electrical prope	rties, The	rmai prop	erties,		
	Magn	rial selection f	Optical p	properties,	rials					CO4	(4)
	Fypl	oring material	ls using	materials	nroperty	charts Mate	rials sele	ection pr	ocess.		
	Trans	lation. Screenin	19 Ranki	ng. Selecting	g materials	s: materials indi	ces. Case	studies			
Assignme	nt:- As	signments based	d Selectio	on of materia	al for speci	ific application	, Cub				
Text Book	KS 1 1 1	6				Trwion				1	1
1.	V.D. I	Kodgire, "Mater	rial sciend	ce and metal	llurgy for e	engineers", Eve	rest Publis	shers Pune	e,44 th 20	018	
2.	W. D	Callister, "Mate	erial scier	nce and engi	neering", '	Wiley India Pvt	. Ltd., 5 th]	Edition.			
3.	T.V. 1	Rajan / C.P. Sh	narma, "H	Heat Treatm	ents Princ	iples and Pract	ices", Pre	ntice Hall	of Ind	lia Pvt L	td, New
	Delhi										
Reference	Books										

1.	R.A. Higgins, "Engineering Metallurgy", Viva Books Pvt. Ltd., New Delhi, 1 st Edition,
2.	S.H. Avner, "Introduction to physical metallurgy", Mcgraw Hill Book Company Inc, 2 nd edition (1 July 2017)
3.	Michael F. Ashby "Materials Selection in Mechanical Design" Fourth Edition • 2011 Butterworth-Heinemann
	publication
4.	D. S. Clark, W. R. Varney, "Physical Metallurgy for Engineers", AN East West Press Pvt. Ltd., New Delhi, 2 nd
	Edition,1962
5.	V Raghwan, "Material Science and Engineering", Prentice Hall of India Pvt. Ltd., New Delhi ,6th Edition, 2015.
6.	J L Smith and SC Bhatia, "Heat Treatment of Metals", CBS Publishers and distributors, New Delhi, 1 st edition,
	2008.
Useful Li	nks
1.	https://archive.nptel.ac.in/courses/113/102/113102080/
2.	https://archive.nptel.ac.in/courses/112/108/112108150/

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	2	2	1	1	-	-	-	-	-	-	-	2	2	-	-
CO 2	1	1	-	-	-	-	-	-	-	-	-	-	3	-	1
CO 3	2	2	1	1	-	-	-	-	-	-	-	2	1	-	2
CO 4	2	2	1	-	-	-	-	-	-	-	-	2	3	-	2

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	-	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad		
Second Year (Sem – III) B. Tech. Mechanical Engineering		
ME 3315: Open Elective 1 (Industrial Instrumentation)		
Teaching Scheme Examination Scheme		
Lectures 03 Hrs/Week MSE 20		
Tutorials ISE 20		
Total Credits03ESE60		
Duration of ESE 02:30	0 Hrs	
Prerequisite: Nil		
Course outcomes: students will be able to -		
CO1 Explain the generalized measurement systems and instruments.		
CO2 Understand the performance characteristics, calibration of transducers/instruments		
CO3 Apply the most appropriate measurement system for a given application.		
CO4 Interpret error analysis, measurement of physical variables.		
Course Contents	CO	Hrs
Unit 1 Introduction to Instrumentation System:	CO1	(06)
Typical applications on Instrument systems, Methods of measurements, functional elements		
of a measurement system, functional elements of instruments, classification of instruments,		
static and dynamic performance characteristics of instruments, standards and calibration,		
sensors and transducer		
elements, Types of errors and uncertainty analysis.	~ ^ /	
Unit 2 Temperature and Pressure Measurement:	CO1	(07)
Temperature scales, Mechanical thermometers-types Mechanical pressure instruments-		
manometers, elastic type pressure gauges, Calibration of temperature and pressure		
measurement instruments.	001	
Unit 3 Force, Torque and Velocity Measurement	COI,	(07)
Force (Weight) measurement, Mechanical balances-types, Accelerometer type force	003	
measurement, Electromagnetic balance, Mechanical load cells- types, Torque Measurement-		
Unit 4 Velocity and Acceleration Measurement:	CO4	(06)
Velocity Measurements, Tachometers, types, Contact & noncontact type, Tachometer	004	(00)
generator I VDT accelerometer Electrical-resistance strain gauge accelerometer		
Piezoelectric accelerometer Canacitive accelerometer		
Unit 5 Flow and Level measurement:	C04	(08)
Mechanical flow meters-types Ultrasonic flow meters Anemometers- principle types	0.04	(00)
Mechanical anemometer-types, Flow meter calibration Level measurement- types, Float type		
level indication, magnetic flow device. Ultrasonic level sensors, Optical level sensors, Laser		
level devices.		
Unit 6 Viscosity, Humidity and Moisture measurement:	CO4	(06)
Viscosity measurement types, selection of viscometers, Humidity measurement- types,		
Measurement of moisture in gases and liquids- types of Hygrometers.		
Text Books		
1. "Mechanical Measurement and Control" D.S. Kumar, Metropolitan Book Co. Pvt. Ltd., New Delhi,	4 th edition	n 2007
2. "Instrumentation Measurement and Analysis", B. C. Nakra, K. K. Chaudhry, McGraw Hill, I	New Del	hi, 3rd
Edition,20012.	. nd	
3. "Industrial Control & Instrumentation", W. Bolton, Orient Logman Limited Prentice Hall Publication	n, 3 ^{ra} Edi	tion.
4. "Industrial Instrumentation and Control", S. K. Singh, Tata McGraw Hill, 2nd Edition, 2005.		
Reference Books		
1. "Mechanical Measurement", Beckwith and Buck, Pearson Education Asia, 5th Edition, 2001.	, th	
1.7 1 "Magguramont Systems" Doobalin Emaste MaCherry IIII International Deblication On Marry V	ork $A^{\rm m}$]	Edition
2. Weasurement Systems, Doedenn Emesto, Weoraw Hill International Publication Co. New Y	ык, т 1	Lancion,
2. Measurement Systems, Doebenn Emesto, McGraw Hill International Publication Co. New Y 1990.	ond -	
 Measurement Systems, Doebenn Emesto, McGraw Hill International Publication Co. New Y 1990. "Industrial Instrumentation", K. Krishnaswamy, S. Vijayachitra, New Age International Publisher 2010. 	ers, 2^{nd}]	Edition,

	Edition.
Use	Participation Participation
1.	https://archive.nptel.ac.in/courses/112/107/112107242/
2.	https://onlinecourses.nptel.ac.in/noc23_me09/preview
3.	https://onlinecourses.nptel.ac.in/noc23_me09/preview

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO 2	3	1	1	-	-	-	-	-	-	-	-	-	3	-	-
CO 3	3	1	1	-	-	-	-	-	-	-	-	-	3	-	-
CO 4	3	2	3	2	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	-	4	10
Apply	5	4	15
Analyze	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

			Govern	ment Colleg	e of Engineerin	g, Karad			
		S	econd Yea	r (Sem – III)) B. Tech. Mech	anical Engin	eering		
			Μ	E3325-OE I	- (MOOC) Co	ntrol System	S		
Teaching	g Sche	eme				Exami	nation Sc	heme	
Lectures		-				ISE	-		
Tutorials		-				ESE]	100	
Total Cre	edits	0	3						
Course (Outco	mes (CO): Students	will be able to					
CO1 Un	dersta	ind basi	c concepts	s and techni	ques involved i	in designing	control	schemes	for dynamic
sys	tems.								
CO2 app	oly in-	depth kr	nowledge o	of concepts from	om classical con	trol theory,			
CO3 und	dersta	nd the co	oncept of tr	ansfer function	on and use it for	obtaining sys	tem respo	onse,	
CO4 An	alyze	dynami	c systems	for their st	tability and per	formance, an	d design	control	lers (such as
FIC	portio	Jilai-Iiite		Contents	on stability and p	errormance n	equiteme	nus.	
Students	shoul	d comple	ete the MO	OC course ce	rtification in the	domain of S	ensors a	nd Interr	et of Things
and subn	nit a c	opv of th	e certificat	e to Head of	Department prio	r to ESE.	chisons d	na mterr	let of Things
Guidelin	nes:	-r <i>J</i>			- · F · · · · · · · · · · · · · · · · · · ·				
	Salaci	tion of th		urse should be	a with the prior pe	rmission of He	ad of Den	artmont	
	-							artificiti	
•	Durat	ion for co	ompletion of	f MOOC cours	se certification is 1	ninimum 8 We	eks.		
•	Platfo	rm: NPT	EL or SWY	AM only					
	Asses	sment G	uideline:- 7	The evaluation	of the MOOC Co	ourse will be b	ased on at	t actual sc	ore secured by
	the stu	udent in I	NPTEL or S	WAYAM cou	rse certification a	nd it will be co	nverted to	ESE scor	e.
•	If the	student u	unable to su	bmit the NPT	EL or SWAYAM	completion C	ertificate,	in such ca	ases evaluation
	will 1	be based	on assign	ment score (60% weightage)	of registered	NPTEL/S	SWAYAN	I and internal
	evalu	ation (40	% weightag	e).		U			
•	The r	ubrics for	internal ev	aluation are gi	ven below				
	THC I	101103 101			ven below.				
			Ge	overnment Co	ollege of Engineer	ring, Karad			
 			-	Department o	of Information Te	chnology			
					A. Y. 2024-25				
Course	e Code	:			Assessment Sheet	;	Cla	SS:	
Course	e Title	:-							
					1	1	1		
Sr No.	Reg. No	Name of Student	Course Title	Knowledge of Course (08 Marks)	Communication Skill (08 Marks)	Presentation Skill (08 Marks)	Content (08 Marks)	Q & A (08 Marks)	Total Marks (out of 40)
								1	
2									
				•				•	·1

Faculty Name and Sign.

Head of the Department

			Government	College of Engineer	ing, Karad			
		Sec	ond Year (Sem –	III) B. Tech. Mecha	nical Engineering			
			ME3306	: Universal Human	Values			
Teac	hing Sche	me			Examination Sche	me		
Lect	ures	02 Hrs/week			MSE	-		
Tuto	rials	00 Hrs/week			ISE	50		
Tota	l Credits	02			ESE	-		
Prer	equisite :	First year Induct	on program					
Cou	rse Outcor	nes (CO): Stude	nts will be able to					
CO	1 Under	rstand and recall	a holistic perspectiv	e on life and profession,	grounded in Universa	l Humar	n Values.	
CO	2 Apply	holistic underst	nding to authentic s	ituations, and implicatio	ons for ethical conduct	with Na	ature.	
CO	3 Analy	se, evaluate conr	ections between a h	olistic perspective, ethic	al conduct, & transform	native i	mpact on I	behaviour.
CO	4 Evalu	ate the course's i	npact ,proficiency in	applying Universal Hun	nan Values across dive	erse con	texts.	
			Cou	rse Contents			CO	Hours
Unit	1 Intro	duction to Valu	e Education:				CO1	(03)
	Right	understanding,	elationship, and ph	ysical facility (holistic	development and the	e role		
	of ed	ucation), under	tanding value educ	cation, self-exploration	as the process for	value		
	educa	ation.						
Unit	2 Fund	lamental Huma	n Aspirations:				CO2	(03)
	Conti	nuous happines	s and prosperity -	- the basic human as	spirations, happiness	and		
	prosp	erity – current s	enario, method to f	ulfil the basic human as	spirations.			
Unit	3 Harn	nony between S	elf and Body:				CO2	(06)
	Unde	rstanding huma	being as the co-ex	xistence of the self and	the body. Distinguis	shing		
	betwe	een the needs of	f the self and the	body, the body as an	n instrument of the	self,		
	under	standing harmo	iy in the self, har	mony of the self with	the body, programn	ne to		
TT • 4	ensur	e self-regulation	and health.				003	
Unit	4 Valu	es in Human In	eraction:	- C I I	The second states the second states	1	003	(04)
	Harm	ony in the Fami	y – the Basic Unit	of Human Interaction,	Trust – the Foundat	ional		
		n to Humon Do	o, Respect – as u	ie Right Evaluation, C	Juner Feelings, Justic	ce in		
Unit	5 Socie	ty Universal O	der and Nature				CO2	(06)
Um	Unde	rstanding Harn	ony in the Socie	ety Vision for the	Universal Human	Order	CO_2 , CO_3	(00)
	Unde	rstanding Harm	ony in the Nature	Interconnectedness s	self-regulation and N	Autual	005	
	Fulfil	ment among the	Four Orders of N	ature. Realizing Existe	nce as Co-existence	at All		
	Level	s. (Self Study: 7	The Holistic Percept	ion of Harmony in Exis	stence.)			
Unit	6 Ethic	al Conduct and	Professional Tran	sition:			CO4	(06)
	Natur	al Acceptance o	Human Values, D	efinitiveness of (Ethical	l) Human Conduct, A	Basis		· · ·
	for 1	Humanistic Edu	cation, Humanisti	c Constitution and	Universal Human	Order,		
	Com	petence in Pro	essional Ethics, H	Iolistic Technologies,	Production System	s and		
	Mana	gement Models	Typical Case Studi	es, (Self Study: Strate	gies for Transition to	wards		
	Value	e-based Life and	Profession)					
Text	Books							
1.	R. R. Gau Ethics", 2	ur, R. Asthana, ^{1d} Revised Editio	G. P. Bagaria, "Th n, Excel Books, Ne	e Textbook A Foundat w Delhi, 2019. ISBN 9	tion Course in Huma 78-93-87034- 47-1 (in Valu Unit: 1,	les and Pi 2,3,4,5,6)	rofessional
2	R. R. Gau	r, R. Asthana, G	P. Bagaria, "The T	eacher's Manual Teach	ners: Manual for A Fo	oundatio	on Course	in Human
	Values an	d Protessional 245	thics", 2 ^{ad} Revised	1 Edition, Excel Book	s, New Delhi, 2019.	ISBN	978-93-8	/034-53-2.
Def	(Unit: 1,2,	<i>3</i> ,4,3,6 <i>)</i>						
reie	rence Boo	KS on "Drofoggies	al athics and hum	n volues" McCrow T	Lill Education (India)	Duirrat	o I imita	1 D 24 2nd
1.	edition (all, $PIOICSSIOI$	Fytension New D	an values, ivicoraw E elhi 110.016	in Education (India	, rnvat		1 г-24, 2
2	V. Javak	umar. "Professio	nal ethics and Hum	an values in Engineerir	າອ"			
2.	Rudolf S	teiner "Human	Values in Education	n (The Foundations of	• • Waldorf Education	20)" Ar	throposo	phic Press
5.	Year: 20	04, ISBN: 0880	05445,9780880105	446				r

4.	R.S. Naagarazan, "A Textbook on Professional Ethics and Human Values", New Age International Pvt Ltd
	Publishers, Year: 2007 ISBN: 8122419380,9788122419382,9788122423013
Use	ful Links
1.	https://nptel.ac.in/courses/109104068
	Exploring Human Values: Visions of Happiness and Perfect Society, IIT Kanpur, Prof. A.K. Sharma
2.	https://onlinecourses.nptel.ac.in/noc23_hs89/preview
	Moral Thinking: An Introduction To Values And Ethics, By Prof. Vineet Sahu IIT Kanpur
3.	https://uhv.org.in/course Universal Human Values

РО	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
\rightarrow														
CO↓														
CO 1	-	1	-	1	1	2	2	2	1	2	-	2	-	-
CO 2	-	-	-	-	-	3	1	3	-	3	-	3	2	-
CO 3	1	-	2	1	2	3	1	2	-	3	1	2	1	_
CO 4	-	1	1	-	-	2	-	3	2	2	1	3	-	1

1: Slight(Low)

) 2: Mod

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	5	-
Understand	-	5	-
Apply	-	15	-
Analyse	-	10	-
Evaluate	-	15	-
Create	-	-	-
TOTAL	-	50	-

	Government College of Engineering, Karad											
		Seco	d Year (Sem – III) B. Tech. Mec	chanical Engineer	ing							
			ME3307 : Economics for H	Engineers	~ -							
Teach	ing Sche	me		Examination	Scheme							
Lectu	res	02 Hrs/week		MSE	-							
Tutor	ials	00 Hrs/week			50							
Total	Credits	02		ESE	-							
Duono		Docio Imorrilado	of mothematics and economics									
Cours	quisite :	mas (CO): Stude	of mathematics and economics									
COI	Identi	fy the need usa	and importance of an information sy	stem to an organizat	tion							
C02	Unde	rstand the basic	oncepts of economics, micro and mac	ro economics.								
CO3	Analy	vse the different	rategies beneficial for industrial econ	omics.								
CO4	Apply	the personal ec	nomics methods in our day to day life	e to gain personal fin	ancial contro	ol.						
	Course Contents CO Hours											
Unit 1	l Basic	of Information	system and management:			CO1	(05)					
	Role	of Information S	stems in Organizations, The Inform	ation System Manag	ger and his							
	challe	enges, Concepts	of Information Systems, Information	on Systems and Ma	anagement							
	Strate	egy Case Studies	- Information Systems in the Indian I	Railways, Informatio	on Systems							
TT A (A	in an	ecommerce Org	nization.			GO •	(07)					
Unit 2	2 Basic	Concepts of E	momics:	Evaluation of th	haaniaa af	CO2	(05)					
	dema	nd supply and	of Micro and Macro Economics	, Explanation of the Basics – Cost efficiency	viency and							
	scarcity Opportunity Cost (Self-Study: Use of IT in economics)											
Unit 3	3 Micr	o and Macro E	nomics:	lines)		CO2	(05)					
	Micro	economics: I	fferences and Comparison, Theori	es of Utility and	Consumers	001	(00)					
	Choic	ce,Competition a	d Market Structures,									
	Macr	o Economics: A	ggregate Demand and Supply, Eco	nomic Growth and	Business							
	Cycle	es, Therole of th	Nation in economic activity									
Unit 4	4 Indu	strial Economic	:			CO3	(05)					
	Beha	viour of firms:	trategies with regard to entry, pricin	g, advertising, and	R & D and							
	innov	ation. The deve	opment of Firms and Market and	Industrial Structure:	Stochastic							
Unit 4	Cash	Flow.	, and market structure.			CO4	(04)					
Ome .	Acco	unting for D	preciation and Income Taxes.	Project Cash-Flow	Analysis.	0.04	(04)					
	Unde	rstanding Finance	al Statements. Case Studies - cash	flow analysis done	in start-up							
	comp	anies.	,	5	1							
Unit (6 Perso	onal Economics				CO4	(04)					
	Comp	oound Interest a	d Credit, Financial Markets, Human	Capital and Insuran	nce, Money							
	Mana	gement/ Budget	ng, Risk and Return, Saving and Inv	esting, (Self-Study:	Role of IT							
	ın fın	ancial market, I	economics and data mining in stock r	narket).								
Tort I	Deelve											
1	Rahul D	e "MIS· Mana	ement Information Systems in Bu	siness Government	and Societ	v" Wile	v India					
1.	ISBN:13	: 978-81-265-20	9-0. (Unit: 1)	siness, Government	and boolet	y, wiic	y mara,					
2.	Panneer	Selvam, R, "Eng	neering Economics", Prentice Hall of	India Ltd, New Dell	ni, 2001.(Uni	it: 5)						
3.	Hay, Do Edition(onald A., Derel Oxford: Oxford	J. Morris, "Industrial Economics niversity Press), 1991. (Unit: 4)	and Organization:	Theory and	l Eviden	ce", 2^{nd}					
4.	Varian, H	Hal, " Intermedia	e Microeconomics: A Modern Approa	ach", Norton, 5 th Edit	tion, 1999.(U	Unit: 3)						
5.	Baumol, (Unit:2)	William J., "E	pnomic Theory and Operations Anal	ysis", Prentice Hall	India Ltd.,4	th Edition	n, 1985.					
6.	Rachel S	Siegel, Carol Y	cht, "Personal finance", Publisher	Saylor Foundation	ISBN 13:	9780982	361863,					
Refer	2009.(Unit: 6)											

1.	R.J. Gordon, "Macroeconomics", Little Brown& Co. Boston, 4 th Edition,1987.									
2.	Donald G. Newman, Jerome P. Lavelle, "Engineering Economics and analysis" Engg. Press, Texas, 2010.									
Use	Jseful Links									
1.	https://nptel.ac.in/courses/112/107/112107209/ Dr. P. K. Jha IIT Roorkee									
2.	https://nptel.ac.in/courses/109/104/109104073/ Dr. S. Sinha IIT Kanpur									
3.	https://www.econlib.org/library/Topics/HighSchool/HighSchoolTopics.html#finance									

$PO \rightarrow$	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
CO↓		2								10	11	12	1	2
CO 1	-	3	-	-	-	1	2	1	2	1	2	1	1	2
CO 2	2		-	-	-	1	2	1	2	1	2	1	1	2
CO 3	1	3	-	-	-	1	2	1	2	1	2	1	1	2
CO 4	-	-	-	3	-	1	2	1	1	2	1	1	1	2

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	05	-
Understand	-	15	-
Apply	-	10	-
Analyse	-	20	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	-	50	-

		Govern	ment College of Engineering	g, Karad							
		Second Year (Sem –III) B. Tech. Mechanie	cal Engineering	g						
		ME3308	: Engineering Thermodyna	mics Lab							
Laboratory Sche	eme:			Examination	n Scheme:						
Practical		2 Hrs/week		ISE	ISE 25						
Total Credits		1		ESE	25						
				TOTAL:	50						
Pre-Requisite: Nil											
Course Outcome	es (CO):	students will be at	ble to -								
CO1 Understan	d workin	ng of boiler, mount	ings and accessories, boiler effic	ciency and conde	nsers						
CO2 Explain a	nd evalua	ate steam generation	on, turbine and its compounding.								
CO3 Interpret	and analy	yse performance of	f reciprocating compressor								
CO4 Determine	CO4 Determine properties of lubricant.										
			Course Contents			СО					
Experiment 1	Study a	and demonstration	of different types of boilers and	its mounting and	accessories.	CO1					
Experiment 2	Study o	of different types o	f steam condensers.								
Experiment 3	Determ	ination of dryness	fraction of steam using Throttlin	ng and separating	calorimeter.	CO2					
Experiment 4	Trial or	n boiler to determin	ne boiler efficiency, equivalent e	vaporation and e	nergy balance	CO1					
Experiment 5	Trial or	n steam power plai	nt.			CO2					
Experiment 6	Study of	of compounding of	steam turbines.			CO2					
Experiment 7	Trial or	n reciprocating air	compressor.			CO3					
Experiment 8	Determ	ination of flash an	d fire point of lubricating oil.			CO4					
Experiment 9	Determ	ination of cloud &	pour point of lubricating oil.			CO4					
Experiment 10	Determ	ination of viscosit	y of oil using Redwood viscome	ter.		CO4					
Experiment 11	Report	on industrial visit	to a steam generating unit.			CO1,2,3					
List of Submission	on:										
Minimum number	r of Expe	eriments: 10									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO↓															
CO 1	3	2	1	1	-	-	-	1	3	2	-	2	2	-	1
CO 2	3	2	1	1	-	-	-	1	3	2	-	2	2	-	1
CO 3	3	2	1	1	-	-	-	1	3	2	-	2	2	-	1
CO 4	3	2	1	1	-	-	-	1	3	2	-	2	2	-	1

1: Slight (Low) 2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
ISE	25	25	25	25	25	25	25	25	25	25	25

	Government College of Engineering, Karad										
		Second Year (S	Sem –III) B. Tech. Mechanical	Engineering							
		ME.	3309 : Material Engineering L	ab							
Laboratory Sche	me:			Examination S	cheme:						
Practical		2 Hrs/week		ISE	25						
Total Credits		1		ESE	25						
Dec. De serietes N	1			TOTAL	50						
Pre-Requisite: N		students will be ab	hle to								
CO1 Evaluate	nachan	ical properties the	nough destructive testing and fin	d defects using	non doctmuntive to	atina					
COI Evaluate		ical properties un			non-destructive te	sung					
CO2 Understar	d micro	ostructural details	s of ferrous and non-ferrous mate	erials.							
CO3 Interpret of	lifferen	t heat treatment p	processes and hardenability test.								
CO4 Identify co	mpositi	on of material usin	g spectrometry analysis			1					
	-		Course Contents			CO					
Experiment 1	To co	onduct tensile test	on standard samples of M.S./ Al	uminium/ C.I., P	lotting of stress-	C01					
Experiment 2	Hard	ness testing of y	arious metals – Brinell hardness	Vickers hardn	ess and study of	CO1					
Experiment 2	Rock	well and Micro-ha	rdness tester	s, vickers hardin	ess and study of	COI					
Experiment 3	Cond	lucting impact test	on samples of various materials/wi	th different notch	es and	CO1					
Experiment 5	inter	pretations of result		th different noten		cor					
Experiment 4	Non-	Destructive testing	g (dye penetrant test and magnetic j	particle test)		C01					
Experiment 5	Anal	ysis of micro struc	tural details of ferrous and non-ferr	rous - Phase analy	ysis, Grain size for	CO2					
	steel,	Inclusion for steel	l.								
Experiment 6	Perfo	orming annealing, r	normalizing and hardening heat trea	tment of steel sar	nples; observation	CO3					
	of mi	crostructures and h	nardness.								
Experiment 7	Hard	lenability determin	ation by Jominy End Quench test a	s per ASTM stan	dard.	CO3					
Experiment 8	Study	y of Ericsson Cupp	ing test			CO3					
Experiment 9	Com	position analysis u	sing spectrometry			CO4					
Experiment 10	Indus	strial visit to found	ry / heat treatment plant			CO3					
List of Submissio	n:										
Minimum number	of Expe	eriments: 10									

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	2	-	1	-	-	-	-	-	1	1	
CO2	3	2	-	2	2	-	1	-	-	-	-	-	1	1	
CO3	3	2	-	2	2	-	1	-	-	-	-	-	1	1	
CO4	3	2	-	2	2	-	1	-	-	-	-	-	1	1	

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
ISE											25

	Government College of Engineering, Karad											
	Second Year (Sem –III) B. Tech. Mechanical Engineering											
			Μ	E3310 : Machine Drawing Lab)							
Labo	ratory Sche	eme:			Examination So	cheme:						
Pract	ical		2 Hrs/week		ISE	25						
Total	Credits		1		ESE	-						
					TOTAL	25						
Pre-F	Pre-Requisite: Engineering Drawing & Graphics Fundamentals											
Cour	se Outcome	es (CO):	students will be ab	le to -								
CO1	Use BIS c	onventio	ons in part drawings	s and assembly machine drawing								
CO2	Understan	id & can	draw function of p	ermanent & temporary joints and va	arious machine co	omponents						
CO3	Interpret g	given pro	duction drawings h	aving surface roughness and tolera	nces							
CO4	Draw asse	embly dra	awing from given d	etail drawing and vice versa with to	olerances and fits		T					
		~ .		Course Contents			CO					
Expe	riment 1	Study a	and draw BIS conve	entions			CO1					
Expe	riment 2	Study a	and draw temporary	/ joints.			CO2					
Expe	riment 3	Study a	and draw permanen	t joints.			CO2					
Expe	riment 4	Study a	and draw sketching	of various machine components (e.	.gkeys, coupling	(s)	CO2					
Expe	riment 5	Study a	and draw sheet base	ed on limits, fits and tolerances & su	urface roughness s	symbols.	CO3					
Expe	riment 6	Study a	and draw sheet on F	Production drawing			CO3					
Expe	riment 7	Study a	and draw assembly	drawing from given details drawing	g 1		CO4					
Expe	riment 8	Study a	and draw assembly	drawing from given details drawing	g 2		CO4					
Expe	riment 9	Study a	and draw assembly	drawing from given details drawing	g 3		CO4					
Expe	riment 10	Study a	and draw details dra	awing from given assembly drawing	g 1		CO4					
Expe	riment 11	Study a	and draw details dra	awing from given assembly drawing	g 2		CO4					
Expe	riment 12	Study a	and draw details dra	awing from given assembly drawing	g 3		CO4					
List o	f Submissio	o n:										
Minir	num numbe	r of Expe	eriments: 10									
Transf 1	D I											
	D Phott (R V M	Donahal "Machina	Drowing by "Charotar Pub Anone	1 Guiarat 52nd a	dition 2014						
1. r 2 P	\sim S Gill "A	$\frac{\mathbf{x} \cdot \mathbf{v} \cdot \mathbf{w}}{\mathrm{Textbox}}$	ok of Machine Dray	ving" S K Kataria & sons New I	Pelhi 18th edition	2014.						
2. Γ	. 5. 611, 71 Dr. K. L. Nat	ravana. T	Dr. P. Kannajah, and	d K. Venkata Reddy. "Machine Dra	wing". New Age	International Pul	blishers.					
N	lew Delhi 4	th edition	n, 2016				,					
4. N	I. D. Junnar	kar, "Ma	chine Drawing", Po	earson Education, 2nd edition, 2006	5							
Refer	ence Books	5			11 5 41							
1. S	P 46: 2003	Engineer	ring Drawing Practical	ice for Schools & Colleges, Publish	ed by Bureau of I	Indian Standards,	Manak					
	S: 696 Code	of Pract	tice for General Fro	Define 2	ons							
3 . I	5 · 2709 Gu	ide for S	election of Fits B l	S Publications	0115							
4. I	S:919 Recor	mmendat	tion for Limits and	Fits for Engineering, B.I.S. Publica	tions							
5. I.	 IS: 8000 Part I, II. III. TV, Geometrical Tolerancing of Technical Drawings B.I.S. Publications. 											
6. C	6. Cecil Jenson, Jay D. Hesel & Dennis R. Short, "Engineering Drawing & Design", Tata McGraw Hill Publication, New Delbi, 7th edition, 2012											
7 "	Design Date	Book"	PSG College of '	Technology Coimbatore 2017								
8. "	Machine To	ol Desig	n handbook" CMT	T. Tata McGraw Hill Publication	2017							
Usefu	l links	.										
1. h	ttps://www.	youtube.	.com/watch?v=0bQ	k\$3_3Fq4								
rl	<u>^</u>	-		•								

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2				2		1	2	3	2	3
CO2	3	2	1	1	2	1			2		1	2	2	2	3
CO3	3	2	1	1	2				1			2	2	2	3
CO4	2	2	1	1	3				1			2	2	2	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
ISE											25

	Government Colle	ege of Engineering, Karad			
	Second Year (Sem – III)	B. Tech. Mechanical Engineering			
	ME 3311 : W	orkshop Practice - III			
Laboratory Scheme:		Examination S	Scheme	:	
Practical	2 Hrs/Week	ISE	25		
Total Credits	1	ESE			
		TOTAL	25		
Prerequisite : Works	hop practice I and II				
Course Outcomes (C	(U): students will be able to -				
CO1 Understand an	d perform various machining opera	ations on lathe			
CO2 Understand an	d perform various milling operatio	ns.			
CO3 Understand an	d perform various machining opera	ations such as shaping / planing.			
CO4 Apply principl	les of maintenance				
	Course Conte	ents		СО	Hours
Experiment 1	Job preparation on lathe having o	perations like straight, step, taper turnir	ıg,	CO1	04
	boring, knurling.			001	• •
Experiment 2	Job preparation on milling machin	ne having operations like plain milling,	side	CO2	04
	milling, etc			02	04
Experiment 3	Job preparation by using operation	s such as shaping / planing, grinding,		CO3	04
	tapping, die threading, slotting.			005	04
Experiment 4	Hands on machine maintenance a	nd overhauling		CO4	04
				007	τv
Experiment 5	Industrial visit to foundry and mac	hine shop.		CO4	04
List of Submission:	Minimum transfirm				
L I.	Minimum number of Experiment	ts: U5			

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	2	2	1	2	-	-	-	-	-	-	-	-	-	-	2
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	1
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-	2
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per	Evn 1	Evp 2	Evp 3	Evn /	Evn 5	Ava
CAS Sheet)	Ехр і	Exp 2	Exp 5	Exp 4	Exp 5	Avg
Task I	15	15	15	15	15	15
Task II	05	05	05	05	05	05
Task III	05	05	05	05	05	05
ISE						25

			Govern	ment College of	Engineering,	Karad		
			Second Year (Sem –III) B. Tecl	h. Mechanical	Engineerin	ng	
				ME3312 : Open	Elective Lab			
Laborat	ory Sch	eme:				Examination	n Scheme:	
Practica	l		2 Hrs/week			ISE	25	
Total C	redits		1			ESE	25	
						TOTAL	50	
Pre-Req	uisite: N	Vil						
Course	Outcom	es (CO): s	students will be a	ole to -				
CO1	Unders	tand sense	or/transducers in o	lesign of measurem	ent systems.			
CO2	Apply instrum	appropria ient.	te calibration me	thods to obtain th	ne static and d	ynamic perfo	ormance character	istics of an
CO3	Develo	p a measu	rement system fo	r any physical proc	ess parameters u	used in indust	trial applications	
CO4	Evaluat	te experim	ental methods in	multi-disciplinary e	engineering app	lications.		
		1		Course Contents	S			СО
Experin	nent 1	Study of	sensors and trans	ducers				CO1,2
Experin	nent 2	Study of	Generalized Mea	surement System				CO1,2
Experin	nent 3	Study of	static and dynam	c characteristics of	instruments			CO1,3,4
Experin	nent 4	Study o	f temperature m	easuring sensors a	and transducers	8		CO1,3,4
Experin	nent 5	Study of	pressure and va	cuum measuring	sensors and in	struments		CO1,3,4
Experin	nent 6	Study of	fluid flow mea	suring sensors and	l instruments			CO1,3,4
Experin	nent 7	Study of	speed measurin	g sensors and inst	truments.			CO1,3,4
Experin	nent 8	Study of	fluid level mea	suring sensors and	d instruments			CO1,3,4
Experin	nent 9	Study of	acceleration an	d vibration measu	iring sensors a	nd instrume	nts.	CO1,3,4
Experin	nent 10	Study of	viscosity meas	iring sensors and	instruments.			CO1,3,4
Experin	nent 11	Study of	humidity meas	uring sensors and	instruments.			CO1,3,4
Experin	nent 12	Study of	moisture measure	ring sensors and	instruments			
Minimu	n numbe	r of Expe	riments: 10					

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2				2		1	2	3	2	3
CO2	3	2	1	1	2	1			2		1	2	2	2	3
CO3	3	2	1	1	2				1			2	2	2	3
CO4	2	2	1	1	3				1			2	2	2	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
ISE	25	25	25	25	25	25	25	25	25	25	25

Government College of Engineering, Karad									
	Second Year (S	Sem – III) B. Tech. Mech	anical Engineeri	ng				
	ME3322-OE	I - (MC	OC) Instrumer	ntation and Cont	rol Lab				
Teaching	Scheme				Examina	tion Scheme			
Lectures		-			ISE	25			
Tutorials		-			ESE	25			
Total Cree	lits	01							
Course O	utcomes (CO): Students will	be able to)						
CO1	Understand the basic concept	ts of Interi	net of Things.						
CO2	Recognize the basic M2M E	cosystem a	and change from M	M2M to IoT.					
CO3	Outline the concepts of IoT	olatform.							
CO4	Discuss the various domains	s where IC	T can be applied	successfully and e	xamine the	challenges, security			
	aspects in IoT.								
			Course Content	ts					

Students should complete the MOOC course certification in the domain of Sensors and Internet of Things and submit a copy of the certificate to Head of Department prior to ESE. **Guidelines:**

• For Open Elective Lab course conducted in online mode (MOOC), assessment may be done in line with course undertaken in MOOC.

General Instruction:

• Course coordinator will decide the suitable assessment method for internal evaluation of 25 marks and for ESE Evaluation of 25 marks based on presentation conducted by Panel of minimum two internal faculty members for the course completion.

SY B.TECH MECHANICAL ENGINEERING

COURSE SYLLABI

FOR

SEMESTER IV

			Government College of Engineering, Karad			
		Seco	nd Year (Sem – IV) B. Tech. Mechanical Engineering			
			ME3401: Fluid Mechanics and Machines			
Teach	ing Schen	ne	Examination S	Scheme		
Lectur	res	03 Hrs/week	MSE	20		
Tutor	ials		ISE	20		
Total	Credits	03	ESE	60		
			Duration of ES	E 02 Hrs	s 30 Min	
Pre-R	equisite: N	Nil				
Cours	e Outcom	es: students will	be able to -			
CO	l Unde	rstand and apply	mathematical knowledge to predict the properties and character	ristics of a	fluid.	
CO2	2 Evalu	ate and major a	nd minor losses associated with pipe flow in piping networks.			
CO3	B Unde	rstand the conce	pt of dimensionless parameters.			
CO4	Anal	yse the performa	nce of pumps and turbines.			
					00	
TT •4	1 1		Course Contents		CO	Hours
Unit	I Flui	a Properties:	Departies of fluids, mass density, specific weight specific	volumo	COL	
	onn on o	s and dimension	is- Properties of fluids- mass density, specific weight, specific	volume,	COI	(6)
	Pase	al's law Hydros	tatic law of pressure	apinanty.		
Unit	2 Flui	d Kinematics a	ad Dynamics			
Ome	Eule	rian and Langra	gian approach of fluid flow Continuity equation in Cartesian co	ordinates		
	in th	ree dimensional	forms. Velocity and Acceleration of fluid particles. Equation of	f motion.	CO1	(7)
	Integ	gration of Euler	's equation as energy equation. Bernoulli's theorem, Appli	cation of		(.)
	Berr	oulli's theorem	such as venture-meter.			
Unit	3 Flow	v through Circu	lar Conduits			
	Hydr	aulic and energ	gy gradient - Laminar flow through circular pipes- Darcy V	Veisbatch	CO2	(7)
	equa	tion – Chezy's e	quation - minor losses - Flow through pipes in series and parall	el.		
Unit	4 Dim	ensional Analys	sis			
	Need	l for dimension	al analysis – methods of dimensional analysis – Similitude	-types of	CO3	(6)
	simi	itude - Dimens	ionless parameters- application of dimensionless parameters	– Model		
T Ins #4	anar	sis (Theoretical	treatment only)			
Unit		sification of tu	things heads and afficiencies velocity triangles Pelton	wheel		
	work	sincation of tu	work done by water on the runner. Specific speed, performan	wheth, -	CO3	(7)
	for t	ing principles - irbines – govern	ing of turbine			
Unit	6 Pum	ns				
Cint	Impa	ict of iets - Eule	r's equation - Theory of roto-dynamic machines- various effective	ciencies-	G ()	
	velo	city components	at entry and exit of the rotor-velocity triangles - Centrifuga	l pumps–	CO4	(7)
	work	ting principle - v	vork done by the impeller - performance curves			
Text B	Books					
1.	Modi P.N	I. and Seth, S.M.	"Hydraulics and Fluid Mechanics", Standard Book House, New	v Delhi 20	17.	
2.	S. Raman	nurtham, "Hydra	ulic Fluid Mechanics and Fluid Machines", Dhanpat Rai Publis	hing Com	pany	
	Ltd.,9the	dition, 2014				
3.	Kumar K	. L., "Engineerir	g Fluid Mechanics", Eurasia Publishing House(p) Ltd., New De	elhi 2016		
Refere	ence Book	S				
1.	Graebel.	W.P, "Engineeri	ng Fluid Mechanics", Taylor & Francis, Indian Reprint, 2011			
2.	White, "I	luid Mechanics'	', McGraw Hill Publication, 8th edition,2010			
3.	Streeter,	V. L. and Wylie	E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010	• • • •		
4.	Robert W	.Fox, Alan T. M	cDonald, Philip J.Pritchard, "Fluid Mechanics and Machinery"	2011		
Useful	Links	1 1 1 1	(110)(05)(110)(050)(0)			
1.	https://arc	chive.nptel.ac.in	/courses/112/105/112105269/			
2.	<u>https://o</u>	nlinecourses.npt	el.ac.in/noc23_ce65/preview			

3. https://archive.nptel.ac.in/courses/112/104/112104305/

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	-	3	1	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	2	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	2	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	-	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad											
		Seco	nd Year (Sem – IV) B. Tech. Me	chanical Engineering	5						
			ME3402: Strength of M	aterials							
Teaching	Schem	e		Examination Sche	me						
Lectures		03 Hrs/week		MSE	20						
Tutorials		00 Hrs/week		ISE	20						
Total Cre	edits	03		ESE	60						
				Duration of ESE	02 Hrs	s 30 Min					
Pre-Requ	isite: N	il									
Course O	utcome	s: students will	be able to -								
CO1 Un	Iderstan	d basic concep	s to arise stresses for various types	of loads applied on ma	chine comp	ponents of	f simple				
geo	ometry,	Hooke's law, r	elation between elastic constants, Mor	r's circle, flexure relation	n, torsion f	ormula, e	etc.				
CO2 Co	nstruct	shear force and	bending moment diagram for differen	t loading pattern.							
CO3 EV	alute Be	ending and shea	r stresses in beams subjected to differ	ent loadings for differen	t machine p	barts	1				
CO4 An	alyse st	tress, strains an	deformations in various machine el	ements such as simple r	nachine coi	mponents	, beams,				
Sna	ans, pre	ssure vessels et									
			Course Contents			CO	Hound				
Unit 1	Defer	motion in Soli	La and Dringing Stragger				nours				
Unit I	Conce	ent of stress and	strain-tension compression and she	r stresses Hooke's law	Poisson's	CO1					
	ratio	elastic constar	ts and their relations- volumetric	inear and shear strains.	nrincinal	COI	(08)				
	stress	es and principal	planes- Mohr's circle	incar and shear strams-	principai						
Unit 2	Shear	r Force and Be	nding Moments in Ream								
One 2	Beam	s and types tr	nsverse loading on beams shear for	e and bending moment	diagrams	CO2	(06)				
	Turner	s and types, u	rte simply supported and over hencir	e and benuing moment	ulagrains,	02	(00)				
	Types		rts, simply supported and over-nangin	ig beams, cantilevers.							
Unit 3	Theor	ry of bending									
	Bendi	ing of beams,	pending stress distribution and neut	al axis, shear stress di	stribution,	CO3	(06)				
	point	and distributed	loads.								
Unit 4	Defle	ction in Beams									
	Mome	ent of inertia a	pout an axis and polar moment of in	ertia, deflection of a be	eam using	CO4	(08)				
	doubl	e integration m	ethod, computation of slopes and det	lection in statically ind	eterminate		(00)				
	beams	s, Maxwell's re	ciprocal theorems, Castigliano's theor	em,							
Unit 5	Torsi	on				~~~	(0.0)				
	Stress	ses and deform	tion in circular and hollow shafts, s	tepped shafts, deflection	ı of shafts	CO3	(06)				
TT 1 1 1	fixed	at both ends.									
Unit 6	Stress	ses in Thin Cy	inders and Spheres	1 10	6.1.	CO 4					
	Axial	and hoop stre	sses in cylinders subjected to interi	al pressure, deformation	on of thin	CO4	(06)				
	cynnc	iers, deformatio	n in spherical shells subjected to inter	nai pressure							
Tort D											
1 ext B00	KS	Timosharler "	Apphanias of Material-" CDS D 11	antiona and addition and	90						
1. Ge	cre and	1 imosnenko, "	Meteriale Tete Manuel UII 2nd	cations, 2 [°] edition, 200	Jð.						
2. S. S. Rattan - Strength of Materials, Tata Mcgraw Hill, 2 nd edition, 2016.											
3. Rattan, Ramamurtham, "A Textbook of Strength of Materials", Laxmi Publications, 6 th edition, 2017											
Reference	e Books	Deen In E I		1 Manual Martania	f. M. (
1. Ferdinand Beer, Jr., E. Russell Johnston, John DeWolf, David Mazurek - Mechanics of Materials-McGraw-Hill Education, 9 th edition, 2014											
2. Mott Robert L, Applied Strength of Materials, 4th edition, 2006											
Useful Li	nks	, <u>F</u> F - 2 - 2									
1. htt	ps://npt	el.ac.in/courses	112107147								
2 htt	ps://onli	inecourses.npte	.ac.in/noc23_ce80/preview								

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO↓															
CO 1	2	1	2	3	-	2	-	-	-	-	-	1	1	-	1
CO 2	2	2	2	3	-	1	-	-	-	-	-	2	1	-	1
CO 3	1	2	1	3	-	1	-	-	-	-	-	1	1	-	1
CO 4	2	1	2	3	-	1	-	-	-	-	-	1	1	-	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	-	4	10
Understand	5	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad												
		Sec	ond Year (Sem – IV) B. Tech.	Mechani	cal Engineering							
			ME3403: Numerica	al Methoo	ls							
Teachi	ng Scher	ne			Examination Sch	eme						
Lectur	es	02 Hrs/week			MSE	20						
Tutoria Total (als Tradita				ISE ESE	20						
Total	realts	02			ESE Duration of ESE	$\frac{00}{02 \text{ Urg}}$	20 Min					
Pro-Ro	anisito.	Nil			Duration of ESE	02 1118	50 IVIIII					
Course	Outcom	es: students wil	l be able to -									
CO1	Understa	nd and remember	er basic concepts of Numerical Me	ethods.								
CO2	Apply in	troductory engin	eering problems using Numerical	Methods.								
CO3	Analyze	basic functions a	and advantages of different Numer	rical Metho	ods.							
CO4	Evaluate	numerical result	ts and approximations with field p	roblems.								
			Course Contents				CO	Hours				
Unit 1	l Brief	review of analy	tical/exact methods for solving a	lgebraic ar	nd differential equ	ations;						
	imita	tions of exact m	ethods and role of numerical methods	hods to fin	d approximate sol	utions;						
	Adve	ent of computer	s and use of numerical methods	s. Errors:	Introduction, Ty	pes of						
	error	s, Rules for estir	nate errors, Error propagation, Err	or in the ap	proximation of fu	nction	CO1,2	(5)				
	Root	s of Faustion.	Bracketing Method: Bisection M	ethod Fals	e position method	Open						
	meth	od [.] Newton Ran	hson's Secant method Roots of r	olvnomial	· Muller's Method	open						
	meth	include. Rewton Raphson 3, Secant method. Roots of polynomial. Waner 3 Wethod										
Unit 2	2 Solu	tions to linear s	imultaneous equations									
	1. El:	imination approa	ach: Gauss Elimination Method- N	Vaïve Gaus	s Elimination, Pitt	falls of						
	El	imination, Tec	hniques of improving solution	ns, Gauss-	Jordan method	l, LU	CO1,2,3,4	(5)				
	de	composition										
	2. Ite	rative approach	Gauss Seidal, Jacobi Iteration met	thod								
Unit 3	3 Curv	ve Fitting										
	Leas	t Square Regress	ion – Linear regression, Polynomi	ial Regress	ion							
	Inter	polation –Newto	n's divided difference, Interp	polating p	olynomial, Lang	ranges	CO1,2,3,4	(4)				
	inter	polating polynor	nial									
T T •4 4			• ,•									
Unit 4	I Num	erical differenti	lation	: abandaan a	wtronclation Dan	votion						
	Num	agually spaced	late Eerward difference. Control of	lifforma	backward differen	vation	CO1 2 3 4	(4)				
	or un	equally spaced of	iata, Forward difference, Central C	interence,	Dackwaru unieren	ce,	001,2,3,4	(-)				
Unit 5	5 Num	erical Integrati	on									
	New	ton's cotes Inte	gration of equation: Trapezoidal	rule, Simp	oson's rules, Integ	gration						
	uneq	ual segments. In	tegration of Equation: Romberg's	Integration	n and Gauss Quadr	ature.	CO1,2,3,4	(4)				
Unit 6	5 Solu	tion to Differen	tial Equation									
	Ordi	nary Differentia	l equations: Taylor's series meth	od, Picard	's Method, Runge	-Kutta						
	meth	od, Euler's Metl	nod,	,			CO1 2 3 4	(4)				
	Parti	al Differential E	quation: Classification of PDE	E, Liebmer	n's Method, Bo	undary	CO1,2,3,4	(4)				
	cond	ition.	-									
Assign	ments:	Assignments b	ased Numerical methods applie	ed Root	finding, simultan	eous e	quations, nu	imerical				
differen	ntiation,	numerical integ	ration and Laplace equation pro	oblems han	d calculations as	well a	s C progran	n, excel				
program	n and Ma	a Lab program d	epending on problem.									

Text l	Books								
1.	S.C. Chapra, "Applied Numerical Methods with MATLAB for Engineers and Scientists", Tata McGraw Hill								
	Education Pvt. Ltd., New Delhi, 3 rd Edition, 2012.								
2.	E. Balguruswamy, "Numerical Methods", Tata McGraw Hill Publication Company Ltd.,8 th Edition,2012.								
3.	S.S. Shastry "Numerical Methods", Prentice Hall India Learning Private Limited; Fifth edition 2012.								
4.	Dr. B. S.Grewal, "Numerical Methods", Khanna Publishers, New Delhi,11 th Edition, 2013.								
Refer	ence Books								
1.	R. L. Burden and J. D. Faires, "Numerical Analysis Theory and Applications", Cengage Learning India Pvt. Ltd.,								
	New Delhi, 1 st Edition.								
2.	W. Y. Yang, W. Cao and J. Morris, "Applied Numerical Methods Using MATLAB", Wiley India Pvt. Ltd., New								
	Delhi, 1 st Edition,2005								
Usefu	l Links								
1.	http://www.nptel.iitm.ac.in								
2.	www.ocw.mit.edu								

$PO \rightarrow CO \downarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	1	2	-	-	-	-	-	-	-	1	-	-	1
CO 2	2	2	1	1	-	-	-	-	-	-	-	3	-	-	1
CO 3	2	2	1	1	-	-	-	-	-	-	-	2	-	-	1
CO 4	2	2	1	1	-	-	-	-	-	-	-	2	-	-	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	-	4	10
Understand	5	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad										
		Seco	ond Year (Sem –IV) B. Tech. Mecha	nical E	ngineering						
T 1. C			ME 3404: Machine Tools and E	Process	es						
Teaching S	schem	e 02 Uma/maala			Examination Scher	me					
Lectures		03 Hrs/week			MSE	20					
Tutorials	ita				ISE	20 60					
	115	05			Duration of ESE	00 F	Irs 30 N	fin			
Pre-Requis	site: B	asic Mechanical l	Engineering and Material Science		Duration of LOL	021.	15 50 14				
Course Ou	tcome	es (CO): students	will be able to -								
Students wi	ll be a	ble to									
CO1 App	ly the	knowledge to pro	oduce simple components by casting pr	rocess.							
CO2 Clas	ssify d	ifferent types of f	forming, Plastic moulding and welding	g proces	ses.						
CO3 Ider	ntify ba	asic working prin	ciple, Configuration, Specification and	d classif	ication of machine to	ols					
CO4 Eva	luate v	arious non-tradit	ional machining processes.								
Course Contents							CO	Hours			
Unit 1	Casti	ing Processes									
	Introduction to casting processes, Patterns: Pattern materials, types of pattern, allowances pattern design, Moulding sand, Properties of moulding sands, Core making, Melting practices and furnaces, Pouring and Gating system design, Numerical estimation to find mold filling time, Riser design and placement, Principles of cooling and solidification of CO										
	and Finishing of casting, Defects and remedies, Principle and equipment of Permanent mould casting, Investment casting, Centrifugal casting, Continuous casting.										
Unit 2	Unit 2Forming ProcessesRolling: Introduction, Hot and Cold Rolling, Rolling Mill Classification, Defects in Rolling. Forging: Introduction, Hand Forging Operations, Forging Machines (Board, Air and Steam and Hydraulic Hammer), Open and Closed Die Forging, Defects in Forging. Extrusion: Introduction, Types of Extrusion, Defects in Extrusion. Wire and Tube Drawing: Wire and tube drawing process, die profile, friction and lubrication in metal forming, forming defects, causes and remedies for all forming processes.							(07)			
Unit 3	Welding ProcessesClassification of joining processes, Welding terminology and types of joints Arc WeldingProcesses: Principles and equipment of Single carbon arc welding, FCAW, TIG, MIG, SAWResistance Welding: Spot, Seam and Projection weld process, Heat balance in resistanceweldingGas Welding and Cutting, Soldering, brazing and braze welding, Welding Metallurgy andHeat Affected Zone, Weld inspection, Defects in various joints and their remedies.										
Unit 4	Macl Lathe attacl Borir borin Drilli drillin	hine Tools for M e: Introduction, W hments, and vario ng Machines: Ho ing tools and bars. ing Machines: Cl ng machine, Vario	Letal Cutting Vorking principle, types, specifications bus lathe operations, Numerical treatme prizontal and vertical boring machine Introduction to Jig boring-machine lassification of drilling machines, Con ous accessories and various operations	s, princij ent of ge ne, Con nstructio	ple parts, accessories, ear calculations. struction and operation and operation and working of ra	, tion, ıdial	CO3	(07)			

Uni	t 5 Machine Tools for Metal Cutting								
	Shaping Machine: Types-crank shaper, hydraulic shaper, Crank and slotted link quick return								
	mechanism, Table feed mechanism, various operations.								
	Planing Machine: Types-standard double housing planer, principle parts, table drive and	CO3	(07)						
	feed mechanism, various operations.	005	(0)						
	Milling Machine: Classification of milling machines, construction and working of column								
	and knee type, milling machines, milling operations, Study of standard accessories- dividing								
	head, etc								
Uni	t 6 Nonconventional Machining								
	Fundamental principle, machining unit, tool material, advantages, limitations and								
	applications of Abrasive Jet Machining, Electrical Discharge machining, Electro- Chemical		~ /						
	machining, Laser beam machining, Ultrasonic machining, Water jet machining.								
1 ext	BOOKS								
1	P. L. Jain, "Principles of Foundry Technology", Tata McGraw-Hill, New Deini, 2ndEdition.2014	Ell Nov	Dalhi						
	3^{rd} edition, 2014.	iiii, Nev	v Deini,						
3	O. P. Khanna, "Foundry technology", Dhanpat Rai Publications, New Delhi .17th Edition, 2013.								
4	O. P. Khanna, "Welding Technology". Dhanapat Rai Publications								
5	P. C. Sharma, "A Textbook of Production Technology (Manufacturing Processes)", S. Chand put	blication	ns, New						
	Delhi.7th Edition, 2012.								
6	Amitabha Ghosh, Ashok Kumar, Mallik, "Manufacturing Science", East-West Press Private Limite	d							
7	S.K. Hajra Choudhury and A.K. Hajra Choudhury, "Elements of Workshop Technology vol. II", N	ledia pr	omoters						
	and Publishers Pvt. Ltd, New Delhi,13th Edition,2012.								
Refe	rence Books								
1	Hein and Rosenthal, "Principles of metal casting", Tata McGraw-Hill Book, Company. New Delh	i. 19 th	Edition						
_	2012								
2	ASTM Volumes on Welding, casting, forming and material selection								
3	ASM Handbook, Volume-15	D 11 '	T 7 1 T						
4	W.A. J. Chapman, "Workshop Technology", CBS Publishing and Distributors, New	Delhi	Vol. I						
~	[ISBN13:9788123904016]2001, Vol. II [9788123904115] 2007 and Vol. III [9788123904122] 1995	•							
5 U. C	Production Technology by Hindustan Machine Tools(HMT), Bangalore-2001								
Usen	II IINKS								
1	npier.ac.ni/video.php.subjectud-112105120								
2	www.nptervideos.in/2012/12/11anuracturing-processes-11.ntim								
3	https://nptel.ac.in/courses/112/105/112105244/#								
4	https://mpte1.ac.in/courses/112/107/112107085/								
3	nttps://npte1.ac.in/courses/112/10//11210/215/								

$PO \rightarrow CO \downarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE									
Remember	5	4	10									
Understand	-	4	10									
Apply	5	4	15									
Analyse	5	4	10									
Evaluate	5	4	15									
Create	-	-	-									
TOTAL	20	20	60									
	Government College of Engineering, Karad											
---	--	--------------------------------------	--	--	--------	--------------	---------	--	--	--	--	--
		Sec	ond Year (Sem – IV) Mechanical Engin	ineering Minor								
		Μ	E3405: Analysis of Mechanical Elemen	nts (MDM-2)								
Teach	ning So	cheme	Exa	xamination Scheme								
Lectu	res	02 Hrs/week	MS	ISE 2	20							
Tutor	ials	-	ISI	SE 2	20							
Total	Credi	ts 02	ES	SE 6	50							
			Du	uration of ESE (02 Hrs	30 Min						
Pre-R	lequisi	ite: Nil										
Cours	se Out	comes: students will	be able to -									
<u>CO1</u>	Unde	erstand basic requirer	nents for design of components.									
	Unde	erstand failure criteria	t for given machine element.	1. 6 1.66 (1 .							
C03	Evan	ute Bending and shea	r stresses in beams subjected to different load	dings for different mac	nine p	arts	La.					
CO4 Analyse stress and strains in various machine elements such as simple machine components, beams, shafts etc.												
	Course Contents CO Hours											
Unit	1 (Overview of Design				~~.	100010					
	5	Selection of materia	ls . Design Process, Evolution of design d	design criteria. Concu	rrent	COI	(04)					
	design.											
Unit	2	Deformation in Soli	ds and Principal Stresses									
	(Concept of stress and	son's	~~~								
	1	ratio, elastic constan	ts and their relations- volumetric, linear ar	and shear strains- prin	cipal	CO3,4	(05)					
	5	stresses		-	-							
Unit	3]	Introduction to Stre	sses			GOA 4	(0.4)					
		SFD, BMD, Bending	, Shear, Torsional stresses			CO3,4	(04)					
Unit	:4]	Product life cycle					(05)					
]	Product design, Produ	act development life cycle, learning from faile	lures.		CO4	(03)					
Unit	5 1	Ergonomics										
]	Introduction and Ove	rview of Ergonomics, Tools and techniques f	for Ergonomics		CO1	(04)					
TT •4	()											
Unit		Failure Analysis		1 .		CO4	(05)					
	0	Case studies-failure a	marysis of mechanical components, Forensic	z anarysis		004						
Toyt	Rooks											
1 1	Gere	and Timoshenko "	Mechanics of Materials" CBS Publications	s 2 nd edition 2008								
2	C C	Pattan Strength of	Materials Tata Magraw Hill 2 nd adition 2	2016								
2.	Ratta	n Ramamurtham "	A Textbook of Strength of Materials" Law	zoro. zmi Publications 6 th ea	dition	2017						
J. Refer			1 Textbook of Strength of Matchais, Lax		unuon,	, 2017						
1.	Ferdi	inand Beer Ir F R	ussell Johnston, John DeWolf, David Mazu	zurek - Mechanics of M	Materi	als-McG	aw-Hill					
_ *	Educ	eation, 9^{th} edition, 201	4	Later incontained of I								
2.	Mott	Robert L, Applied S	trength of Materials, 4th edition, 2006									
Usefu	l Link	S	<u> </u>									
1.	https	://nptel.ac.in/courses/	/112107147									
2.	https	://onlinecourses.npte	l.ac.in/noc23_ce80/preview									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO↓															
CO 1	2	-	-	-	-	-	-	-	-	-	-	1	1	-	1
CO 2	2	-	-	2	-	-	-	-	-	-	-	2	1	-	1
CO 3	1	2	1	3	-	-	-	-	-	-	-	1	1	-	2
CO 4	2	1	2	3	-	-	-	-	-	-	-	1	1	-	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	-	4	10
Understand	5	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad										
		Secon	nd Year (Sem – IV) B. Tec	h. Mechar	nical Engineering						
			ME 3406: Open Elective	II (Indust	rial Safety)						
Teach	ing S	Scheme			Examination Sche	ne					
Lectur	es	02 Hrs/week			MSE	20					
Tutori	als	-			ISE	20					
Total	Credi	ts 02			ESE	60					
					Duration of ESE	02 Hrs	30 Min				
Pre-re	quisit	e :- Workshop Practi	ice – I & II								
Cours	e Ou	tcomes (CO): studen	its will be able to -								
<u>CO1</u>	Und	lerstand Hazard and R	Risk Assessment	1 1 11		1					
CO2	Rec	ognize the importance	e of promoting employee healt	th and well	hess within the workp	lace					
<u>CO3</u>	Eva	luate design for engin	neering systems safety and con	trol for safe	ety						
CO4	Inte	grate safety with othe	er operational goals such as qua	ality and rel	liability		00	TT			
T I •4			Hours								
Unit	.1	Unit - I	·		· · · · ·		CO1,	(0)			
		Fundamentals of 1	industrial safety, important	ce of Safe	ty in industry, cau	ses or	COS				
		accidents and them	r preventive measures, type	es of accid	ient, safety policy,	sarety					
	committee and its activities, Different types of industries, Different types of										
.		safety systems and	equipment's, safety termin	ology,			GOA				
Unit	t 2	Unit - II					CO2,	(6)			
		Occupational Heal	Ith and safety, meaning, he	alth care s	ervices, quality of	health	COS				
		services, occupatio	onal health services in place	es of empl	loyment, safety acti	vities,					
		suggestion for pro	omoting occupational heal	th and sa	fety, difference be	etween					
		work related diseas	se and occupational disease.	,							
Unit	:3	Unit - III					CO3,	(7)			
		Work permit syste	ems, types of work permit, j	precaution	s, Job safety analys	is, job	CO4				
		safety procedure,	advantages of job safety	analysis,	Hazop study, Faul	lt tree					
		analysis, Emergeno	cy planning and its objectiv	es, Safety	inventory systems,	Safety					
		survey, Safety orga	anization and duties of a saf	ety officer	•						
Unit	: 4	Unit - IV					CO2,	(4)			
		Stress- meaning, c	causes of stress, symptoms	s stress, ha	andling stress, sour	ces of	CO3				
		stress and control r	measures, Accident prevent	ion method	ds,						
Unit	5	Unit - V					CO3,	(3)			
		Safety committee,	, Accident investigation, S	Safety mar	nagement systems,	Laws	CO4				
		related to safety (F	Factories ACT 1948 Explosi	ve ACT, E	Electricity ACT etc.))					
Text I	Book	5									
1.	Ele	ctrical Safety, fire sa	fety Engineering and Safety	managemer	nt- S.Rao- R.K.Jain-I	Prof. H.I	L. Saluja	. Kanna			
	put	olishers Delhi-www.k	hannapublicshers.in - sec ed-	2012							
2.	Ind	ustrial safety and first	t Aid - NIFE, kochi-wwwnifei	ndia.com. I	BS Publication hyd. 2	009					
3.	Ind	ustrial Safety and Env	vironment-A.K.Gupta, An imp	orint of Lax	mi Publication pvt. L	td. New	delhi-20	008.			
4.	Fur	ndamentals of Industri	ial safety & health by K.U. Mi	istry							
5	Fac	ctories Act 1948									
Refer	ence	Books									
1.	ind	ustrial Safety, Health	Environment and Security –B	asudev Pan	da, University scienc	e press l	New delh	i- 2011			
2.	Saf	ety and Health in indu	ustry A Handbook- A M Sarm	a; Hyd.ww	w.BS publication.net.	BS Put	lication-	2009			
Usefu	l Lin	ks									
1.	htt	os://archive.nptel.ac.ir	n/courses/110/105/110105094/								
2.	htt	os://nptel.ac.in/course	<u>s/110105094</u>								

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	2	1	1	1	2	2	1	1	2	1	-	1	2	1	1
CO 2	2	1	-	1	1	2	1						1	-	-
CO 3	2	1	1	1	-	-	-	-	-	-	-	-	1	-	1
CO 4	1	1	-	-	-	-	-	-	-		-	-	3	2	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	ISE	MSE	ESE
Remember	3	3	6
Understand	4	5	9
Apply	4	4	8
Analyse	3	3	6
Evaluate	6	5	11
Create			20
TOTAL	20	20	60

			Government College of Engineering, Karad									
		Seco	ond Year (Sem –IV) B. Tech. Mechanical Engi	neering								
			ME3407 : Strategic Management									
Tea	ching S	Scheme	Examina	tion Scheme								
Lect	tures	02 Hrs/week	MSE	-								
Tute	orials	00 Hrs/week	ISE	25								
Tota	al Cred	lits 02	ESE	-								
Prei	requisi	te : Nil										
Cou	rse Ou	tcomes (CO): Stud	ents will be able to									
CC	D1 U	nderstand the Strate	gic Management Process.									
CC	D2 A	pply Strategic Anal	rsis Tools for Competitive Advantage.									
CC) 3 A	nalyze External Env	ironmental Factors Impacting Firms.									
CC)4 D	esign and Implement	t Business-Level Strategies.		1	1						
			Course Contents		CO	Hours						
Uni	t 1 T	he Tools of Strateg		CO1	(04)							
	S	trategy and the Str	ategic Management Process, What Is Competitive	Advantage, The								
	S	Strategic Management Process, Measuring Competitive Advantage, Emergent Versus										
	lr	itended Strategies.										
Uni	t 2 E	valuating a Firm's	External Environment:		CO2	(04)						
	U	Inderstanding a Firm	's General Environment, The Structure-Conduct-Perf	ormance Model								
	0	f Firm, Performan	ce, A Model of Environmental Threats. Industry	Structure and								
T		nvironmental Oppor			CO2	(05)						
Uni		valuating a Firm's	Internal Capabilities :	wine the VDIO	02	(05)						
		ne Resource-Based	view of the Firm, The vRIO Framework, Appl	ying the VRIO								
		annework, militatio	, and Competitive Dynamics in an industry, imp.	lications of the								
T In:		esource-Daseu view	/.		CO3	(04)						
		usinoss Lovel Stret	www.Cost Londorship. The Value of Cost Londorship.	Cost Londorship	005	(04)						
		nd Sustained Compa	titive Advantage Organizing to Implement Cost Leadership,	dership								
U ni	t 5 P	roduct Differentiat	ion.	dersnip.	CO3	(05)						
		roduct Differentiation	on The Value of Product Differentiation product dif	ferentiation and	005	(00)						
	S	ustained Competitiv	e Advantage Organizing to Implement Product Diffe	rentiation								
Uni	t6 V	ertical integration	& Corporate diversification:		CO4	(06)						
		orporate Strategy V	ertical Integration Vertical Integration and Sustained	Competitive	0.04	(00)						
	A	dvantage Organizi	n_{σ} to Implement Vertical Integration Corporate	Diversification								
		rganizational Struc	ture and Implementing Corporate. Diversification	. (Self Study:								
	Ň	Ianagement Control	s and Implementing Corporate).	, (See See								
Tex	t Books	8										
1.	Jay B	. Barney and Will	am S. Hesterly, "Strategic Management and Com	petitive Advantag	ge Conce	pts", 5 th						
	edition	n, Pearson Education	Limited 2015 (Unit : 1,2,3,4,5,6)		· .							
2	Masor	n Carpenter Gerry S	Sanders, "Strategic Management Concepts and Case	s", 2 nd Edition P	earson Ed	ducation						
	Limite	ed 2014										
Refe	erence	Books										
1.	Frank	Rothaer, "Strategic	Management Concepts", McGraw-Hill Irwin, 2014.		•• _th							
2.	Micha South	el A. Hitt, R. Duane Western College Pu	Ireland, Robert E. Hoskisson, "Strategic Management	it Concepts and C	ases", 7 th	edition,						
3	Micha	el A Hitt R Duane	Ireland Robert F. Hoskisson "Strategic Managemen	t Concepts Comp	etitivenes	s and						
5.	Globa	lization". South We	stern College Pub, 2010	a concepts comp		o unu						
Use	ful Lin	KS										
1.	https	://onlinecourses.npt	el.ac.in/noc22_mg88/preview Prof. Sanjib Chowdhur	y, IIT Kharagpur								
2.	https	https://archive.nptel.ac.in/courses/110/108/110108047/ Prof. R. Shrinivasan, IISc, Banglore										

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
\rightarrow														
CO↓														
CO 1	1	2	-	2	-	3	-	2	1	1	1	1	3	-
CO 2	-	1	3	1	1	3	1	3	-	3	2	2	-	1
CO 3	-	-	3	2	2	3	1	2	-	3	1	2	1	2
CO 4	-	2	2	3	-	2	-	3	2	2	1	1	-	-

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	5	-
Understand	-	5	-
Apply	-	5	-
Analyse	-	5	-
Evaluate	-	5	-
Create	-	-	-
TOTAL	-	25	-

	Government College of Engineering, Karad											
	Second Year (Sem –IV) B. Tech. Mechanical Engineering											
			ME3408 : Professional Ethics									
Tea	ching Sch	eme	Examin	ation Scheme								
Lect	tures	02 Hrs/week	MSE	-								
Tute	orials	00 Hrs/week	ISE	25								
Tota	al Credits	02	ESE	-								
D	•••	NT*1										
Prei	requisite :	NII mag (CO): Stud	nta will be able to									
	rse Ouico	v analytical tech	ints will be able to	<u>c</u>								
	1 Appi	y analytical tech	-making principles to negative complex dilemmas	5.								
	3 Impl	ement profession	al work ethics to achieve excellence in practice									
)4 Anal	vse positive inter	personal skills through effective collaboration strates	zies.								
			Course Contents		CO	Hours						
Uni	t 1 Deve	loping self-kno	vledge:		CO1	(03)						
	Knov	v Yourself, Pr	ofiles and Types, personality, Applying Your	Knowledge of								
	Perso	onality, Applying	Your Knowledge of Learning Styles, Introverts and	Extroverts								
Uni	t 2 Reco	gnize your valu	es and ethics:		CO2	(05)						
	Obse	Observe yourself, ethics Should and Should Nots, Personal Code of Ethics, The										
	Importance of Being on Time, The Art and Importance of Follow. Personal, financial and											
T T •	private resopocibility.											
Uni	L S ACH	lishing a Work	Ethic Unselfish Excellence Professional Etique	tta Professional	COS	(05)						
	Δttit	ude Professional	Privacy Professional Honesty	ue, Floressional								
Uni	t 4 Ann	t A Annroach situations with an anthusiastic and genuinely:										
	Way	s to Be Aggress	vely Nice in the Office. Improve Interpersonal Skill	lls in the Office,		(0-)						
	Be A	ggressively Nice	in Business Dealings, Your Role with Your Team.	(Self Study: The								
	Bene	fits of Mentoring)	_								
Uni	t 5 Imp	rove your time-	nanagement, and goal setting, skills:		CO1	(05)						
	The	Tyranny of the	Urgent, Setting Personal Goals, short term goals, I	long term goals,								
.	Sche	dule the Plan, A	oid Procrastination, Memory Skills		GOA	(05)						
Uni	t 6 Mai	itain balance to	succeed in the workplace	Dunchos Admit	CO2	(05)						
	Vou	Mistokas Sonse	of Humor	e Punches, Admit								
Toy	t Rooks	wiistakes, Selise										
1.	David St	elecky. Ferguso	, "Professional Ethics and Etiquette", 2 nd Edition.	An imprint of Fa	acts On 1	File, Inc						
	(Unit: 1,2	,3,4,5,6)	,, _ ,,,,,,,,,,,,,,	· · · · · · · · · · · · ·		,						
2	R. Subrar	nanian, "Profess	onal Ethics", Oxford University Press, 2015.									
3	Caroline	Whitbeck, "Ethic	s in Engineering Practice & Research", 2 nd Edition, C	Cambridge Univers	sity Press	2015.						
Refe	erence Boo	oks		11 ~ ~	th							
1.	Charles E	Harris Jr., Mic	nael S Pritchard, Michael J Rabins "Engineering E	thics, Concepts Ca	ases", 4 ^m	edition,						
2	Cengage Charles B	Eleddermann '	Engineering Ethics" Pearson Prentice Hall New Jer	rsev 2004								
 Charles D. Frequermann, Engineering Eulies, realson Fielduce nan, New Jersey, 2004. John R Boatright "Ethics and the Conduct of Business" Pearson Education New Delhi 2003 												
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford												
5	Laura P.	Hartman and J	e Desjardins, "Business Ethics: Decision Making	for Personal Inte	egrity and	d Social						
6	Responsil Erode, "V	oility", Mc Graw Vorld Communit	Hill education, India Pvt. Ltd., New Delhi, 2013. Service Centre Value Education", Vethathiri public	cations, 2011								
Lee	ful Linke											
1	https://on	inecourses notel	ac in/noc22_mg54/preview_Prof_Susmita_Mukhopa	dhvav IIT Kharao	nır							
2	https://arc	hive.notel ac in/	ourses/109/106/109106117/ Prof. Shrikumar Mellic	kappli. IIT Madras	Pui							
	2. https://archive.nptel.ac.in/courses/109/106/109106117/ Prof. Shrikumar Mellickappli, IIT Madras											

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
\rightarrow														
CO↓														
CO 1	-	1	-	1	1	1	1	3	3	-	1	1	1	2
CO 2	1	-	1	2	2	2	2	2	-	2	2	2	1	2
CO 3	-	2	-	1	1	1	1	3	3	1	1	3	1	2
CO 4	-	-	1	2	2	2	2	3	1	3	2	2	1	2

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	5	-
Understand	-	5	-
Apply	-	5	-
Analyse	-	5	-
Evaluate	-	5	-
Create	-	-	-
TOTAL	-	25	-

	Government College of Engineering, Karad									
			Second Year (S	Sem –IV) B. Tech. Mechanical	Engineering					
			ME34	09 : Computer Aided Drafting	Lab					
Labor	atory Sche	eme:			Examination Sc	cheme:				
Pract	ical		2 Hrs/week		ISE	25				
Total	Credits		1		ESE	25				
					TOTAL	50				
Prere	quisite : En	gineerin	g Graphics, Machin	ne Drawing Fundamentals						
Cours	se Outcome	es (CO):	students will be ab	ple to -						
CO1	Create 21) sketch	ing using profile	commands, modify command, view	ving commands,	competence in	modeling			
and design, adeptly applying material techniques, fillets, chamfers, and advanced design features at the creation										
	level									
CO2	CO2 Apply/modify constraints and dimensions transform the parametric 2 D sketch into a 3D solid									
CO2	Create 3	$\frac{1}{2}$ model	ing synthesize skil	lls in manipulating sketches project	cting 3D element	s and enhancin	a design			
0.05	nrocontoti	one in ed	lug synthesize skii	Is in manipulating sketches, projec	ting 5D element	s, and enhancin	ig uesign			
COA	Freihate		vanceu courseworr		a and acceptualized					
004		and mas	ter sketching tech	iniques, applying various operation	is and constraints	s to synthesize	accurate			
	sketches a	t the eva	luation level.							
				Course Contents			CO			
Expe	riment 1	Study 2	2-D sketching Prof	file, Operation commands	G 1.		CO1			
T	• • • •	Profile	Commands: Point,	<u>, Line, Circle, Arc, Ellipse, Profile, S</u>	Spline.	T '11 (001			
Experiment 2 Study 2-D sketching Modify Commands: Erase, Trim, Extend, Scale, Break, Fillet,						COI				
Experiment 2 Study 2 Deletabing Viewing Commonday					CO1					
Lxper	ment 5	Zoom	2-D sketching view	wing Commanus: al View Isometric View Multi Vie	wate		COI			
Fynei	rimont A	Study 1	2-D sketching Con	nmands: Line type Text Text style	<u>Mimensioning</u> Γ	imension	CO1			
Ехрег	miciit 7	style I	eader Lavers etc	minands. Enie type, rext, rext style,	, Dimensioning, L	mension	COI			
Expe	riment 5	Introd	Introduction to 3D Modeling							
		Apply/1	modify constraints	and dimensions, transform the para	metric 2 D sketch	into a 3D	000			
		solid.	•	· · · · ·						
Expe	riment 6	Featur	e operations				CO3			
		Pad, Po	ocket, Shaft, Groov	ve, Hole, Rib, Slot, Multi-section sol	id, Fillet, Chamfe	er, Thread,				
		Shell, F	Pattern etc.							
Expe	riment 7	Draftir	ng				CO2			
		Genera	tion of 2-D sketche	es from parts and assembly 3-D mod	del, appropriate di	mensioning				
F		and tole	erance	opents based on onthe menhic views			CO2			
Exper	intent o	5-D uia		solients based on orthographic views			005			
Expe	riment 9	Draw a	ssembly drawing o	of any machine components			CO4			
Expe	riment 10	Draw d	letails of any maching	ine components			CO4			
Exper	iment 11	Assem	bly Drafting				CO4			
		Assemb	bly Drafting – Det	fining relationship between various	s parts of machir	e, creation of				
		constra	ints, and generation	n of exploded view						
Expe	riment 12	Produc	tion Drawing using	g dimensional geometrical tolerance	s.		CO2			
List o	List of Submission:									
Minin	num numbe	r of Expe	eriments: 10							
Text l	Books									
1. N	. D. Bhatt &	& V. M. I	Panchal, "Machine	Drawing by," Charotar Pub, Anand	l, Gujarat, 52nd eo	lition, 2014.				
2. P	S. Gill, "A	Textboo	ok of Machine Drav	wing", S. K. Kataria & sons, New D	Delhi					
3. R	alph Grabo	wski "Au	atoCAD For Dumm	nies'2024						
Refer	ence Books				~					
1. <u>R</u>	Randy H. Shih "Parametric Modeling with Autodesk Fusion 360", SDC Pub, Spring 2023 edition.									

2. Ibrahim Zeid, "Mastering CAD-CAM", McGraw-Hill, 2006.

Useful links

1. https://www.youtube.com/watch?v=6ftfkBt83og&list=PLIhUrsYr8yHyLArdiiSDLa0Fmz8YKIy7G

Mapping of COs and Pos:

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	2	2	1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
ISE											25

	Governme	nt College of Engineering,	Karad							
	Second Year (Sen	n –IV) B. Tech. Mechanica	l Engineerin	ıg						
	ME3410 : Fluid Mechanics & Machines Lab									
Laboratory Sche	eme:		Examination	Scheme:						
Practical	2 Hrs/week		ISE	25						
Total Credits	1		ESE	25						
			TOTAL	50						
Pre-requisite: Ni	Pre-requisite: Nil									
Course Outcome	es (CO): students will be able	to -								
CO1 Develop sk	ills and knowledge to make de	ecisions in the performance of t	luid mechani	es tasks						
CO2 Apply the l	pasic concepts of fluid mechan	ics to carry out professional en	gineering acti	vities in the field of	of fluid					
CO3 Calculate p	performance parameters of diff	erent turbo machinery.								
CO4 Evaluate pe	erformance characteristics curv	ves with their theoretical nature	of different t	urbo machinery						
	С	ourse Contents			CO					
Experiment 1	Demonstration of Pressure N	leasuring Devices			CO1,2					
Experiment 2	Verification of Bernoulli's ea	quation.			CO1,2					
Experiment 3	Calibration of Venturimeter	/Orifice-meter.			CO1,2					
Experiment 4	Calibration of notches.				CO1,2					
Experiment 5	Determination of coefficient	of friction in pipes of different	materials.		CO1,2					
Experiment 6	Determination of minor loss	es in pipe-fittings			CO1,2					
Experiment 7	Trial on impulse turbine and	plotting of Main/operating cha	racteristics.		CO1,3,4					
Experiment 8	xperiment 8Trial on any one reaction turbine and plotting of main/operating characteristics.CO1,3,4									
Experiment 9	Trial on centrifugal pump an	d plotting of operating charact	eristics		CO1,3,4					
Experiment 10	Industrial visit to Pump/Turl	pine Manufacturing Industry or	Hydro Power	r Plant	CO2,3,4					
Minimum number	n of Experimental 10									
winning number	of Experiments: 10									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	2	2	1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Avg
Task I	20	20	20	20	20	20
Task II	15	15	15	15	15	15
Task III	15	15	15	15	15	15
ISE						50

Government College of Engineering, Karad										
		Second Year (Se	em – IV) B. Tech. Mechanic	al Engineering	g					
		ME3411	: Community Engagement	Project						
Laboratory	Scheme:			Examination S	Scheme:					
Practical		04 Hrs/week		ISE	50					
Total Cred	its	02		ESE						
				TOTAL	50					
Prerequisit	e:Nil	~								
Course Out	tcomes (CO)	:Students will be a	able to	1 1						
		community problem	n identification, formulation and	d solution.						
<u>CO2</u>	Design engi	neering solutions	to complex problems.							
CO3 Implement a project that focuses on community issues.										
CO4 Communicate with the community and demonstrate the knowledge.										
		•	Course Contents			CO				
Implement	ation of follo	wing concepts								
1 ne course Students w to address to The specific overall performance <i>1. Literatu</i> statement w clearly spec- possible diffication <i>2. Enginee</i> testing the to use.	e outlines the ill be able to the same. c objectives ce must be n cre survey of vith cified inputs rections sho pring tools- described m	ne benefits of c o understand the of the course co neasured on the f and Problem sta s and outputs. A l uld be adequate. Numerous avail nodel. They shou	community engagement thro various problems of any con uld depend on the problem de following criteria. <i>atement</i> - Students should be brief survey of the available l lable methods could be put ld demonstrate the ability to	ugn research a nmunity and the efinition for the e able to definant literature and a to use in implearn and put v	and innovation. e possible ways e project but the ne the problem n initial draft of plementing and various methods					
to use. <i>3. Demonstration and Presentation-</i> A model designed and implemented should be convincingly presented to showcase its positive and negative aspects. A demonstration to this end where applicable or a presentation in case of theoretical contributions should clearly describe the work. Maximum Five students may carry out the project together. Project should be based on community problem. Evaluation will be done based on presentations, written report and developed system.										
Text Book	k Principles of Community Engagement, 2nd Edition, NIH Publication No. 11-7782, Printed June 2011.									
Link	https://onlinecourses.swayam2.ac.in/ugc23_ge04/preview									

Second Year (Sem – IV) B. Tech. Mechanical Engineering ME3412: Environmental Science Teaching Scheme Examination Scheme Lectures 02 Hrs/week MSE Tutorials 00 Hrs/week ISE Total Credits Adult Course ESE Conrec Outcomes (CO): Students will be able to CO1 Understand environmental principals which in turn help in sustainable development. CO2 CO2 Evaluate environmental impacts of human activities on ecosystems and on the environment. CO4 Apply interdisciplinary knowledge in environment, Multidisciplinary Nature of Environment, Types of Environment, Multidisciplinary Nature of Environment, Types of Environment, Multidisciplinary Nature of Environmental Studies, Scope of Environment, Multidisciplinary Nature of Environmental for Public Awareness, institutions and People, Raising Environmental Awareness in India. Case study of Ganga rejuvenation plant/Namani Gange) CO3 (03) Unit 1 Natural Resources: Ciassification of surface and ground water, Mineral resources; use and exploitation, environmental effects of estructing and using mineral resources; use and exploitation, environmental effects of estructing and using mineral resources; use and texploitation, genetic, species and ecosystem fuery surface, and ground water, Mineral resources: use and function, Definition, genetic, species and ecosystem value, services, Field visit to a biodiversity. Prast		Government College of Engineering, Karad									
ME3412: Environmental Science Lectures 02 Hrs/week MSE Tutorials 00 Hrs/week ISE Total Credits Audit Course ESE Prerequisite: Universal Human Values COI Understand environmental principals which in turn help in sustainable development. COI Develop itechnologies on the basis of ecological principles. COI Develop itechnologies on the basis of cological principles. COI Hours COI Hours COI Evaluate environmental Stience. COI Hours COI Hours Nature Resources: Definition and Concept of Environment, Types of Environment, Multidisciplinary (03) (03) Natural Resources: Lise and a environmental futicies, Components of Environment of Environment of Environment of Resources: Unitian Consection environmental futicies, Component and Poople, Raisfication of Resources: Living and Non-Living resources, use and exploitation, environmental Studies, Componental resources: Land resources: Land resources: Unitian Consection environmental futicities, conservation and exploitation, environmental Studies of extracting and using mineral resources: Land res			Second Y	Year (Sem – IV) B. Tech. Me	chanical Engineerin	g					
Teaching Scheme Examination Scheme Iextures 02 Hrs/week INSE Tutorials 00 Hrs/week ISE Total Credits Aduli Course ESE Prerequisite : Universal Human Values ESE Course Outcomes (CO): Students will be able to CO1 Understand environmental impacts of human activities on ecosystems and on the environment. CO2 Develop technologies on the basis of cological principles. CO3 Fealuate environmental science. CO3 Fealuate environmental science. CO1 (03) Unit 1 Introduction: Co1 Fourise Contents CO1 (03) Environmental Awarenes in India. Case study of Ganga rejuvenation plan(Namani Gange) CO1 (03) Unit 2 Natural Resources: Living and Non-Living resources, water resources: us and exploitation of surface and ground water, Mineral resources, use and exploitation of surface and ground water, Mineral resources, use and exploitation, cenvironmental effects of extracting and using mineral resources, use and function of surface and ground water, Mineral resources, use and function of surface and ground water, Mineral resources, use and exploitation, Definition, genetic, species and ecosystem diversity. Value of biodiversity ration park. CO4 CO2				ME3412: Environmenta	l Science						
Lectures 02 Hrs/week MSE Total Credits Audit Coarse ESE Total Credits Audit Coarse ESE Prerequisite: Universal Human Values ESE Cont Understand environmental principals which in turn help in sustainable development. CO1 Understand environmental principals which in turn help in sustainable development. CO2 Develop technologies on the basis of ecological principles. CO3 Hors/work CO3 Evaluate environmental principals in environmental science. CO Hours CO4 Aply interdisciplinary knowledge in environmental Studies, Components of Environment, Multidisciplinary Nature of Environmental Studies, Conponents of Environmental Studies, Components of Environmental Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, Mineral resources: use and exploitation environmental effects of extracting nul sug mineral resources. Land resources: Forser resources: growing energy needs. (Self Study: renewable and non-renewable energy source, use of alternate energy source, case studies) CO4 (65) Unit 3 Biodiversity and Biotic Resources: Living and ecological primcipies: Cocy energy ecosystem sciences. Here y rowing energy needs. (Self Study: and Ecosystem Value, environmental studitic conditicts; conservation biodiversity in Fishu and Ecosyste	Teachin	ig Schen	ne		Examination Scheme	e					
Tutorials 00 Hrs/week ISE	Lecture	S	02 Hrs/week		MSE						
Total Credits Addit Course ESE	Tutoria	ls	00 Hrs/week		ISE						
Introduction Cost Corree Outcomes (CO): Students will be able to Corree Outcomes (CO): Students will be able to CO2 Develop technologies on the basis of ecological principles. CO3 CO3 Evaluate environmental impacts of human activities on ecosystems and on the environment. CO4 CO4 Apply interdisciplinary knowledge in environmental science. CO1 Iourse Co1 Introduction: Corres Contents CO1 (03) Definition and Concept of Environment, Types of Environment, Multidisciplinary Nature of Environmental Studies, Scope of Environmental Studies, Components of Environmental Studies, Scope of Environmental Studies, Components on plan(Namani Gange) CO1 (03) Unit 2 Natural Resources: CO3 (05) Classification of Resources: Living and Non-Living resources, water resources: Land resources: Energy resources: growing energy needs. (Self Study: renewable and non-nernewable energy source, case studies) CO4 CO2 (05) Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, assthute rank to abiodiversity park/nature park. CO4 CO2 CO2 (05) Introduction, Definition, genetic, species and ecosystem diversity LineStu and diversity park/nature park. Eco	Total C	redits	Audit Course		ESE						
Prerequisite : Universal Human Values Course Outcomes (CO): Students will be able to CO1 Understand environmental principals which in turn help in sustainable development. CO2 Develop technologies on the basis of ecological principles. CO3 Evaluate environmental impacts of buman activities on ecosystems and on the environment. CO4 Apply interdisciplinary the vironmental Studies, Components of Environmental Studies, Components of Environmental Studies, Components of Environmental fundies, Scope of Environmental Studies, Components of Environmental fundies, Scope of Environmental Studies, Components of Environmental fundies, Case study of Ganga rejuvenation plant(Namami Gange) CO3 CO3 (CO3 (CO4 (CO3 (CO4 (CO4 (CO4 (CO4 (CO4 (CO4 (CO4 (CO4 (CO4 <th cols<="" th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th>	<th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>										
Concess Outcomes CO1 Understand environmental principals which in turn help in sustainable development. CO2 Develop technologies on the basis of ecological principles. Image: CO3 Evaluate environmental impacts of human activities on ecosystems and on the environment. CO3 Apply interdisciplinary knowledge in environmental science. CO1 Hord Unit 1 Introduction: CO1 (03) Definition and Concept of Environment, Types of Environment, Multidisciplinary Nature of Environmental Studies, Scope of Environment, Bustitutions and People, Raising Environmental Awareness in India. Case study of Ganga rejuvenation plan(Namani Gange) CO3 (05) Unit 2 Natural Resources: Living and Non-Living resources, water resources: use and exploitation of surface and ground water, Mineral resources: use and exploitation environmental effects of extracting and using mineral resources. Land resources: Forest resources, Energy resources, use of alternate energy needs. (Self Study: renewable and non-renewable energy source, use of alternate energy needs. (Self Study: renewable and non-renewable energy sources, use of biodiversity. Value of biodiversity and Biotic Resources: CO4 (05) Unit 3 Biotiversity and Biotic Resources: neevoluces: use and function. Definition, genetic, species and ecosystem diversity. Value of biodiversity: habitat loss, man-wildlife conflicts; conservation of biodiversity ark. CO4 CO4 CO4 CO4 <	Prerequ	<mark>iisite :</mark> U	niversal Human Val	lues							
CO1 Understand environmental principals which in turn help in sustainable development. CO2 Develop technologies on the basis of ecological principles. CO3 Evaluate environmental impacts of human activities on ecosystems and on the environment. CO4 Apply interdisciplinary knowledge in environmental science. Unit 1 Introduction: Course Contents CO1 Hours Unit 2 Attural Resources: CO1 (03) Paintion and Concept of Environmental Studies, Components of Environmental Multidisciplinary Nature of Environmental Studies, Components of Environmental Awareness in India. Case study of Ganga rejuvenation plan(Namani Gange) CO3 (05) Unit 2 Natural Resources: Livin gand Non-Living resources; use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources. Energy resources; growing energy needs. (Self Study: renewable and non-renewable energy sources, use of alternate energy source, case studies) CO4 (05) Unit 3 Biodiversity and Biotic Resources: growing energy needs. (Self Study: Threats to biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity park/nature park. CO4	Course	Outcom	es (CO): Students v	vill be able to							
CO2 Develop technologies on the basis of ecological principles. CO3 Evaluate environmental impacts of human activities on ecosystems and on the environment. CO4 Apply interdisciplinary knowledge in environmental science. CO4 Course Contents CO1 Horduction: Definition and Concept of Environment, Types of Environment, Multidisciplinary Nature of Environmental Studies, Scope of Environmental Studies, Components of Environmental Importance, Need for Public Awareness, Institutions and People, Raising Environmental Awareness in India. Case study of Ganga rejuvenation plant/Namani Gange) CO3 (05) Unit 2 Natural Resources: Living and Non-Living resources; use and over uilization of surface and ground water, Mineral resources: use and over uilization of surface and ground water, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, case studies) CO4 (05) Unit 3 Biodiversity and Biotic Resources: growing energy needs. (Self Study: renewable and non-renewable energy sources, use of alternate energy source, case studies) CO4 CO2 (05) Unit 3 Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: habitat loss, man-wildlife conflicts; conservation of biodiversity: Institut and Ex-situ conservation. National Biodiversity park/nature park. CO4 CO4 CO4 CO4 CO4 CO4 CO4 CO4	CO1	Unders	tand environmental	principals which in turn help in s	sustainable developmen	ıt.					
CO3 Evaluate environmental impacts of human activities on ecosystems and on the environment. CO4 Apply interdisciplinary knowledge in environmental science. CO0 Hours Unit 1 Introduction: CO1 (03) Introduction: CO1 (03) Nature of Environmental Studies, Scope of Environment, Multidisciplinary Nature of Environmental Studies, Scope of Environmental Studies, Components of Environmental Awareness in India. Case study of Ganga rejuvenation plan(Namani Gange) CO3 (05) Classification of Resources: Living and Non-Living resources, user resources: use and over utilization of surface and ground water, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources. Land resources: Forest resources, Energy resources: growing energy needs. (Self Study: renewable and non-renewable energy source, use of alternate energy source, case studies) CO4 (05) Unit 3 Biodiversity and Biotic Resources: CO4 CO2 (05) Unit 3 Biodiversity and Biotic Resources: Co4 CO2 (05) Unit 3 Biodiversity and Biotic Resources: Co4 CO4 (05) Unit 4 Aroiduction, Definition, genetic, species and cosystem diversity. Value of biodiversity consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity natific conflicts: conservation of biodiversity: In-Situ and E	CO2	Develo	p technologies on th	ne basis of ecological principles.							
CO4 Apply interdisciplinary knowledge in environmental science. CO Hours Unit 1 Introduction: Definition and Concept of Environment, Types of Environment, Multidisciplinary Nature of Environmental Studies, Components of Environmental Awareness in India. Case study of Ganga rejuvenation plan(Namami Gange) (03) Unit 2 Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and exploitation, environmental effects of extracting and using mineral resources. Land resources: Forest resources, Energy resources; growing energy needs. (Self Study: renewable and non-renewable energy sources, use of alternate energy source, case studies) CO4 (05) Unit 3 Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: and Biotic Resources: made systems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains and ecological pyramids. Flow of energy ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains and ecological pyramids. Flow of energy ecosystem value, services, Field visit to a biodiversity park/nature park. CO4 CO2 (05) Unit 4 Environmental Pollution, drink gwater management, Soil Pollution: Sources and types of modern agriculture, Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, Composition and characteristics of e-Waste and its management, Waste Management (Self Study:- Pollution case studies:- Bhopal Cas Tragedy.) CO4 (03) (04)	CO3	Evaluate environmental impacts of human activities on ecosystems and on the environment.									
Course Contents CO Hours Unit 1 Introduction: Oction: COI (03) Definition and Concept of Environment, Types of Environmental Studies, Components of Environment, Importance, Need for Public Awareness, Institutions and People, Raising Environmental Awareness in India. Case study of Ganga rejuvenation plan(Namami Gange) CO3 (05) Unit 2 Natural Resources: Classification of surface and ground water, Mineral resources: use and over utilization of surface and ground water, Mineral resources, Land resources: Forest resources, Energy resources, growing energy needs. (Self Study: renewable and non-renewable energy sources, use of alternate energy source, case studies) CO4 (05) Unit 3 Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation. Hot spots of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act. Field visit to a biodiversity park/nature park. CO4 Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains and ecological pyramids. Flow of energy, ecosystem value, services, Field visit to a biodiversity park/nature park. CO4 Ecosystems: Definition, Scope, Field visit to a biodiversity park/nature park. CO4 Ecosystem value, services, Field visit to a biodiversity and secondary pollutants, Automobile and Industrial pollution. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources a	CO4	Apply	interdisciplinary kno	owledge in environmental science	е.			-			
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and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management, Waste Management (Self Study:- Pollution case studies:- Bhopal Gas Tragedy,)CO1(03)Unit 5Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. (Self Study:- Chernobyl nuclear accident case)CO4(05)Unit 6Environmental Policy, Legislation & EIA: Introduction to Environmental Protection act, Air Act1981, Water Act, Forest Act,CO3		second	ary pollutants, Auto	omobile and Industrial pollution	, Water pollution: Sou	rces					
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characteristics of e-Waste and its management,Waste Management (Self Study:- Pollution case studies:- Bhopal Gas Tragedy,)(01)Unit 5Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. (Self Study:- Chernobyl nuclear accident case)CO1(03)Unit 6Environmental Policy, Legislation & EIA: Introduction to Environmental Protection act, Air Act1981, Water Act, Forest Act,CO4 CO3(05)		standar	ds, Solid waste:	Municipal Solid Waste mana	gement, composition	and					
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Conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. (Self Study:- Chernobyl nuclear accident case) Unit 6 Environmental Policy, Legislation & EIA: Introduction to Environmental Protection act, Air Act1981, Water Act, Forest Act, CO3		depleti	ng substances (C	DDS). Deforestation and des	serurication. Internati	onal					
Unit 6Environmental Policy, Legislation & EIA:CO4(05)Introduction to Environmental Protection act, Air Act1981, Water Act, Forest Act,CO3CO3		conven	Champel - 1	artn summit, Kyoto protocol, an	a Montreal Protocol. (Self					
Introduction to Environmental Protection act, Air Act1981, Water Act, Forest Act, CO3 (05)	II:4 (Study:-	Chernobyl nuclear	accident case)			COA	(05)			
introduction to Environmental Protection act, Air Act1981, water Act, Forest Act, CO3	Unito	Enviro	numerical Policy, Le	restation act Air Act 109	1 Water Act Forest A	ot	CO4 CO2	(05)			
Wild life Act biomedical waste management and handling rules bazardous waste		Wila 1	ife Act biomedical	waste management and handlin	i, waiti Ati, forest A	ste	COS				

	management and handling rules. Nature of Environmental Policies, Stockholm
	Conference (1972), Rio Conference (UNCED, 1992)
	EIA: EIA structure, methods of baseline data acquisition Towards Sustainable
	Future: Concept of Sustainablity and sustainable Development. Environmental
	Ethics, Concept of Green Building,
Gen	eral Instruction:
Cou	rse coordinator will decide the suitable assessment method for internal evaluation of 50 marks and award Pass or
Fail	grade for the course completion.
Tex	t Books
1.	Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", University Grants
	Commission. (Unit: 1,2,3,4,5)
2.	R. Rajagopalan, "Environmental Studies", Oxford University Press. (Unit: 1,2,3,4)
3.	Dr. M. Anji Reddy, "Text book of Environmental Science and Technology", 2007, BS Publications. (Unit:
	1,2,3,4,5,6)
4.	Dr. P. D. Raut, "Text book of Environmental studies", Department of Environmental Science, Shivaji University,
	Kolhapur. (Unit: 1,2,3,4,5,6)
5.	Fundamentals of Environmental Studies by Mahua Basu & S. Xavier - Cambridge University Press.
Refe	erence Books
1.	Richard T. Wright, "Environmental Science: towards a sustainable future", PHL Learning Private Ltd. New
	Delhi, 2008
2.	Gilbert M. Masters and Wendell P. Ela, "Environmental Engineering and science", PHI Learning Pvt. Ltd., 2008
3.	Daniel B. Botkin & Edward A. Keller, "Environmental Science", Wiley INDIA edition.
Usef	ful Links
1.	https://www.unishivaji.ac.in/uploads/syllabus/2022/syllabus/common/Environmentat%20English%20Book%201-
	3-2022%20Final%20Corrected%20copy_compressed.pdf

$PO \rightarrow$	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
CO↓		2								10	11	12	1	2
CO 1	-	-	-	-	-	-	3	2	-	-	-	-	-	1
CO 2	-	-	3	-	-	2	3	2	3	-	-	-	-	1
CO 3	-	-	-	-	-	-	-	3	-	-	-	-	-	1
CO 4	-	-	-	-	-	2	3	2	3	-	-	3	-	1
	1: Slight(Low)				2: Moderate(Medium)				3: Substantial(High)					

EXIT COURSE SYLLABI

ONLY APPLICABLE FOR STUDENTS OPTING FOR EXIT AFTER SECOND YEAR B.TECH MECHANICAL ENGINEERING

Government College of Engineering, Karad										
	Second Year (Exit Course) B. Tech. Mechanical Engineering ME-EC-0201- Industrial Training / Internship									
	<u> </u>	ME-EC-	0201- Industrial Training	/ Internship						
Teaching Drastical	Scheme:			Examination S	Scheme:					
Total Cree	lite	- 04		ISE	-					
Prerequis	site : Second Ye	ear Mechanical En	gineering	LOL	-					
Course O	utcomes (CO):	: Students will be	able to							
CO1	To make the	he students awar	re or familiar with the indu	strial work &	Accustome	ed with i	industrial			
	environmen	nt								
CO2	Learn and a	ring tools.								
CO3	Understand	l functions of m	aintenance, purchase, R &	D, materials r	nanageme	nt, Sche	duling &			
	dispatch, T	QM and houseke	eping.							
CO4	Create, sele	ect, learn and app	oly appropriate techniques, re	esources, and m	odern eng	ineering	tools			
		С	ourse Contents			CO	Hours			
Impleme	ntation of follo	wing concepts				[]				
Unit 1	The students	s have to undergo	o an industrial training of fo	our weeks in an	industry					
	preferably d	lealing with me	echanical engineering and	allied discipl	ine after					
	completion of	of first year duri	ng the summer vacation. He	e / she will wo	ork under					
	supervision	of insti	itute guide and	industrial	guide.					
	The students	s have to subm	nit a report of the training	g undergone a	nd make					
	presentation	before evaluation	on committee constituted l	by the departr	nent An					
	internal evalu	uation will be co	onducted for examining the	quality and au	thenticity					
	of contact	nto of th	report and av	yord the	morks					
	Demont in he		tion of second convict out	walu ule						
	Report is ba	ised on complia	ation of work carried out	related to mad	interies,					
	measuring	instruments, st	ate-of-art technologies, p	lant layout,	Industry					
	organization	chart, Manage	ement functions, Safety,	rules and reg	gulations,					
	documentatio	on work, Industr	y standards, processes and	tools used, fix	tures and					
	gauges used,	Industrial autom	nation, Computerization and	software used i	n various	CO1,				
	departments,	product flow,	testing and quality contro	l checks, pain	ting and	CO2,	4337 1			
	packing proc	edures, housekee	eping practices as identified	etc.		CO3,	4 week			
	Our and the main of the	d anality of mode		the land and a	uio auido	CO4				
	Quantum and	a quality of work	will be monitored by indust	trial and acader	nic guide					
	both.									
	Industrial Tra	aining Report Fo	rmat:							
	Maximum fiv	ve students in on	e batch, shall work under on	e Faculty. How	ever,					
	each student	should have diffe	erent industrial training and i	its presentation						
	The report sh	nould be of 20 to	40 pages.	1						
	For standardi	ization of the ren	ort the following format sho	uld be strictly f	ollowed.					
	1. Page Size	Trimmed A4	6	j-						
	2 Ton Margi	in: 1.00 Inch								
	3 Bottom M	argin: 1 37 Inche	2S							
	1 Loft More	in. 1.5 Inches	70							
	4. Lett wiarg	m. 1.5 menes								
	э. кight Mar	gin: 1.0 Inch								

	6. Para Text: Times New Roman 12 Point. Font		
	7. Line Spacing: 1.5 Lines		
	8. Page Numbers: Right Aligned at Footer. Font 12 Point. Times New Roman		
	9. Headings: Times New Roman, 14 Point., Bold Face		
	10. Certificate: All students should attach standard format of Certificate as		
	described by the department. Certificate should be awarded to batch and not to		
	individual student. Certificate should have signatures of Guide. Head of		
	Department and Principal		
	11. The entire report should be decumented as one chapter with details like a		
	11. The entire report should be documented as one chapter with details like a.		
	A way in subject to be statistical training is a suppleted with completed training certificate b.		
	Area in which industrial training is completed All Students have to present their		
	reports individually		
	Upon successful completion of this course, the student should be able to answer		
	following questions.		
	1. Which subjects you found useful for this training?		
	2. Have you seen any chart, tables, and graphs in industry? What was its meaning		
	for you?		
	3. Can you design any system or part of it from this training? If not what		
	knowledge you feel inadequate?		
	4. Was this training involved knowledge of electrical, electronics, civil, chemical		
	or any process engineering industry?		
	5. Have you come across any technical difficulty in training? If yes write in short,		
	How you solved?		
	6. What was timing for training? Have you followed it? Were people in industry		
	sincere in their work?		
	7 Which language used for communication in industry you visited? Have you		
	talked there?		
	8 What pollution measures were taken by the industry for their waste disposal?		
	9 What is most important part of training you remember?		
	10 What is current issue in technical field you find most challenging?		
	11. Do you think this training is useful? What is its use?		
	12. Is there any scope for research you find while undergoing this training?		
	12. Is there any scope for research you find while undergoing this training?		
	Execution scheme:-work load of the assessment can be assigned to the project or		
	seminar guide.		
List of Su	bmission:		
I. Text Rool	keport based on training done as per the given format.		
Reference	e Books		
1.	Design Data Handbook for Mechanical Engineers in SI and Metric Units by K. Red	dy, K.	
	Balaveera, Mahadevan, CBS Publishers	• ·	
Useful lin	ks		

		Government College of Engineeri	ng, Karad					
		Second Year (Exit Course) B. Tech. Mecha	anical Engineering					
		ME-EC-0202: Computer Aided Dr	afting Lab					
Laborato	ory Sche	me:		Examina Scheme:	ation :			
Practical		8 Hrs/Week		ISE	100			
Total Cre	edits	4		ESE				
Prerequis	sites: See	cond Year Mechanical Engineering						
Course O	utcome	s (CO): students will be able to -						
CO1	Analys	se fundamental CAD principles, navigating interfaces, n s at the application level.	nanaging file types, and cr	eating pre	cise dr	awing		
CO2 Evaluate and master sketching techniques, applying various operations and constraints to synthesize accu								
	sketch	es at the evaluation level.	· · · · · · · · · · · · · · · · · · ·	··· ~ j				
CO3	Synthe	size skills in manipulating sketches, projecting 3D e	lements, and enhancing d	lesign pre	sentati	ons in		
000	advanc	ced coursework.			~			
CO4	Create	competence in 3D modeling and design, adeptly app	lving material techniques.	fillets. cl	hamfer	s. and		
	advanc	the creation level.				, ,		
		Course Contents				CO		
Experime	ent 1	CAD Fundamentals Exploration: Concept of Param	etric Modeling, Feature Ba	ased Mode	eling,	CO1		
		User Interface, Mouse operations, File types and Manag	gement, drawing profiles.		U.			
. .				<u> </u>	1	000		
Experime	ent 2	Sketcher Basics: Profile Toolbar, Sketch Operations	(Corner, Chamfer, etc.), (Constraint	s and	CO2		
. .		Types of Constraints, Sketch Tools and Analysis.				000		
Experime	ent 3	Advanced Sketching Techniques: Transformation	on Tools, Projecting	3D Elen	ients,	CO2,		
. .		Visualization Toolbar, User Selection Filter.		D 1	(D 1	<u>CO3</u>		
Experime	ent 4	Introduction to Modeling Machine Components:	- Material Addition and	Removal	(Pad,	CO3,		
		Pocket, etc.), Types of Fillets and Chamfers, Patterns and Datum Features	(Rectangular, Circular, etc	c.), Thread	1/1 ap	CO4		
Experime	ent 5	Advanced Design Features- Axis Systems, Types	of Draft, Shell and Stift	fener Fea	tures.	CO3.		
		Applying Materials and Rendering.			,	CO4		
Experime	ent 6	Introduction to Multibody Concept: - Copying,	Pasting, and Inserting Bo	odies, Bo	olean	CO3,		
I. ·		Operations (Add, Remove, Intersect), Transformation	s (Translation, Mirror, etc	.), Introdu	iction	CO4		
		to Negative Body Concept.	x · · ·	,.				
Experime	ent 7	Drafting and Detailing Theory: Generative vs. Inte	ractive Drafting Initial Dr	afting Set	tings,	CO2		
-		Sheet Background and Views (Ortho, ISO), Dimension	ing Techniques.	C	0			
Experime	ent 8	Views and Annotation: Auxiliary and Section View	vs, Clipping and Broken	Views, D	Datum	CO1		
		Features and Tolerance, GD&T Symbols and Notes						
Experime	ent 9	Introduction to Assembly: - Types of Assembly A	Approaches, Constraints a	nd Degre	es of	CO4		
		Freedom, Component Placement and Manipulation.						
Experime	ent 10	TOP DOWN Approach: - Part, Product, and Compo	nent Creation, Space Anal	ysis and I	Reuse	CO3,		
		Patterns, Save Management Techniques.				CO4		
Experime	ent 11	Assembly Drafting: - Creating Scenes (Exploded	Views), Bill of Materia	ls Genera	ation,	CO3		
		Balloon Creation and Graph Tree Reordering.						
Experime	ent 12	Final Project and Review: Integration of CAD Con	cepts, Practical Application	on in a Pro	oject,	CO4		
T • • • • • •		Review of Learned Techniques and Skills.						
List of Su	ibmissio	n:						
Transf D	2.	Ninimum number of Experiments: 10						
1 ext Boo	KS	Show Tickoo "Cotic V5 (D2021, Ear Engineers of E	Designary DDD D.1. 2021					
1.		Shall Tickoo, Caua v 3-0K2021: For Engineers and L William Howard and Josoph Musto "Introduction to Se	vesigners, DPB Pub, 2021	Works" N	In Gran	w Ц;11		
2.		Pub 18 th edition 2022	ma wouching Using Solia	•• 01K5 , IV		vv 11111		
2.		N. D. Bhatt & V. M. Panchal, "Machine Drawing by,"	Charotar Pub, Anand, Gui	arat, 52nd	edition	1,		

	2014.
3.	P. S. Gill, "A Textbook of Machine Drawing", S. K. Kataria & sons, New Delhi
Reference Books	
1	Randy H. Shih "Parametric Modeling with Autodesk Fusion 360", SDC Pub, Spring 2023 edition.
2	Ibrahim Zeid, "Mastering CAD-CAM", McGraw-Hill, 2006.
Useful links	
1	https://www.lynda.com/CATIA-tutorials/Learning-CATIA-v5/606059-2.html

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2					2		2	2		2
CO2	3	2	1	1	2					2			2		
CO3	3	2	1	1	2					2			2		
CO4	3	2	2	2	3	2	2			3		3	3		2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	50	50	50	50	50	50	50	50	50	50	50
Task II	20	20	20	20	20	20	20	20	20	20	20
Task III	20	20	20	20	20	20	20	20	20	20	20
ISE											100

Government College of Engineering, Karad										
Second Year (Exit Course) B. Tech. Mechanical Engineering										
MEEC-0203_Workshop- (CNC operations) Lab										
Laboratory Scheme: Examination Scheme: Practical 8 Hrs/week ISE 100										
Practical		8 Hrs/week		ISE	100					
Total Credits		4		ESE						
D	1.8			TOTAL: 100						
Prerequisites: S	econd M	Year Mechanical En	gineering							
1 To write and simulate CNC lathe and milling program for various component										
1. To write an		ate CNC fattle allu fi	ar simple component							
2. To write all	u Silliul	are robot program to								
3. To demonstrate	$\frac{1}{2NC} \frac{C}{C}$	MM to monorma you	b.							
4. To operate	UNC-C.	why to measure var	Tous geometrical parameters.			CO				
Evneriment 1	Unde	erstanding & Study	and construction of CNC lathe mac	hine		C01				
Experiment 2	Unde	erstanding & Study	G and M codes for CNC lathe mach	nine.		C01				
Experiment 2	Stud	v and demonstration	Programming for simple compone	ents on CNC Lath	e machine	C01				
Experiment 4	Stud	y and demonstration	Graphic simulation of CNC lathe	operations for sim	nle	C01				
Experiment 4	com	ponents.	i chapine sinialation of crite hand	operations for shin	ipie	cor				
Experiment 5	Stud	y and demonstratior	Understanding construction of CN	C milling machin	ie.	CO1				
Experiment 6	Stud	y and demonstration	Understanding G and M codes for	CNC milling mad	chine.	CO1				
Experiment 7	Stud	y and demonstration	n of Programming for simple compo	onents on CNC mi	illing machine.	CO1				
Experiment 8	Stud	y and demonstration	n of Graphic simulation of CNC mil	ling operations for	or simple	CO1				
E 4 0	com	ponents.				CON				
Experiment 9	Stud		f of Robot pick and place programm	ning.						
Experiment 10	Dom	ly OI ASKS.	mming of ASDS							
Experiment 11	Stud	u and domanstration	animing of ASKS.							
Experiment 12	Siud	y and demonstration	TOI CINC-CIVIMI.			04				
Minimum numbe	on: er of Ex	periments: 10								
		perments. 10								
Text Books										
1. "Automat	tion, Pro	oduction systems an	d Computer Integrated Manufacturi	ing" by M. P. Gro	over (PHI), 3rd Ed	lition				
2. "Compute	er Aideo	d Manufacturing", b	y P. N. Rao, N.K. Tewari and T. K.	. Kundra, Tata Mo	cGraw Hill, ISBN					
97800746	$\frac{31034}{MCar}$	3rd Edition	n and Manufacturing" M. Graquar	E Zimmora Doo	rean Dublications	ICDN				
97881774	84165	5th Edition		, E. Zilliners, rea	rson r uoncations,	, ISDIN				
4. "Worksho	op Tech	nology Vol. II" – by	y Raghuvanshi, Dhanpath Rai and c	o. (P) Ltd., 9th Edi	ition					
 Workshop Technology Vol. II "- by Hajara Choudhary, Media Promoters and Publishers, Mumbai, 10th Edition 										
Reference Books										
1. "Principle 2 "Introduce	$\frac{1}{100}$	mputer Integrated N	vianufacturing", by S. Kant Vajpaye	e (PHI), 2nd Edition	on					
 Introduction to Robotics in Chvi system ", James A. Reng, Pearson Education, 3rd Edition. Workshop practice manual" by V. Venkata Reddy, BS Publications. 6th edition 										
 worksnop practice manual by v. venkata Keddy, BS Publications, 6th edition "Automation, Production systems and Computer Integrated Manufacturing" by M. P. Groover (PHI). 3rd Edition 										
	. Tratemation, Froduction Systems and Computer integrated manufacturing by W.T. Orobver (FIII), Sid Edition									
Useful Links	Useful Links									
http://nptel.ac.	in/cour	ses/112102103/17	-1.54							
http://nptel.ac.	1n/cours	ses/11210/07//mod	ule5/lecture2/lecture2.pdf							

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	50	50	50	50	50	50	50	50	50	50	50
Task II	20	20	20	20	20	20	20	20	20	20	20
Task III	20	20	20	20	20	20	20	20	20	20	20
ISE											100

Multi-disciplinary Minor (Institute Level-Industrial)

Electrical Vehicle
(Electrical Engineering- Institute Level-Industrial)

			Government College	e of Engineerir	ng, Karad			
Secon	d Year	r (Sem – III) N	MDM- Electrical Vehicl	le (Electrical E	ngineering- Instit	ute Lev	vel-Indu	strial)
			IMI3311: Foundation	of EV and Hyl	brid Vehicle			
Teachin	g Sche	me			Examination Sche	eme		
Lectures	5	02 Hrs/week			MSE	20		
Tutorials	S	00 Hrs/week			ISE	20		
Total Cr	edits	02			ESE	60		
-	• • •				Duration of ESE	02 Hr	rs 30 Min	
Prerequ	isite:	Basics of Electr	ical and Electronics.					
Course	Uutco	nes (CO): Stud	ents will be able to	desertion	of alastria and hubri	dalaatri	a vahiala	-
	Ident	in the fundament	electrical and electronic	a components f	or advanced EV	d electri	c venicles	5.
C02	Discu	is hybridization	of automobile	s components r				
C03	Illust	rate the electric	drive-trains characteristics					
04	musu		Course Co	ontents			CO	Hours
Unit 1	Intro		C01	(04)				
		Current dem	•• and in FV industry and onr	ortunities of skil	led FV engineers		001	(0-1)
		Listory and	and in EV industry and opp avalution of alactric value	violos	icu L V engineers,			
		Components	of an alastric vehicle	licies,				
Unit 2	Floc	trical Enginee	oring for FV.				C01	(04)
Unit 2	LICC	EV alagific	otion and their electrifie	ation lavala			COI	(04)
	•	E v Classific		ation levels				
	•	Battery tech	inology,					
	•	Motor and	controller systems,					
	•	EV numeri	ical calculation					
	•	EV chargin	ng infrastructure.					
Unit 3	Adva	anced Electric	e Vehicles:				CO2	(05)
	•	Electrical Re	quirement,					
	•	Power Distri	bution Specifications,					
	•	Electronic Co	Superifications					
	•	Ev Standard	Specifications					
Init 4	• IIh	Selection of		omponents.			C03	(05)
Unit 4	нур		ne Automobile:				COS	(05)
	•	Challenges	and Key Technology of	HEVS.				
	•	Basics of H	ybrid Electric Venicle (F	$1 \le V$				
	•	Basics of Plu	Ig-in Hybrid Electric Venic	cles(PHEV)				
	•	Basics of Fi	iel Cell Venicles (FCVs)).				
TT •4 7	•	Vehicle to G	rid technology				COA	(0.4)
Unit 5	Hyb	rid Electric V	enicles :				CO3	(04)
	•	HEVS Fullua Vahiala parte	armanaa					
		Configuratio	n of UEV (Sorios Daralla)	Sorias parallal &	Complex)			
		Power Flow	control Examples	Series-parallel o	ecomplex),			
		Operation of	HFVs					
Unit 6	Hvbr	id Electric Dri	ve-trains:				CO4	(04)
	•	Basic concer	ot of hybrid traction.					
	•	introduction	to various hybrid drive-trai	in topologies.				
	•	power flow c	control in hybrid drive-train	topologies.				
	•	fuel efficienc	cy analysis.					

	Electric Drive-trains:		
	Basic concept of electric traction,		
	 introduction to various electric drive-train topologies, 		
	• power flow control in electric drive-train topologies,		
	• Fuel efficiency analysis.		
Tex	xt Books		
1.	Electric And Hybrid Electric Vehicles Braking Systems & NVH considerations, Author Jurgen R.	K., Publi	sher -
	Sae International		
Ref	Cerence Books		
1.	Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", CRC Press, 2nd Edition, 20	03.	
2.	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and F	uel Cell	
	Vehicles: Fundamentals, Theory and Design, CRC Press, 2004		
3.	James Larminie, John Lowry, "Electric Vehicle Technology", Wiley publications, 1st Edition, 200)3.	
4.	B D McNicol, D A J Rand, "Power Sources for Electric Vehicles", Elsevier publications, 1st Editi	on, 1998	
5.	Seth Leitman, "Build Your Own Electric Vehicle" MC Graw Hill, 1st Edition, 2013		
Use	ful Links		
1.	https://archive.nptel.ac.in/courses/108/102/108102121/ Prof. Amit Jain IIT Delhi.		
2.	https://nptel.ac.in/courses/108/103/108103009/ Prof. S. Majhi, Dr. Praveen Kumar IIT Guwahati.		

РО	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
\rightarrow										10	11	12	1	2
CO↓														
CO 1	2	-	1	-	-	2	3	-	-	-	-	3	-	-
CO 2	2	-	1	-	-	2	3	-	-	-	I	3	-	I
CO 3	2	-	1	_	-	2	3	-	-	-	-	3	-	-
CO 4	2	2	1	-	-	2	3	-	-	-	-	3	-	-

1: Slight (Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	5
Understand	5	5	20
Apply	5	5	15
Analyse	5	5	20
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60

			Government College of Engineering, Karad					
Second	l Year (Sem –	· IV) M	IDM- Electrical Vehicle (Electrical Engineering- Insti	tute Lev	vel-Indu	strial)		
	I	MI34 1	2: EV Battery Technology and Powertrain Developme	ent				
Teachin	g Scheme		Examination Sch	eme				
Lectures	02 Hrs/	week	MSE	20				
Tutorials	s 00 Hrs/	week	ISE	20				
Total Cr	edits 02		ESE	60				
			Duration of ESE	02 Hr	s 30 Min			
Prerequ	isite : Electrosta	atics an	d Basic Circuit Laws					
Course	Outcomes (CO): Stud	ents will be able to					
<u>CO1</u>	Analyze the pe	ertorma	nce of the batteries.					
CO2	Discuss and A	nalyze	different energy storage technologies used for hybrid electric v	ehicles.				
<u>CO3</u>	Implement pro	oper dri	ve configuration to electric and hybrid vehicle.					
CO4	Visualize the	worki	ng of an EV powertrain.		T			
			Course Contents		CO	Hours		
Unit 1	Batteries:				CO1	(04)		
	Overview of E	Batterie	s, Battery Parameters, Lead acid batteries, Lithium ion batteries	s, Metal				
	air batteries,	Battery	Charging, Thermal runway battery management system	(BMS),				
	Functionality,	SOC/S	OH estimation.					
Unit 2	Energy Stora	ge Syst	ems for EV:		CO2	(04)		
	Introduction to	o Energ	gy Storage Requirements in Hybrid and Electric Vehicles, Di	fferent				
	batteries for	EV, B	attery Characterization Comparison of Different Energy S	torage				
	Technologies	for HE	Vs, Battery Charging Control					
Unit 3	Energy Stora	ge and	its analysis:		CO2	(04)		
	Battery based	energy	v storage and its analysis, Solar Photovoltaic based energy s	storage				
	system, Fuel	Cell b	ased energy storage and its analysis, Super Capacitor based	energy				
	storage and its	s analys	sis, Flywheel based energy storage and its analysis, Hybridiza	tion of				
	different energ	gy stora	ge devices					
Unit 4	Battery Pack	Design	and Modeling	-1 1	CO1	(04)		
	Battery pack	Design	, Properties of Batteries, Battery Pack Assembly and Test,	hermal				
	Analysis on B	attery F	ack, Battery Pack Modeling, The basics of charging technolog	У				
Init 5	Types of charge	ging are	mite existing globally, CAN communication		CO3	(04)		
Unit 5	Introduction to		unit.	ion and	005	(04)		
	control of D	C Mot	or drives. Configuration and control of Induction Motor	drivos				
	configuration	and cou	or drives, Configuration and control of induction which	unives,				
	Switch Reluct	ance M	otor drives. Drive system efficiency					
Unit 6	Flectric Vehi	cle Pov	vortrain.		CO4	(06)		
Omeo	Introduction	to EV	Powertrain Special electric traction motors Various ty	nes of	0.04	(00)		
	regulations an	id stand	lards set in the CMVR (Central Motor Vehicles Rules - 19	(39) for				
	selecting and	manuf	acturing various components of an electric vehicle. The rul	es and				
	regulations ne	ed to f	blow while designing a retrofit powertrain model. Architectu	re and				
	Components of	of EV H	Powertrain. Basics of Carbon footprint of companies and under	erstand				
	how companie	es utiliz	e carbon credits to reduce their carbon footprint issues					
Text Bo	oks							
1. Har	ndbook on Batte	ery Ene	rgy Storage System, Asian Development Bank,2018.					
2. Hai	ndbook of Autor	motive	Powertrain and Chassis Design, 1998.					
Referen	ce Books	1		7 1.4.				
1 . lq	1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", CRC Press, 2nd Edition, 2003.							
2. M V	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004							
3. Ja	mes Larminie. J	John Lo	wwy, "Electric Vehicle Technology", Wiley publications. 1st E	dition, 2	003.			
4. B	D McNicol, D	A J Rar	nd, "Power Sources for Electric Vehicles". Elsevier publication	s, 1st Edi	ition, 199	8		
5. Se	eth Leitman, "B	uild Yo	ur Own Electric Vehicle" MC Graw Hill, 1st Edition, 2013	,	,			

Use	ful Links				
1. https://nptel.ac.in/courses/108106170 Prof. Ashok Jhunjhunwala , IIT Madras.					
2.	https://onlinecourses.swayam2.ac.in/ntr24_ed16/preview Dr	G.A.Ra	thy, Dr R. Suja, NITTTR,	Chennai.	

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
\rightarrow										10	11	12	1	2
CO↓														
CO 1	2	2	2	-	-	2	3	2	-	-	-	2	-	-
CO 2	2	-	-	-	-	2	3	-	-	-	-	2	-	-
CO 3	2	2	2	-	-	2	3	-	-	-	-	2	-	-
CO 4	2	-	2	-	-	2	3	2	-	-	-	2	-	-
(T)		0. 14.	1	M. 1.). C. 1		TT: -1-)					

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	5
Understand	5	5	20
Apply	5	5	15
Analyse	5	5	20
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60

			Government	College of Eng	gineerin	ng, Karad			
Third	d Year	$(\text{Sem} - \mathbf{V}) \mathbf{M}$	DM- Electrical V	ehicle (Electr	ical En	gineering- Institut	te Leve	el-Indus	trial)
		IM	I3513: EV Powe	r Electronics a	nd Em	bedded System			
Teachin	ng Scher	ne				Examination Scher	ne		
Lectures	5	03 Hrs/week				MSE	20		
Tutorial	s	00 Hrs/week				ISE	20		
Total Cr	edits	03				ESE	60		
						Duration of ESE	02 Hrs	30 Min	
Prerequ	iisite : E	Basics of Electro	onics						
Course	Outcon	nes (CO): Stude	ents will be able to						
CO1	Select	proper machine	e drive for HEVs ap	pplication.					
CO2	Compa	are different po	wer converters top	ologies in HEVs					
CO3	Develo	op the basic fun	damentals of embe	dded system, C	++ and]	Linux programming.			
CO4	Discus	ss the sensor ch	aracteristics, comm	unication protoc	ol and c	configuration of the en	mbedde	d system	S
			Co	urse Contents				ĊO	Hours
Unit 1	Electr	ic Machines a	nd Drives in HEV	s :				CO1	(04)
	Introduction, BLDC motors, Induction Motor Drives, Permanent Magnet Motor Drives,								
	Switch	ned Reluctance	Motors, Doubly	Salient Permane	nt Mag	net Machines, Desig	n and		
	Sizing	of Traction Me	otors, Thermal Ana	lysis and Model	ling of T	Fraction Motors.			
	(only	functional trea	tment to be given).	-				
Unit 2	Power	r Electronics in	HEVs:					CO1	(05)
	Power	electronics inc	luding switching, A	AC-DC, DC-AC	convers	sion, Electronic devic	es and		
	circuit	s used for cont	rol and distribution	n of electric pow	ver, The	ermal Management of	HEV		
	Power Electronics, Generator and Basics of controlling System in Hybrid Vehicle.								
Unit 3	Power	r Converter:						CO2	(04)
	Introd	uction, various	power electronics	converter topol	ogies an	nd its comparisons, C	ontrol		
	of con	vertor operatio	ns in EV and HV,	EV Charging an	d Batter	y System ,Emerging	power		
	electro	pnic devices ,PI	E in renewable ener	gy system, PE in	1 industi	rial system			
Unit 4	Intro	luction to Emb	edded System:					CO3	(04)
	Micro	controllers and	microprocessors i	n EVs, Basics	of Embe	edded System, Embe	dded		
	C/C++	- programming,	Idea about Linux,	Linux in Embec	ded Sys	stem.			(0.1)
Unit 5	Senso	r Characterist	ics and communic	ation Protocols	:			CO3	(04)
	Sensor	r Principal Cha	racteristics, Sensor	-Actuator Integr	ation Sy	stem. Basic introduct	tion to		
TI 4 C	comm	unication proto	cols CAN bus, LIN	, FlexRay.				004	(05)
Unit 6	Confi	guration of En	ibedded System:	A	. F 1.	11.1 D	T :	CO4	(05)
	Buildi	ng of Linux-f	mbedded System	, Application in	n Embe	EVa Sabaduling and	- 1 ime		
	Opera	ung Systems (KIUS), KIUS C	oncepts and usa	ige m	Evs, Scheduling and	i task		
Handha	manag	gement							
1 Nic	polas Na	vet François S	monot Lion "Aut	omotive Embede	d Syste	ms Handbook" CRC	Dress T	aulor &	Francic
I. NIC	201as $1Va$	q	IIIOIIOI-LIOII, Auto		u Syste.		11055 1	ayioi &	rancie
$\frac{g_{10}}{2}$ Frs	an Kaba	2. alci "Power Fle	ectronics and Drive	s Used In Auton	notive A	pplications"2014			
2. Lis Referen			ettomes and Diffe						
1 Los	enh Vit	havathil "Powe	· Flectronics· Princ	inles and Applic	ations"	McGraw Hill Publics	ation 20	010	
1. 503					<u></u>		ation, 20	510	
2. Cy	ril W. L	ander "Power E	lectronics", 3rd Ed	lition McGraw F	lill publ	ication.			
3. Fra	ınk Vah tion, Joł	id and Tony G nn Wiley & son	ivargis, "Embedde s, 2010	ed system design	n: A un	ified hardware/Softw	are intr	oduction	", Third
4. L.	Ashok I	Kumar, S. Albe	rt Alexander, "Pov	wer Converters	for Elec	tric Vehicles", CRC	Press, 7	Taylor &	Francis
5. Au	tomotiv	e Industry Stan	dards, India, 2015-2	2016					
Useful I	Links								
1. <u>htt</u>	ps://npte	l.ac.in/courses/	108/101/10810103	<u>8/</u> Prof. B. G. Fe	rnandes				
2. <u>htt</u>	ps://npte	l.ac.in/courses/	108/102/10810214	5/ Prof. G. Bhuv	aneshw	ari			
3. <u>htt</u>	ps://d1.	amobbs.com/ł	bs_upload78211	1/files_38/ourd	ev_629	261ASTZIF.pdf			

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
\rightarrow										10	11	12	1	2
CO↓														
CO 1	2	1	1	-	-	1	-	-	-	-	-	2	-	-
CO 2	2	1	2	-	-	1	-	-	-	-	-	2	-	-
CO 3	2	2	2	-	3	1	-	-	-	-	2	2	-	-
CO 4	2	2	2	-	3	1	-	-	-	-	2	2	-	-
t(Low)	t(Low) 2: Moderate(Medium) 3: Substantial(High)													

1: Slight(Low)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	5	5	10
Apply	5	5	20
Analyse	5	5	25
Evaluate	5	5	5
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad										
Th	ird Year (Sem	-V) MDM- Electri	cal Vehicle (Electrical Engine	ering- Institute	e Level-Industri	al)				
		IM	I3514: Electric Vehicle Lab							
Labora	atory Scheme:			Examination S	cheme:					
Practic	cal	2 Hrs/week		ISE	50					
Total (Credits	1		ESE						
				TOTAL: 50	_					
Prereq	uisite : Basics of	f Electronics								
Course	e Outcomes (CO): Students will be abl	e to							
CO1	Perform exper	iments by interfacing	sensor with microcontroller							
CO2	Illustrate the M	IATLAB programmi	ng for EV systems							
CO3	Develop and e	xecute the Simulink	model for different EV units							
CO4	CO4 Design the power supply EV unit on PCB									
Course Contents										
Experi	ment 1	Introduction to boot	ing process of raspberry pi			CO1				
Experi	ment 2	Perform experiment	to control the speed of dc motor			CO1				
Experi	ment 3	Interface IR/ PIR sen	sor with microcontroller			CO1				
Experi	ment 4	Interface ultrasonic s	ensor with microcontroller and fine	d distance		CO1				
Experi	ment 5	Developing SIMUL	INK Models for Vehicle Units			CO3				
Experi	ment 6	Programming EV Sy	stems in MATLAB			CO2				
Experi	ment 7	Application of Data	Analysis Techniques in EV Electri	cal system		CO2				
Experi	ment 8	Design a power supp	ly unit and create a PCB design for	r same.		CO4				
Experi	ment 9	Modelling and simul	ation of EV powertrain component	s in MATLAB		CO3				
Experi	ment 10	Analysis of EV powe	ertrain components in ANSYS			CO3				
Experi	ment 11	Battery Management	System modelling			CO3				
Experi	ment 12	Modelling of Li-ion	battery pack using MATLAB and A	ANSYS		CO3				
List of	Submission:									
Minim	um number of Ex	periments: 10								

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	1	2	3	1	3	-	1	-	2	-	2	2	-	2
CO2	1	2	3	2	3	-	1	-	2	-	2	2	1	-
CO3	1	2	3	3	3	-	1	-	2	-	2	2	2	-
CO4	1	2	3	3	3	-	1	-	2	-	2	2	2	-

1: Slight (Low)

2: Mode

2: Moderate (Medium)

3: Substantial (High)

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Avg
Task I	15	15	15	15	15	15	15	15	15
Task II	5	5	5	5	5	5	5	5	5
Task III	5	5	5	5	5	5	5	5	5
ISE	25	25	25	25	25	25	25	25	25

	Government College of Engineering, Karad										
Th	ird Year	(Sem – VI) M	DM- Electrical Vehicle (Electrical Engineering- Institute Lev	vel-Indu	strial)						
		IMI3615: EV	/ Charging Infrastructure, Vehicle Testing and Homologation	1							
Teac	hing Sche	me	Examination Scheme								
Lectu	res	02 Hrs/week	MSE 20								
Tutor	ials	00 Hrs/week	ISE 20)							
Total	Credits	02	ESE 60								
			Duration of ESE 02 H	s 30 Min							
Prere	equisite :	Basics of Power	Electronics Converters.								
Cour	se Outcor	nes (CO): Stude	ents will be able to								
CO	I Discu	ss the electric v	ehicle market, opportunities and challenges								
CO	2 Illust	ate different EV	development methods and unit economics								
CO.	3 Desci	ibe the EV char	ging technologies, standards and protocols.								
CO4	4 Execu	ite site selection	and planning infrastructure design								
			Course Contents	CO	Hours						
Unit	1 Fund	amentals of EV	' Management:	CO1	(04)						
	Intro	luction to EV N	larket, EV Design Procedure and ICE Model, EV Management, EV								
TT • 4	Home	plogation and Te	esting.	001	(05)						
Unit	2 Char	ger Manufactu	ring:	COI	(05)						
	FAM	FAME India and Manufacturing Guidelines, EV Certification Process, EV Charging,									
Unit	2 Drod	Product Development Plan:									
Omt	S Frou	ant Selection	nt Flam: Product Design Plan Broduct Validation Plan Vehicle Dynamics	02	(04)						
	Selec	tion Product De	sign Validation Product Selection Plan								
Unit	4 Deve	lonment Metho	ds:	CO2	(05)						
Cint	Produ	ict Developmer	t Methods, Product Development Plans, Unit Economics, Design	001	(00)						
	feasil	oility, Design for	Manufacturing.								
Unit	5 EV C	harging Techn	ology:	CO3	(04)						
	Over	view, Charging	Standards.								
Unit	6 Char	ging Infrastruc	ture and Site Selection:	CO4	(04)						
	EV C	harging Infrastr	ucture Design, Site Selection and Planning, Safety and Regularities.								
Hand	lbook										
1.	Amitabh	Kant, Randheer	Singh and Sanjeev Kumar Kassi, "Handbook of Electric Vehicle Char	ging							
	Infrastru	cture Implement	ation" version 1, 2021.								
Z.		ging Station Tec	Inncian Technicai Handbook , USAID Gov,2025.								
Refei	Cence Boo	KS nol "Electric Ar	d Unhaid Vahiolog Design Fundamentals" CBC Broog 2nd edition 2010								
1.	Ehsoni M	$\frac{Dal}{Cac}$ Vimin Er	a Hydrid Venicles Design Fundamentals CKC Press, 2 edition, 2010) mdomont	<u></u>						
∠.	Elisaili IVI. Theory an	, Gao Thinn , El d Design" Cro P	naula A., Modern Elecuric, Hydrid Elecuric and Fuel Cell Venicles, F	indament	als						
Usofi	l L inke	u Designi Cici									
1	https://onl	inecourses notel	ac in/noc20_ee99/preview Prof_Ashok_Ihunihunwala IIT Madras								
2	https://npt	el ac in/courses/	108/103/108103009/								
3.	https://onl	inecourses.swav	am2.ac.in/ntr24_ed54/preview								
4.	https://ww	ww.niti.gov.in/si	tes/default/files/2023-02/EV_Handbook_Final_14Oct.pdf								
	https://co	renenergy net/w	vp-content/uploads/2023/07/EV-Technican-Handbook-SAREP.pdf								

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
\rightarrow										10	11	12	1	2
CO↓														
CO 1	1	-	-	-	-	-	2	-	-	-	3	2	-	2
CO 2	1	-	1	-	-	-	2	-	-	-	3	2	1	-
CO 3	1	2	2	-	-	2	3	-	-	-	-	2	2	-
CO 4	1	2	2	2	-	3	3	2	-	-	2	2	2	-

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	5	5	05
Apply	5	5	20
Analyse	5	5	20
Evaluate	5	5	15
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad											
Fi	nal Y	ear (Sem – VII) M	DM- Electrical Vehicle (Electrical Engineering- Institute	e Level-Indu	strial)							
		Ι	MI3716: EV Vehicle Design, Analysis and Control									
Tea	ching	Scheme	Examination Schem	e								
Lect	ures	02 Hrs/week	MSE	20								
Tuto	orials	00 Hrs/week	ISE	20								
Tota	l Crec	lits 02	ESE	60								
			Duration of ESE	02 Hrs 30 Min								
Prei	requis	ite : Semiconductor I	Devices Knowledge									
Cou	rse O	utcomes (CO): Stude	ents will be able to									
CO)1	Apply the power elec	tronics technique to diagnostics fault									
CO) 2	Explore the knowledg	ge about analog and digital electronics									
CO) 3	Develop the EV archi	tecture with the help of design and simulation parameters.									
CO) 4]	Design and modelling	g the different EV units.									
			Course Contents	CO	Hours							
Uni	t1	Analog Electronics:		CO2	(04)							
		Sensors for EV A	Applications (Temperature, Pressure, Current, Voltage) Sig	gnal								
		Conditioning Circuit	its (Amplifiers, Filters) Interface Circuits (Analog-to-Dig	gital								
	(Converters)										
Uni	it 2 Power Electronics: CO1 (04)											
]	Pulse Width Modulat	ion (PWM) Techniques Current and Voltage Regulation Over current	rent								
		and Overvoltage Prot	ection Fault Detection and Diagnostics.									
Uni	t 3	Digital Electronics:		CO2	(04)							
		Analog-to-Digital C	onversion (ADC) Sensor Types and Characteristics (Temperatu	ure,								
]	Pressure, Acceleratio	n, etc.) Signal Conditioning Circuits Filtering and Noise Reduct	tion								
	,	Techniques										
Uni	t 4	Automotive Compor	nents:	CO3	(04)							
]	Power Semiconduct	ors, Trends in Power semiconductors, Bidirectional Conver	rters,								
]	Inverters, Interleaving	g mode in power converters, Passive Components									
Uni	t 5	EV Architecture:		CO3	(05)							
]	Motor development	and induction motor characteristics, Simulink model to calc	ulate								
		vehicle configuration	, Multilevel inverter design and simulation, DC –DC converter, M	lotor								
	(controllers			(0.0)							
Uni	t6	Modelling and Simu	lation of Electric Vehicles:	CO4	(06)							
		Modeling and sizing	of the traction systems, Modeling and sizing of the storage syst	ems,								
	_	Modeling of EV batte	ery and BMS, Interaction between the different blocks of the elect	rical								
		Architecture										
Han				1 IEEE D	ICDN							
1.	K. I.	Chau, Electric Ven	icle Machines and Drives: Design, Analysis and Application", W1	ley-IEEE Press	S, ISBN:							
2	9/8-1 Den E	I-118-75252-4, Augu	st 2015. Itan Zaanf "Electric Valiala Engineering" 1st Edition McCrowy	TT:11 anti-1: a ati-a								
<i>Z</i> .	Per E	enge "Nick Enge, Step	onen Zoepi, Electric venicle Engineering, ist Edition, McGraw	Hill publicatio	n 2021							
3.	Nicol	las Navet, Francois S	imonot-Lion, "Automotive Embeded Systems Handbook", CRC P	ress Taylor&F	rancic							
	group	o, 2009.		·								
	0 1											
Refe	Reference Books											
1.	1. M. S. Tyagi, Introduction to Semiconductor Materials and Devices, John Wiley & Sons Inc.											
2.	2. Michael Shur, Introduction to Electronic Devices, John Wiley & Sons Inc., 2000.											
3.	K. 1	$\frac{1}{1}$ Howe and C. G. So	dini, Microelectronics: An Integrated Approach, PrenticeHall Inc.	. 1997.								
4.	Jaco	ob Millman, and C.C.	Halkias, "Electronic devices and circuits", IMH Publications									
5.	5. Ben G. Streetman, Solid State Electronic Devices, PHI, 5th Ed, 2001											
Usef	tul Li	nks	·// 1001/L // 1									
1.	http:/	//web.11td.ac.1n/~shou	ri/eei201/lectures.php									
2.	http:/	//www.daenotes.com/	electronics/digital-electronics									
3.	https:	://onlinecourses.nptel	.ac.in/noc24_ee30/preview_									

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
\rightarrow										10	11	12	1	2
CO↓														
CO 1	2	-	-	-	-	-	1	-	-	-	-	2	-	-
CO 2	2	-	-	-	-	-	1	-	-	-	-	2	-	-
CO 3	2	1	2	1	1	-	1	-	-	-	-	2	-	-
CO 4	2	1	2	1	1	-	1	-	-	-	-	2	-	-
t(Low)		2. Ma	damata	Madin	m)	2	2. Suba	ontiol(Uigh)					

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	5	-	10
Apply	5	5	20
Analyse	5	5	20
Evaluate	5	5	10
Create	-	5	-
TOTAL	20	20	60

	Government College of Engineering, Karad												
Final	Year (S	em – VIII) M	IDM- E	Electrica	al Vehicl	e (Elect	rical E	ngineering- In	nstitute Lev	vel-Indu	strial)		
			IMI	3817: E	V PCB I	Design d	& Data	Analytics					
Teachin	g Schen	ne						Examination	Scheme				
Lectures	5	02 Hrs/week						MSE	20				
Tutorials	s	00 Hrs/week						ISE	20				
Total Cr	edits	02						ESE	60				
								Duration of ES	E 02 Hr	Hrs 30 Min			
Prerequ	Prerequisite : Basics of Analog and Digital Electronics												
Course	Outcom	nes (CO): Stude	ents will	l be able t	to								
CO1	Discus	s the basics of	PCB De	esign and	its compo	onents.							
CO2	Organize and execute hierarchical schematics of EV												
CO3	3 Explore ideas about data visualization.												
CO4	Analyz	ze data for elect	tric and	autonom	ous vehic	les.							
	Course Contents CO Hour										Hours		
Unit 1	it 1 Basics of PCB Design:									CO1	(04)		
	Overview, Basic Ideas, Different Technologies, Understanding Schematic Capture.												
Unit 2	Comp	onent Workin	ng:							CO2	(05)		
	Symbo	ol and Nets, C	Creating	Hierarc	hical Sch	ematic,	Multi S	Sheet Design, (Generating				
	Netlist	t and Bill of Ma	aterial.										
Unit 3	Design	n Applications	5 :				D			CO1	(04)		
	Design	n for Analog	and D ₁	gital Cir	cuits, De	esign to	r Power	Electronics, L	besign for				
TT A (A	M1crov	wave circuits.											
Unit 4	Data A	Analytics:	C 11 <i>.</i> .	D		D		T 1 ·		CO4	(04)		
	Introdu	uction, Data (Collectio	on, Prepi	rocessing,	Data	Collectio	n Techniques	in Electric				
TI:4 5	Venici Data									<u> </u>	(04)		
Unit 5	Jala V	visualization:	Vienelia	ration To	obniquo. I	Doto Evr	loration	Data Explorati	on for EV	COS	(04)		
Unit 6		view and Appli	v Isualiz	of Data A	nolveie.	Jala Exp		, Data Exploratio		CO4	(05)		
Omto	Overvi	iew of Data A	nalveie	J Data A Techniar	inarysis. Jes Regra	ession A	nalveis	Clustering An	nlication in	04	(05)		
	EV Ele	ectrical System	n Data A	nalvsis F	Platform f	or EV S	vstem	clustering, rip	pheation in				
Handbo		eethear bystem	i, Dutu I	inary 515 T	iutionin i		, stem.						
1. "F	P-CAD	PCB User's Gu	uide", p-	-cad PCB	lavout sv	stem fro	m Altur	n.2006.					
Referen	ce Book	(S	71					7					
1. "I	PC-PCE	B Design Desk	Referen	ce 2022 I	Edition",	IPC desi	gn,2022.						
2. Sa	ai Kiran	"PCB Designin	ng E- Le	earning B	ook", Dig	gimind 2	009.						
Useful I	links	8	0	0	,	/							
1. http	os://reso	urces.pcb.cader	nce.com	/ebooks-v	white-pap	ers	1			1			

PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO
\rightarrow										10	11	12	1	2
CO↓														
CO 1	2	2	3	2	2	-	1	-	-	-	-	2	-	I
CO 2	1	2	2	-	-	-	1	-	-	-	-	2	-	I
CO 3	1	1	1	2	-	-	1	-	-	-	-	2	-	-
CO 4	1	1	1	2	-	-	1	-	-	-	-	2	-	-

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	-	-	10
Apply	5	5	20
Analyse	5	5	20
Evaluate	5	5	10
Create	5	5	-
TOTAL	20	20	60

Multi-disciplinary Minor (Institute Level-Industrial)

Image Processing (ETC- Institute Level-Industrial)

Government College of Engineering, Karad											
	S	econ	nd Year (Sem –	III) MDM- Image	e Processing (ETC	- Institute Level-I	ndusti	rial)			
				IMI3321: Fu	undamentals of In	nage					
Teachi	ng Sch	ieme				Examination Sche	me				
Lecture	es		02 Hrs/week			MSE	20				
Tutoria	ls					ISE	20				
Total C	redits		02			ESE	60				
						Duration of ESE	02 Hr	s 30 Min			
Prereq	uisite	: Ma	thematics basics								
Course	Outco	omes	s (CO): Student	s will be able to							
CO1		Und	erstand the imag	ge fundamentals							
CO2	CO2 Study the Image perception										
CO3		Expl	lain different op	perations applied to N	Medical Images						
CO4 Apply various image transformation procedures used in health care											
				Cour	se Contents			CO	Hours		
Unit	1	Fun	damentals of I	nage :				CO1	(04)		
		Fund	damentals of Im	age and Pictures, A	nalog image and Di	gital Image, Elemen	nts of				
		Visu	al perception, In	nage sampling and q	juantization,						
Unit	2	Diff	erent Types of	Image:				CO1,	(04)		
		Imag	ge Perception, C	Breyscale Images, R	GB Images, Indexed	Colour Images, Me	dical	CO2			
		Imag	ges.								
Unit	3	Rep	resentation of l	mage:				CO1,	(04)		
		Cam	era Models , I	maging Geometry,	Basics Of Image D	isplay, Data Types	And	CO2			
T Init	4	Lima	versions					CO3	(04)		
Unit	4	Moic	ge Operations:	Polationshing Rasi	ia Imaga Operations	Arithmatic Goon	otrio	005	(04)		
		And	Morphological	Relationships, Dash	ie inlage Operations	- Antimetic, Ocon	lettie				
Unit	5	Tra	nsformation.					CO4	(05)		
Omt		Imag	pe Transform: 2	1 Dft- Discrete Cosi	ne. Sine . Haar Trans	form. Walsh Transf	orm.	04	(02)		
Unit	6	Coor	study 1 Modia	al Imaga Display usi		n		<u> </u>	(05)		
Unit	0	Case	e study 1. Medic	an intage Display usi	d RGB images using	MATIAR / Duthon		004	(05)		
		Case	e study 3 Differ	ent Operations on Im	na ROD mages using	, WATEAD /T yulon					
		Cube	o study 5. Differ	ent operations on m	14ges.						
Text B	ooks										
1.	Rafae	el C.	Gonzales, Richa	rd E. Woods, "Digit	tal Image Processing'	", Third Edition, Pea	rson Ec	lucation,	2010.		
			,		0 0	, , ,		, ,			
2.	Anil	Jain	K. "Fundament	als of Digital Image	e Processing", PHI I	Learning Pvt. Ltd., 2	2011 A	n Introdu	ction to		
	Digit	al Im	nage Processing	with Matlab, Alasda	ir McAndrew						
Referen	nces										
1.	Rafae	el C.	Gonzalez, Rich	ard E. Woods, Steve	n L. Eddins, "Digital	l Image Processing U	Jsing N	IATLAB	". Third		
	Editio	on Ta	ata Mc Graw Hi	ll Pvt. Ltd., 2011.	, 8	6 6	0		,		
2.	Will	iam l	K Pratt, "Digital	Image Processing",	John Willey, 2002.						
3.	Mala	y K.	Pakhira, "Digit	al Image Processing	and Pattern Recogni	ition", First Edition,	PHI Le	earning P	vt. Ltd.,		
	2011.										
Useful	Useful Links										
1.	1. <u>https://onlinecourses.nptel.ac.in/noc19_ee55/preview</u>										
2.	https:	://ww	ww.coursera.org	specializations/imag	<u>ge-processing</u>						
3.	https://www.coursera.org/learn/introduction-image-processing										

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]	$\to Oq$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
0	CO↓										10	11	12	1	2	3
(CO 1	3	2	1	-	1	1	2	1	-	-	1	2	1	1	-
(CO 2	2	2	1	2	1	1	1	-	-	-	-	1	-	1	-
(CO 3	3	2	3	3	3	2	-	-	-	1	-	-	1	2	2
(CO 4	3	2	3	3	3	2	-	-	-	1	1	1	1	2	2

1: Slight (Low) 2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE							
Remember	-	-	-							
Understand	5	5	05							
Apply	5	5	20							
Analyse	5	5	20							
Evaluate	5	5	15							
Create	_	-	-							
TOTAL	20	20	60							
Government College of Engineering, Karad										
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S	econd Year (Sen	$\mathbf{n} - \mathbf{IV}$	MDM- Ima	age Proce	essing (ETC	C- Institute Level-	-Indust	rial)		
	I	MI3422	: Basics of	Image P	rocessing f	or Healthcare				
Teaching Sch	eme					Examination Sch	eme			
Lectures	02 Hrs/week					MSE	20			
Tutorials						ISE	20			
Total Credits	02					ESE	60			
						Duration of ESE	02 Hr	s 30 Min		
Prerequisite	Digital Signal F	Processin	g basics							
Course Outco	omes (CO): Stude	lents will	be able to							
CO1	Study digital image	age fund	amentals.							
CO2	Explain image e	enhancen	nent and res	toration, co	ompression,	segmentation techni	ques		-	
Course Contents CO Hours										
Unit 1		CO1	(03)							
	Digital Image Re	lepresenta	ation – Fund	lamental St	teps In Imag	e Processing, Comp	onents			
	Of An Image Pro	ocessing	System.							
Unit 2	Image Enhance	ement In	The Spatia	al Domain	:			CO1,	(04)	
	Some Basic Gra	ay Level	Transforma	tion, Histo	gram Proces	ssing, Enhancement	Using	CO2		
	Arithmetic/Logi	ic Operat	ions, Basics	s Of Spatia	al Filtering,	Smoothing Spatial I	filters,			
I I 1 2	Sharpening Spat	tial Filter	S.		•			COA	(0.4)	
Unit 3	Image Enhance	ement In	The Frequ	form And	ain:	nov Domain Sma	othing	CO2	(04)	
	Erequency Dom) The Fo	ourier Trans	ning Erogu	The Freque	in Eilters Homom	ormhia			
	Filtering		ers, Sharper	ing riequ	iency-Doma	in filters, nomoni	orpine			
Unit 4	Image Restorat	tion						CO2	(06)	
Cint 4	A Model Of Th	ne Image	Degradation	n/Restorati	on Process	Linear Position Inv	variant	02	(00)	
	Degradations. In	nverse F	iltering. Mi	inimum M	ean Square	Error (Wiener) Fili	tering.			
	Constrained Lea	ast Squa	res Filtering	g. Wavele	ts And Mul	ti Resolution Proce	essing:			
	Multi Resolutio	on Expan	nsions, Wav	velet Trans	sforms In C	one Dimension, The	e Fast			
	Wavelet Transfo	orm, Ŵav	elet Transfo	orms In Tw	o Dimensio	ns				
Unit 5	Image Compres	ession and	d segmenta	tion:				CO2	(05)	
	Image Compres	ssion Mo	dels, Error-	-Free Com	pression, Lo	ossy Compression,	Image			
	Compression Sta	tandards,	Detection (Of Discont	inuities, Edg	e Linking And Bou	ındary			
	Detection, Thres	sholding,	Region-Bas	sed Segme	ntation			~~~	(0.4)	
Unit 6	Object Represe	entation .	And Descri	ption:	1 5			CO2	(04)	
	Various Schem	nes For	Represent	tation, Bo	bundary De	escriptors, And R	egional			
	Descriptors									
Text Books								l		
1.	Rafael C. Gonza	ales, Rich	ard E. Woo	ds, "Digita	l Image Pro	cessing", Third Editi	ion, Pear	son Educ	cation,	
	2010.	,		, 0	U	8	,		,	
References										
1.	Rafael C. Gonza Third Edition Ta	alez, Ricł ata Mc G	nard E. Woo raw Hill Pvt	ods, Steven t. Ltd., 201	L. Eddins, " 1.	Digital Image Proce	essing Us	sing MA	ΓLAB",	
2.	Malay K. Pakhir Ltd., 2011.	ra, "Digit	tal Image Pr	ocessing a	nd Pattern R	ecognition", First Ec	dition, P	HI Learn	ing Pvt.	
Useful Links	· · ·									
1.	https://onlinecou	urses.npte	el.ac.in/noc1	19_ee55/pr	eview					
2.	2 https://www.coursera.org/learn/introduction_computer_vision_watson_opency									
2. <u>https://www.coursera.org/learn/introduction-computer-vision-watson-opencv</u>										

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	2	1	1	2	1	-	-	-	-	-	-	2	3	2	1
CO 2	2	2	1	1	1	-	-	-	-	-	-	1	3	2	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	5	5	05
Apply	5	5	20
Analyse	5	5	20
Evaluate	5	5	15
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad									
	Third Year (Sem –	V) MDM- Image Processing (ETC-]	Institute Level-Indus	strial)						
	IMI	3523: Particle Size Analysis using Imag	ge Processing							
Teaching Scl	heme		Examination Scheme							
Lectures	03 Hrs/week		MSE 2	0						
Tutorials	-		ISE 2	0						
Total Credits	03		ESE 6	0						
			Duration of ESE (2 Hrs 30 M	in					
Prerequisite : Basics of Image Processing										
Course Outc	Course Outcomes (CO): Students will be able to									
CO1	Understanding of pa	article size analysis techniques and their a	pplications in health car	e						
CO2	Apply Methods of p	article size Measurements by microscopic	c technique							
CO3	Develop interpretati	on of particle size distribution data and an	nalyzing particle morph	ology.						
		Course Contents		CO	Hours					
Unit 1	Principles of Particl	e Size Analysis		CO1	(05)					
Unit 2	Techniques in Parti	cle Size Measurement		C01,	(07)					
				CO2						
Unit 3	Interpretation of Par	ticle Size Distribution Data		CO3	(07)					
Unit 4	Particle Morpholog	y Analysis		CO3,	(07)					
				<u>CO4</u>						
Unit 5	Particle Size Analys	is in health care medical system and Bior	nedical Samples	<u>CO3</u>	(07)					
Unit 6	Introduction of MA	TLAB operations used for image process	sing, Image sampling a	nd COI,	(07)					
	quantization, Stud	y of DICOM standards. Histogram	Processing and Ba							
	Thresholding functi	ons, mage Ennancement-Spatial Intering	,							
Text Books										
1.	G.R. Sinha, Bhagwa	aticharan patel, Medical Image Processing	g: Concepts and Applica	tions, PHI I	earning					
	private limited.2014		· · · · ·							
2.	KayvanNajarian and	d Robert Splinter, "Biomedical Signal and	I Image Processing", Se	cond Edition	n, CRC					
	Press, 2005.									
3. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012										
References										
1.	I. Geoff Dougnerty, Medical Image Processing: Techniques and Applications, Springer Science & Business Media, 25-Jul-2011									
2.	Isaac N. Bankman, Handbook of Medical Image Processing and Analysis, Science Direct,2nd Edition, 2009									
3.	Deserno T M, "Biomedical Image Processing", Springer, 2011.									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO		
CO↓										10	11	12	1	2	3		
CO 1	-	1	3	3	2	1	-	-	-	-	-	1	2	2	1		
CO 2	-	3	3	2	2	1	-	-	-	-	-	1	1	2	1		
CO 3	-	3	3	2	2	1	-	-	-	-	-	2	2	3	2		
		1: Slig	ht (Lov	(Low) 2: Moderate (Medium))	3: \$	Substar	ntial (H	ligh)	l)				

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	5	5	05
Apply	5	5	20
Analyse	5	5	20
Evaluate	5	5	15
Create	-	-	-
TOTAL	20	20	60

	Government Colle	ege of Engineering, H	Karad							
Third	Year (Sem – V) MDM- Image P	Processing (ETC- In	nstitute L	evel-Industrial)						
	IMI3524: Particle Size Ana	alysis using Image	Processin	g Lab						
Teaching Scheme			Examinati	on Scheme						
Lectures	02 Hrs/week		MSE	-						
Tutorials	-		ISE	50						
Total Credits	01		ESE	-						
Course Contents										
Prerequisite : Basics of Image Processing										
Course Outcomes	Course Outcomes (CO): Students will be able to									
C01	Identify and describe the diffe formulation analysis.	Identify and describe the different tools and instruments used in particle characterization and formulation analysis.								
CO2	Prepare and organize the labo for experiments.	pratory environment,	ensuring al	ll equipment is correctly set up						
CO3	Execute particle characteriza demonstrating proficiency and	tion and morpholog	gical analy	vsis procedures independently,						
	Course Contents									
Experiment 1	Principles of Particle Character	rization in Formulatio	ons							
Experiment 2	Techniques in Reverse Engine	ering of Formulations	3							
Experiment 3	Classification Analysis of Form	mulated Products, Mo	rphologica	l Characterization of						
	Formulations									
Experiment 4	Microscopic Analysis of Form	ulated Products, Adv	anced Topi	cs in Formulation						
	Characterization									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	1	-	-	3	3	-	1	-	2	2	-	2	-	2	2
CO 2	1	3	3	2	2	1	3	1	2	-	2	2	1	2	2
CO 3	1	3	3	2	2	1	-	2	2	-	2	2	1	2	2

1: Slight (Low) 2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Avg
Task I	15	15	15	15	15
Task II	5	5	5	5	5
Task III	5	5	5	5	5
ISE	25	25	25	25	25

	Government College of Engineering, Karad									
	Third Year (Sem – VI) MDM- Image Proce	ssing (ETC- Institute Level-In	ndustrial)							
	IMI3625: Particle Charact	terization in Healthcare								
Teaching S	Scheme	Examination Sche	me							
Lectures	02 Hrs/week	MSE	20							
Tutorials	-	ISE	20							
Total Credi	ts 02	ESE	60							
		Duration of ESE	02 Hrs 30 Min							
Prerequisi	Prerequisite : Basics of Image processing									
Course Ou	Course Outcomes (CO): Students will be able to									
CO1	CO1 Understand of particle characterization techniques used in the health care sector.									
CO2	CO2 Analyse the morphology, structure, and properties of particles.									
CO3	Apply particle characterization techniques in hea quality control.	Ith care medical research, formula	tion developmen	it, and						
	Course Conten	its	СО	Hours						
Unit 1	Fundamentals of Particle Characterization		C01	(04)						
Unit 2	Techniques in Particle Morphology Analysis		CO2	(04)						
Unit 3	Analysis of API Particles		CO1, CO2	(04)						
Unit 4	Microscopy Techniques for Characterization		CO3	(04)						
Unit 5	Impurities Analysis and Detection		СОЗ,	(05)						
Unit 6	Advanced Topics in Particle Characterization for	health care applications.	CO3	(05)						
	·									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	-	2	3	3	3	-	-	-	-	1	-	1	-	2	1
CO 2	-	3	3	2	2	1	-	-	-	-	1	1	1	2	1
CO 3	-	3	3	2	2	1	-	-	-	-	-	2	1	2	2

1: Slight (Low) 2:

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	5	5	05
Apply	5	5	20
Analyse	5	5	20
Evaluate	5	5	15
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad									
	Final Year (Sem – VII) MDM- Image Processing (ETC- Institute Level-Industrial)									
	IMI3726: Particle Characterization in Formulation and Reverse Engineering									
Teachin	g Scheme	Examination Schem	ne							
Practical	2 Hrs/week	MSE 2	20							
Tutorials	S -	ISE 2	20							
Total Cr	edits 02	ESE 6	50							
	Duration of ESE 02 Hrs 30 Min									
Prerequ	isite : Basics of image proc	cessing								
Course	Outcomes (CO): Students	will be able to								
CO1	Explain the advanced knowledge and skills in particle characterization techniques applicable to health care image analysis.									
CO2	Illustrate the reverse engi	neering methods for analysing complex formulations and identif	fying key							
GOA	components									
<u>CO3</u>	Explain the techniques fo	r microscopy image analytics for formulation characterization.	1 11							
<u>CO4</u>	Apply the particle charac	cerization techniques in formulation development, optimization,	, and quality c	control.						
			CO	**						
TT 1 4		Course Contents	CO	Hours						
Unit I	1Principles of Particle Characterization in FormulationsCO1(04)									
Unit 2	2Techniques in Reverse Engineering of FormulationsCO2(04)									
Unit 3	3Classification Analysis of Formulated ProductsCO2(04)									
Unit 4	Morphological Character	zation of Formulations	CO3	(05)						
Unit 5	Microscopic Analysis of	Formulated Products	CO3	(05)						
Unit 6	Advanced Topics in Formulation CharacterizationCO4(04)									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	1	3	3	3	3	-	-	-	-	1	-	2	-	2	2
CO 2	-	3	3	2	2	1	-	-	-	-	-	2	1	2	2
CO 3	-	3	3	2	2	1	-	-	1	-	-	2	1	2	2
CO 4	-	3	3	3	3	2	-	1	-	-	1	2	1	2	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	5	5	05
Apply	5	5	20
Analyse	5	5	20
Evaluate	5	5	15
Create	-	-	-
TOTAL	20	20	60

		Government Co	llege of Engineering, Karad								
	Final Year (Sem	– VIII) MDM- Imag	e Processing (ETC- Institute L	evel-Industrial)							
		IMI3827:	Project/Internship								
Teaching	Feaching Scheme Examination Scheme										
Practical	04 Hrs/week		ISE	-							
Tutorials	Tutorials - ESE 100										
Total Cred	'otal Credits 02										
Prerequis	site -										
Course O	utcomes (CO): Stud	dents will be able to									
CO1	Carry out compres	nensive reverse enginee	ering of a formulation, utilizing mu	ltiple analytical techniques to							
CO2	Modify standard demonstrating flex	procedures to troub ibility and problem-solv	leshoot and optimize techniques	s for specific formulations,							
CO3	Design and implementation and advanced technology	nent novel analytical pr nical skills.	rotocols to characterize new formul	ations, showcasing innovation							
		Course Co	ontents	СО							
	Project /Internship	based on the completio	n of previous courses.	CO1,CO2,CO3							

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO	PSO	PSO
CO↓										10	11	12	1	2	3
CO 1	1	3	3	3	3	-	3	-	2	-	2	2	-	2	2
CO 2	-	3	3	2	2	1	2	3	-	2	2	2	1	2	2
CO 3	-	3	3	2	2	1	2	-	1	-	2	2	1	2	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	ISE	ESE
Remember	-	10
Understand	-	10
Apply	-	20
Analyse	-	20
Evaluate	-	20
Create	-	20
Total	-	100

Multi-disciplinary Minor (Institute Level-Industrial)

Electrical Vehicle (Mechanical Engineering- Institute Level-Industrial)

			Government College of Engineering, Kara	ad								
Seco	ond Ye	ar (Sem – III) M	DM- Electrical Vehicle (Mechanical Enginee	ering- Institute L	evel-Indus	strial)						
	IMI3331: Foundation of EV and Hybrid Vehicle uching Scheme Examination Scheme											
Teach	ing Sch	eme	Exa	amination Scheme								
Lectur	es	02 Hrs/week	MS	SE	20							
Tutori	als	-	ISE	E	20							
Total (Credits	02	ESI	E	60							
_			Du	ration of ESE	02 Hrs	s 30 Min						
Preree	<u>quisite :</u>	Basics of mechani	cal, Basics of electrical									
Cours	e Outco	mes: Student will	be able to									
<u>CO1</u>		Explain the fu	ndamentals of EV technology									
CO2 Identify and discuss different components and their operation need in a Hybrid vehicle												
<u>CO3</u>	CO3 Demonstrate different battery technologies and charging stations											
CO4	Calculate motors and motor controller sizing need in an EV											
TT •4	1 1		Course Contents		CO	Hours						
Unit	I In	troduction to EV:	analassa and annuariza Automotiva revolution			(04)						
		plaining EV lect	inology and summarize Automotive revolution	ii, explore Electric								
Unit	2 FV	V layout and com	nonente:			(04)						
Omt	Jmt 2 EV layout and components: (04) Evaluring different types of EV layouts and basic components of Electric Vahiala (04)											
Unit	3 In	troduction to Hyb	rid electric vehicle.			(04)						
Ome	De	fining Hybrid Veh	icle working principles and architecture Introduction	ion Battery chemist	rv CO2	(04)						
	.Et	ficiency .Definition	n and parameters for Hybrid Systems	ion, Duttery enemies								
Unit	4 La	yout and compon	ent of hybrid electric vehicle :			(04)						
	El	ectric Motors, Gen	nerators, and Power electronics for Hybrid syste	ems, control systen	is, CO2	· /						
	Hy	brid electric vehic	ele operation	-								
Unit	5 Id	entify and demon	strate Battery Technology and charging station is	infrastructure:		(05)						
	De	fining Battery Te	echnology, recognize different types of batteries	and components	of CO3							
	Ba	ttery, describing E	V charging Infrastructure									
Unit	6 Ac	lvanced EV:				(05)						
	Li	sting of Electrical	Requirement needed in EV, state Power distrib	bution specification	IS,							
	de	scribe Electronic c	control system, Listing of EV standards and classi	ifications. Summari	ze CO4							
	cri	teria for selection	of electrical and electronic components for EV. br	rief outline of Moto	rs							
	ne	ed in EV										
Defer	Deference Realize											
1	eference Books											
Elsevier- edition 2001												
2. Heinz Heisler; Advanced Vehicle Technology, Publisher: Butterworth-Heinemann Ltd; 2nd edition- July 2002												
3	Seth L	eitman Bob Brant	Leitman Seth: Build Your Own Electric Vehicle: P	Publisher: McGraw-	Hill - 3 rd ed	ition-feb						
5.	2013	Julian, 200 Dialit,	Lotanan bean, bana 10ar 0wii Licenie velliele. I	actioner. Weedraw-		1011-100						
Refere	ence lin	KS										
1.	https://	www.carbodydesig	n.com/									
2.	https://	www.team-bhp.com	n/									
3.	https://autoprotoway.com/automotive-design-process/											
4.	https://www.carbodydesign.com/											

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
CO↓										10	11	12
CO 1	3	1	-	-	3	-	2	-	-	2	-	3
CO 2	3	1	-	-	3	-	3	-	-	2	-	2
CO 3	3	2	2	3	3	-	3	-	2	2	-	3
CO 4	2	3	3	3	3	1	3	1	2	2	-	3

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	10
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	10
Evaluate	4	4	20
Create	-	-	-
TOTAL	20	20	60

				Government College of Engineering,	Karad					
Sec	ond	Year ((Sem – IV) M	DM- Electrical Vehicle (Mechanical Eng	gineering- Institut	e Leve	el-Indus	trial)		
				IMI3432:Automotive Mechanics fo	r EV					
Teach	ing S	Scheme	e		Examination Sch	eme	-			
Lectur	res		02 Hrs/week		MSE		20			
Tutori	als		-		ISE		20			
Total	Credi	ts	02		ESE		60			
					Duration of ESE		02 Hrs	30 Min		
Prere	quisi	te: Bas	sics of mechanic	cal, Basics of electrical, fundamentals of EV.						
Cours	se Ou	itcome	s: Student will	be able to						
CO1	Des	cribe v	vehicle dynamic	es and elements involved in Automobile engine	ering					
CO2	Der	nonstra	ate different aut	comotive sketching techniques and various creater	tive softwares					
CO3 Design various systems of EV using advance modeling techniques and softwares										
CO4	Ana	alyze ad	dvance EV syst	em using different data analysis software						
Course Contents CO										
Unit 1 Introduction to vehicle dynamics:										
Unit 1 Introduction to vehicle dynamics: Fundamentals of vehicle dynamics, different mechanisms and dynamics involved in wheels.										
		funda	mentals of Hyb	rid vehicle dynamics.						
Unit	2	Aeroo	dynamics and	power train system:				(04)		
		Basics	s of aerodynam	ics, principles of aerodynamics, fluid mechanic	es and airflow dynam	nics,	CO1			
		Suspe	nsion and Brak	ing system, Vehicle stability control and vehic	le safety,	,				
Unit	3	Sketc	hing of autom	otive EV design:				(04)		
		Introd	luction to Auto	omotive sketching software, Overview of ve	hicle design proces	s and	CO2			
		Autor	notive sketchin	g, Basic sketching techniques.						
Unit	4	Softw	are for EV dra	afting and designing				(05)		
		Basic	sketching tech	iniques and tools in the software, sketching of	ar exteriors, interior	rs and	CO3			
		detail	s. creating diffe	erent views and angles of vehicle						
Unit	5	Adva	nce EV modeli	ing techniques using Solidworks :				(05)		
		Basic	vehicle design	n principles, design and modeling of chass	is and frame, suspe	ension	CO4			
		system	ns, design and	d modeling of braking and steering syster	ns, automotive sket	tching	C04			
		softwa	ares, advance b	ody design modeling.		_				
Unit	6	Adva	nce EV analysi	is using different data analysis software:				(04)		
		Analy	vse the EV desig	gned in modeling software using advance data	analysis software, se	tting	CO4			
		up mo	deling environ	ment.						
Refer	Reference Books									
1.	1. Julian Happian-Smith, "Introduction to Modern Vehicle Design", Transport Research Laboratory (TRL) ,Elsevier-									
	edition, 2001									
2.	Hei	nz Heis	sler; "Advanced	d Vehicle Technology", Butterworth-Heineman	nn Ltd; 2 nd edition, J	uly 200)2.			
3.	Setl	n Leitn	nan, Bob Brant	t, Leitman Seth; Build Your Own Electric Ve	ehicle: Publisher: M	cGraw-	Hill, 3 rd	edition,		
	201	3.								
Refer	ence	links								
1.	http	s://ww	w.carbodydesig	gn.com/						
2.	http	s://ww	w.team-bhp.com	m/						
3.	3. https://autoprotoway.com/automotive-design-process/									
4.	httn	s://ww	w.carbodvdesig	gn.com/						
Refer 1. 2. 3.	ence http http http	links os://ww os://ww os://auto	w.carbodydesig w.team-bhp.com oprotoway.com	gn.com/ m/ /automotive-design-process/						
4.	пцр	95://WW	w.carbodydesig	gii.com/						

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
CO↓										10	11	12
CO 1	3	-	-	-	1	-	2	-	-	2	-	3
CO 2	2	-	2	-	2	-	1	-	-	1	-	2
CO 3	3	3	3	3	3	1	3	1	2	2	-	3
CO 4	3	3	3	3	3	1	3	1	2	1	-	2

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	20
Evaluate	4	4	10
Create	4	4	10
TOTAL	20	20	60

Government College of Engineering, Karad										
Third	Year (Sem – V) MDM	- Electrical Vehicle (Mechanical Engin	eering- Institute Level	-Indust	rial)					
	IMI35	33:EV Design, Development, Analysis	and Control		,					
Teaching	Scheme		Examination Scheme							
Lectures	03 Hrs/week		MSE	20						
Tutorials	00 Hrs/week		ISE	20						
Total	03		ESE	60						
Credits										
			Duration of	02 Hrs	30 Min					
			ESE							
Prerequis	ite : Basics of mechanical	, Basics of electrical, fundamentals of EV								
Course O	utcomes: Student will be a	able to								
CO1	Demonstrate various tool	s and techniques of modeling and simulation	of EV							
CO2	Design and model compo	onents of EV								
CO3	Analyze EV powertrain c	components								
CO4	Examine and simulate the	ermal management in EV powertrain		1						
		Course Contents		CO	Hours					
Unit 1	Essential for designing	Essential for designing and simulation using MATLAB: (05)								
	Overview and environme	ent, Basic variables, syntax, commands, com	imands, M-files and	CO1						
	types, Operators decision	making and loops, vector , matrix and arrays	s, colon notation and							
TT */ 0	numbers, string and func	tions			(05)					
Unit 2	Fundamentals of EV s		CO1	(05)						
	DC motor characteristics	k model to calculate	CO1							
Unit 3	Design and modeling of	$\mathbf{F} \mathbf{F} \mathbf{V}$ system using MATI AB .	tor controller design,		(04)					
Onit 5	Designing DC motor and	l induction motor, multilevel inverter designi	ng.	CO2	(04)					
Unit 4	Modeling of EV power	train in Solid works:			(04)					
0	Introduction to EV Powe	r train. Modeling architecture of EV Powertr	ain. Modeling of EV	CO2	(01)					
	powertrain components.	Battery pack modeling in solidworks	, 0							
Unit 5	Analysis of EV power t	rain components:		CO2	(04)					
	Modeling and simulation	of EV powertrain components in ANSYS,		COS						
Unit 6	Simulation of Thermal	management system for EV:		CO4	(04)					
	Battery management sys	tem modeling, simulation li-ion battery pack	using MATLAB	04						
Reference	Books									
1.	Julian Happian-Smith, "Introduction to Modern Vehicle Design", Transport Research Laboratory (TRL)									
	,Elsevier- edition, 2001		nd							
2.	Heinz Heisler; "Advance	d Vehicle Technology", Butterworth-Heinem	hann Ltd; 2 nd edition, July	/ 2002.						
3.	Seth Leitman, Bob Brant	, Leitman Seth, "Build Your Own Electric Ve	ehicle", McGraw-Hill, 3 rd	edition,	2013.					
Reference	links									
1.	https://www.carbodydesi	gn.com/								
2.	https://www.team-bhp.co	m/								
3.	https://autoprotoway.com/automotive-design-process/									
4.	https://www.carbodydesi	gn.com/								

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
CO↓										10	11	12
CO 1	2	2	1	2	2	1	2	1	1	1	1	2
CO 2	3	2	3	3	2	1	2	1	1	1	1	2
CO 3	2	3	3	3	3	1	3	2	2	2	2	3
CO 4	3	3	3	3	3	1	3	1	2	2	2	3

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	20
Evaluate	4	4	10
Create	4	4	10
TOTAL	20	20	60

Government College of Engineering, Karad											
Third Year (Se	m –V) MDM- Electrical V	vehicle (Mechanical Eng	ineering- Iı	nstitute Level-Indus	strial)						
	IMI3534: 3D Modelling and simulation Lab										
Laboratory Scheme	:		Examinat	ion Scheme:							
Practical	2 Hrs/week		ISE	50							
Total Credits	1		ESE								
Prerequisite : Basic	s of mechanical, Basics of ele	ctrical, fundamentals of EV									
Course Outcomes (CO): Students will be able to										
CO1 Demonstra	te various softwares needed	for 3D modelling									
CO2 Design 3D model of EV components											
CO3 Analysis 3	D data with different simula	tion softwares									
CO4 Inermal analysis of battery components											
Experiment 1	Introduction to Solidworl	anse contents			C01						
Fyneriment ?	3D modelling of FV comm	onents			CO1						
Experiment 2	Drafting of FV component	s in solidworks									
Experiment 4	Visualization techniques for	or 3D data									
Experiment 5	Pasia skatabing tashnigu	n 5D data	9								
Experiment 5	Basic sketching technique	es need for E v component	8		003						
Experiment 6	Introduction to ANSYS A	ND ABAQUS			CO2						
Experiment 7	Introduction to 2D meshin	g,3D meshing			CO2						
Experiment 8	Mesh modelling of 3D dat	a			CO2						
Experiment 9	Modelling and simulation	of EV powertrain componer	nts in MATL	AB	CO1						
Experiment 10	Experiment 10 3D modelling of EV powertrain components in ANSYSCO3										
Experiment 11	simulation of EV powertra	in components in ANSYS			CO3						
Experiment 12	Thermal simulation of EV	Battery system in ANSYS			CO4						
List of Submission:											
Minimum number of	Experiments: 08										

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	2	2	1	2	2	1	2	1	2	1	1	2	2	2
CO2	3	2	1	3	2	2	2	1	1	1	1	2	3	2
CO3	2	3	3	3	3	1	3	2	2	2	2	3	2	3
CO4	3	3	3	3	3	1	3	1	2	2	2	3	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	15	15
Task II	5	5	5	5	5	5	5	5	5	5	5	5	5
Task III	5	5	5	5	5	5	5	5	5	5	5	5	5
ISE	25	25	25	25	25	25	25	25	25	25	25	25	25

Government College of Engineering, Karad											
Third Year (Sem – VI) MDM- Electrical Vehicle (Mechanical Engineering- Institute Level-Industrial) IMI3635: EV Product Development, Homologation and Hydrogen FCEV											
	IMI3635: EV Pr	oduct Development, Homologation and	Hydrogen FCEV								
Teaching	Scheme	E	Examination Scheme								
Lectures	02 Hrs/week	N	ASE	20							
Tutorials		I	SE	20							
Total	02	E	ESE	60							
Credits											
		Γ	Duration of	02 Hrs	s 30 Min						
		E	ESE								
Prerequis	site : Basics understanding of	f EV									
Course O	utcomes: Students will be a	ble to									
CO1	Explain fundamentals of E	V business management									
CO2	Classify different EV testir	ng parameters									
CO3	State different product development methods										
CO4	D4 Describe Hydrogen vehicle and Fuelcell in Hybrid vehicles										
		Course Contents		CO	Hours						
Unit 1	Introduction to Business n	nanagement:			(04)						
	Introduction to EV market a	and opportunities, EV market categories, regu	ulations and standards	, CO1							
	product development plan	segment selection, product design plan,	product specification	- 001							
	competitor analysis, develop	pment methods									
Unit 2	Business plan and product launch: (04)										
	Process of making busines	s plans, different marketing methods, produc	et launch ideation and								
TI 4 2	executions	· ·			(0.4)						
Unit 3	EV testing and Homologation: (04)										
	FAME india and manufacturing guidelines,, EV certification process, standards for EV CO2										
Tin:4 4	charging and retrontung, E	v motor parameter guidennes, batter selection	i criteria.		(05)						
Unit 4	Design fossibility Selectiv	nous:	validation design fo	r	(05)						
	manufacturing Vehicle dy	manics selection product planning segme	valuation, design to								
	design plan product spec	cification product development methods	working prototyping								
	methods	enteution, product development methods,	working prototyping								
Unit 5	Introduction to Hydrogen	vehicle:			(04)						
0	Introduction to future mol	bility. Why hydrogen based technology, es	sentials of hydrogen		(0.)						
	Hydrocarbons terms in fue	els, energy, flammability and safety, use of	f hydrocarbons in IC	2 CO4							
	engine.		5								
Unit 6	Fuel cell in Hybrid electric	c vehicle:			(05)						
	Hydrogen fuel cells techni	ques and systems. fuel cell engine safety a	nd maintenance, Fue	1							
	vehicle Acts, codes, Re	gulations and Guidelines, maintenance	and fueling Facility	/ CO4							
	requirements, Fuel cells in	Hybrid electric vehicle and pure electric veh	icle, Auxiliary powe	r							
	generation using Hydrogen.										
Reference	e Books										
1.	Julian Happian-Smith, "	Introduction to Modern Vehicle Design", Tra	nsport Research Labo	ratory (TF	RL)						
~	,Elsevier- edition, 2001	d Vahiala Tashnala and Dutte mouth U.	nonn I tol. Ond _ 1111	Lul. 2002							
2.	Heinz Heisler; Advance	ed vehicle Technology", Butterworth-Heinen	$\frac{1}{1}$ hann Ltd; 2 edition,	July 2002							
5.	Seth Leitman, Bob Bran	i, Leitman Seth, Build Your Own Electric Vo	enicie", McGraw-Hill	, 5 editio	on, 2013.						
Kelerence	https://www.carbad-1	im com/									
1.	https://www.carbodydes										
2.	nttps://www.team-bhp.c	om/									
3.	nttps://autoprotoway.com	n/automotive-design-process/									
4.	https://www.carbodydes	1gn.com/									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
CO↓										10	11	12
CO 1	1	-	-	-	-	2	3	2	1	2	1	2
CO 2	2	-	-	-	-	3	2	3	2	3	2	2
CO 3	1	-	-	-	-	1	3	3	3	3	3	3
CO 4	2	-	-	-	-	3	3	3	3	3	3	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	20
Understand	5	5	20
Apply	10	10	20
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad											
Forth Y	Year (Sem – VII) MD	M- Electrical Vehicle (Mechanical Engineer	ring- Institute Leve	l-Indus	trial)						
		IMI3736:EV FEA ANALYSIS	-								
Teaching	Scheme	Exa	amination Scheme								
Lectures	02 Hrs/week	MSI	E	20							
Tutorials		ISE		20							
Total	02	ESE		60							
Credits											
		Dura	ration of	02 Hrs	30 Min						
		ESE									
Prerequis	ite : Basic understanding	of EV and 3D modelling									
Course O	utcomes: Students will b	e able to									
CO1	Design and analyze stru	cture of Electric vehicle									
CO2	Demonstrate FEA analy	sis of EV									
CO3	Analyse EV model										
CO4	Execute model testing for thermal analysis of radiator and external cooling mechanism										
		Course Contents		CO	Hours						
Unit 1	EV design and structu	iral analysis:		0.01	(04)						
	Theory of FEA/CAE, Procedure of implementing FEA /CAE analysis, Introduction to hyper CO1										
II '4 0	mesh, creating and modifying geometry, Geometry cleanup and defeature,										
Unit 2	Introduction to 2D mashing 3D mashing alament Quality Mash Edit Introduction to plastic CO2										
	mash Introduction 10 2D mes	ming, 5D mesning , element Quanty, Mesn Edit, int	itroduction to plastic	02							
Unit 3	FEA analysis for EV engineering with Abagus:										
Unit 5	Introduction to Abagu	s software fundamentals of FFA stress Abou	it Abacus Software		(03)						
	features Create mater	al and Create assembly Create steps loads h	boundary conditions	CO2							
	.Generate mesh .Result	visualization.1 D Analysis. Linear static analysis	and linear buckling	00-							
	analysis.		, and milear 0 demiling								
Unit 4	Analyze EV dynamic	and simulation:			(05)						
	Basics of Finite-Eleme	nt Analysis (FEA) along with ANSYS Tool and	Software Interface,	CON							
	Essential Mechanical a	nd Electrical Properties of Materials, Various Case	e Studies on ANSYS	02							
	Mechanical										
Unit 5	CFD analysis for EV:				(04)						
	Basics of Computation	al Fluid Dynamics, Simulation of Battery Therr	mal Management in	CO3							
	Electric Vehicle, Vibra	tion and Fatigue Analysis of Battery Pack,									
Unit 6	Thermal analysis of E		1	GO 4	(04)						
	Thermal Analysis of Li	quid-Cooled Radiator, CFD Study of External Coo	oling Mechanism for	CO4							
	Battery Pack.										
Reference	eference Books										
1	1. Julian Happian-Smith "Introduction to Modern Vehicle Design" Transport Research Laboratory (TRL)										
1.	Elsevier- edition. 2001										
2. Heinz Heisler; "Advanced Vehicle Technology", Butterworth-Heinemann Ltd; 2 nd edition, July 2002.											
3.	Seth Leitman, Bob B	rant. Leitman Seth. "Build Your Own Electric Veh	nicle". McGraw-Hill	3 rd editio	n. 2013						
Reference	links	, 2-runan Son, Bana Tour Swit Dicette Ven			, 2010.						
1.	https://www.carbodv	design.com/									
2.	https://www.team-bh	p.com/									
3.	https://autoprotowav	com/automotive-design-process/									
4.	https://www.carbodv	design.com/									
Unit 4 Unit 5 Unit 5 Unit 6 <u>Reference</u> 1. 2. 3. <u>Reference</u> 1. 2. 3. 4.	Introduction to Abaqu features, Create mater ,Generate mesh ,Result analysis. Analyze EV dynamic Basics of Finite-Eleme Essential Mechanical a Mechanical CFD analysis for EV: Basics of Computation Electric Vehicle, Vibra Thermal analysis of E Thermal Analysis of E Thermal Analysis of Li Battery Pack. Books Julian Happian-Smitt ,Elsevier- edition, 20 Heinz Heisler; "Adva Seth Leitman, Bob B Ilinks https://www.carbody https://www.carbody	s software, fundamentals of FEA stress ,Abou ial and Create assembly, Create steps ,loads , b visualization,1 D Analysis, Linear static analysis and simulation: nt Analysis (FEA) along with ANSYS Tool and nd Electrical Properties of Materials, Various Case hal Fluid Dynamics, Simulation of Battery Therr tion and Fatigue Analysis of Battery Pack, V: quid-Cooled Radiator, CFD Study of External Coo n, "Introduction to Modern Vehicle Design", Transpon unced Vehicle Technology", Butterworth-Heineman rant, Leitman Seth, "Build Your Own Electric Veh design.com/ p.com/ com/automotive-design-process/ design.com/	at Abaqus Software boundary conditions and linear buckling I Software Interface, e Studies on ANSYS mal Management in oling Mechanism for sport Research Labora unn Ltd; 2 nd edition, Junicle", McGraw-Hill, 2	CO2 CO2 CO3 CO4 tory (TR aly 2002. 3 rd editio	(05) (04) (04) L) 						

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
CO↓										10	11	12
CO 1	2	3	2	3	2	1	2	2	2	2	-	1
CO 2	2	2	3	2	3	1	3	1	2	1	-	2
CO 3	3	3	2	3	2	1	2	2	1	2	-	2
CO 4	3	3	3	3	3	1	3	1	2	12	-	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	-
Understand	4	4	10
Apply	4	4	10
Analyse	4	4	20
Evaluate	4	4	20
Create	-	-	-
TOTAL	20	20	60

	Government College of Engineering, Karad						
Forth	Year (Sem – VIII) MDM- Electrical Vehicle (Mechanical Engineering- Institute Lev	el-Indus	strial)				
	IMI3837:CYBER SECURITY AND DATA ANALYSIS						
Teaching	Scheme Examination Scheme						
Lectures	02 Hrs/week MSE	20					
Tutorials	ISE	20					
Total	02 ESE	60					
Credits							
	Duration of ESE	02 Hrs	; 30 Min				
Prerequis	ite : Basics understanding of EV						
Course O	utcomes: Students will be able to						
CO1	Describe Data analysis techniques and methods						
CO2	Demonstrate of software involved in data analysis						
CO3	Classify different techniques of cyber security implementation						
CO4	Explain different vehicle parking and driving methods						
	Course Contents	CO	Hours				
Unit 1	Introduction to Data analysis:		(05)				
	Introduction to Data analytics and application in automotive industry, data analysis						
	pipeline.						
Unit 2	Data analysis tools and techniques: EV data collection and analysis, data preprocessing, static analysis and of EV data.	CO1	(05)				
Unit 3	Software involved in data analysis:		(04)				
	Overview of different software used for data analysis.	02					
Unit 4	Cyber security for EV systems:		(04)				
	Automotive megatrends, automotive electrical and electronics, automotive software technology, mobile apps for connected vehicles.	CO3					
Unit 5	Vehicle parking and charging Methods:		(04)				
	Vehicle sharing connected parking and automated parking systems.	CO3					
Unit 6	Autonomous vehicle systems:	CO4	(04)				
	ADAS and autonomous driving, different vehicle autonomous classifications.	04					
Reference	e Books						
1.	Julian Happian-Smith, "Introduction to Modern Vehicle Design", Transport Research Laborato, Elsevier- edition, 2001	ry (TRL)					
2.	Heinz Heisler; "Advanced Vehicle Technology", Butterworth-Heinemann Ltd; 2 nd edition, July	/ 2002.					
3.	Seth Leitman, Bob Brant, Leitman Seth, "Build Your Own Electric Vehicle", McGraw-Hill, 3rd	edition, 2	2013.				
Reference	e links						
1.	https://www.carbodydesign.com/						
2.	https://www.team-bhp.com/						
3.	https://autoprotoway.com/automotive-design-process/						
4.	https://www.carbodydesign.com/						

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
CO↓										10	11	12
CO 1	2	-	-	-	-	2	3	2	-	1	-	1
CO 2	2	-	-	-	2	2	2	3	-	2	-	2
CO 3	2	-	-	-	-	3	3	2	-	3	-	3
CO 4	2	-	-	-	-	2	3	3	-	3	-	3

Knowledge Level	MSE	ISE	ESE
Remember	5	5	25
Understand	10	10	25
Apply	5	5	10
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60

Institute Level- Industrial orientated Open Elective <u>OPEN ELECTIVE OTHER THAN PARTICULAR PROGRAM (OE)</u> AIDSML

			Government College of Engineering, Karad								
	Second Year (Sem – III) OE- Institute Level- Industrial orientated Open Elective- AIDSML										
	IOE3311: Open Elective I Foundations of AI, Data Science, and Data Engineering										
Tea	ching	Scheme	Examination Scheme	<u> </u>							
Lect	ures	03 Hrs/wee	ISE 50								
Tuto	orials	00 Hrs/wee	ESE 50								
Tota	l Cre	dits 03	Duration of ESE As appl	icable							
Prei	requi	site : Mathematics,	Programming for problem solving								
Course Outcomes: Students will be able to											
CO	CO1 Understand foundational concepts of AI and Data Science.										
CO	CO2 Apply programming skills in Python for data manipulation.										
CO)3	Demonstrate profi	iency in mathematical foundations for AI and ML applications.								
CO)4	Utilize various te	chniques for data wrangling, cleaning, visualization, inferential statist	ics, reg	ression						
	analysis, and SQL database management.										
I.m.	Course Contents										
Uni	at I Introduction to AI & Data Science: Overview of AI and Data Science. The data science workflow AI applications across										
	various industries Ethical considerations in AL and data science										
Uni	Init 2 Programming Fundamentals for AI & Data Science										
		Python for data	nanipulation, Libraries: NumPy and Pandas for data science, Data								
		visualization with	Matplotlib, Introduction to Scikit-learn for AI, Introduction to								
		TensorFlow and P	Torch								
Uni	t 3	Mathematical Fo	undations for AI & ML:	CO3	(07)						
		Linear algebra bas	cs: vectors, matrices, and operations, Calculus essentials: derivatives and								
T T •		integrals, Probabil	ty and statistics for data science.	COA							
Uni	t 4	Data Wrangling	t Cleaning:	CO4	(06)						
		Data transformatic	and normalization								
Uni	t 5	Data Visualizatio	and Inferential Statistics:	CO4	(08)						
		Data exploration a	nd visualization techniques. Understanding data distributions. Inferential	001	(00)						
		statistics: hypothes	is testing, confidence intervals, and statistical tests for comparisons.								
Uni	t 6	Regression Analy	sis and SQL Database Management:	CO4	(07)						
		Linear regression	concepts, Time series analysis, Model building, evaluation, and								
		interpretation, SQ	L for database management, Data analysis with SQL, ETL processes								
		(Extract, Transform	n, Load).								
Text	t Boo	ks									
1.	Wes 2017	McKinney, "Pythe	n for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython"	O'Reilly	⁷ Media,						
2	Gare	th James Daniela	Witten, Trevor Hastie, and Robert Tibshirani - "Introduction to Statistical	Learni	ng: with						
	Applications in R" Springer 2017.										
3	Sanj CRC	eev J. Wagh, Mar C press 2021.	sha S. Bhende, Anuradha D. Thakare "Fundamentals of Data Science, T	ayler &	Fransic						
4	Alar	Beaulieu - "Learn	ng SQL: Generate, Manipulate, and Retrieve Data" - O'Reilly Media 2009.								
Refe	erenc	e Books									
1.	Joe	el Grus - "Data Scie	nce from Scratch: First Principles with Python" - O'Reilly Media 2015.								
2.	Aure 2019	élien Géron - "Ha 9.	ds-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" -	O'Reilly	/ Media						

Use	ful Links		
1.	https://onlinecourses.nptel.ac.in/noc21_cs69/preview		
2.	https://onlinecourses.nptel.ac.in/noc22_cs32/preview		
3.	https://nptel.ac.in/courses/106106226/		

*Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	3	2	2	1	3	-	-	-	2	2	-	1
CO 2	2	2	2	2	3	-	-	-	2	1	-	2
CO 3	3	3	3	3	3	1	2	-	2	1	-	3
CO 4	3	3	3	3	3	2	1	2	2	3	1	3

Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	ISE	ESE
Remember	5	5
Understand	5	5
Apply	15	15
Analyse	10	10
Evaluate	15	15
Create	-	-
TOTAL	50	50

	Government College of Engineering, Karad								
S	Second Year (Sem – III) OE- Institute Level- Industrial orientated Open Elective- AIDSML								
Ι	IOE3312: Open Elective -01 Lab - "Foundations of AI, Data Science, and Data Engineering Lab								
Laborato	ory Schen	ne:			Examination Sc	cheme:			
Practical			02 Hrs/week		ISE	25			
Total Cre	dits		01		ESE	25			
Prerequi	site : Mat	hematics	, Programming for p	problem solving					
Course Outcomes (CO): Students will be able to									
CO1	Underst	and the f	undamental principl	les of data science, AI application	s, and Python scrip	ting.			
CO2	Apply P	ython pro	ogramming skills to	perform data manipulation, analy	vsis, and visualizati	on			
CO3 Demonstrate proficiency in linear algebraic computations and implement basic machine learning models.									
CO4	Utilize a	dvanced	data handling techn	niques and SQL database manager	nent.				
				Course Contents			CO		
Impleme	ntation of	f followiı	ng concepts						
Experim	ent 1	Data S	Science Workflow:	: Implement a basic data scien	ce workflow usin	g a sample	CO1		
-	dataset.								
Experim	ent 2	AI App	olications: Case stud	dy analysis of AI applications in h	ealthcare, finance,	and retail.	CO1		
Experime	ent 3	Python	Basics: Write Pyt	thon scripts for basic data opera	tions (CRUD - C	reate, Read,	CO2		
		Update	, Delete).						
Experime	ent 4	NumPy	y: Perform array ope	erations and linear algebraic comp	outations using Nur	mPy.	CO2		
Experime	ent 5	Pandas	s: Data manipulation	on and analysis using Pandas	(e.g., merging, gr	ouping, and	CO2		
		aggrega	ating data).						
Experim	ent 6	Matplo	otlib: Create various	s types of plots (line, bar, scatter)	using Matplotlib.		CO2		
Experime	ent 7	Scikit-l	learn Basics: Imple	ement simple machine learning me	odels like linear reg	gression and	CO3		
		k-mean	s clustering.						
Experime	ent 8	Linear	Algebra: Implem	nent matrix operations, eigenva	lues, and eigenve	ectors using	CO3		
		Python.	•						
Experim	ent 9	Handli	ng Missing Values	: Techniques to handle missing da	ta (e.g., imputation	n, deletion).	CO4		
Experime	Experiment 10 Exploratory Data Analysis (EDA): Perform EDA on a dataset to summarize its main CO4								
Experiment 11 Visualization: Create histograms, how plots, and pair plots to visualize data distributions.									
Experime	ent 11		aging White SOL	by an a prote read undets and	delete dete in a der	tabaaa	CO4		
Experime	ent 12	SQL B	asics: write SQL q	ueries to create, read, update, and	delete data in a dai	ladase.	UU4		
LIST OF SU	DIMISSION	l: Minis	mum number of P	nominanta e 10					
		IVIIIII	mum number of Exp	periments : 10					

*Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	2	3	3	3	3	1	-	-	-	-	-	2
CO 2	2	2	2	2	3	2	-	-	2	2	2	2
CO 3	3	3	3	3	3	-	1	2	1	2	3	2
CO 4	2	3	2	3	3	2	2	2	2	2	1	2
	1: Slight (Low)			2	: Modera	te (Medi	um)	3: 5	Substanti	al (High)		

Assessment Pattern:

Skill Level (as per	Exp	Avg											
CAS Sheet)	1	2	3	4	5	6	7	8	9	10	11	12	
Task I	5	5	5	5	5	5	5	5	5	5	5	5	5
Task II	10	10	10	10	10	10	10	10	10	10	10	10	10
Task III	10	10	10	10	10	10	10	10	10	10	10	10	10
ISE	25	25	25	25	25	25	25	25	25	25	25	25	25

	Government College of Engineering, Karad										
See	Second Year (Sem – IV) OE- Institute Level- Industrial orientated Open Elective- AIDSML IOE3413: Open Elective II Advanced AI Integration										
	IOE3413: Open Elective II Advanced AI Integration										
Teaching	Scheme		Examination Sch	eme							
Lectures	02 Hrs/week		ISE	50							
Tutorials	00 Hrs/week		ESE	50							
Total	02		Duration of ESE	As applicable							
Credits											
Duonocui	cite + Ecundations	of AL Data Science, and Data Engi	naamina								
Course	utcomes (CO):St	udents will be able to	neering								
	Implement super	vised and unsupervised algorithms	using Scikit-learn								
C01	Enhance model r	performance through feature engine	ering and model se	lection							
CO2	Develop and app	ly CNNs and RNNs for deep learni	ng and NLP tasks								
CO4	Utilize advanced	data mining techniques and big dat	a platforms for ana	lytics.							
		Course Contents	s S		CO	Hours					
Unit 1	Introduction to		CO1	(04)							
	Supervised Lear	ns (e.g., linear									
	regression, decis	ion trees, SVM) Unsupervised Le	earning: Definition,	examples, and							
	common algorith	ums (e.g., k-means clustering, hierar	chical clustering, F	PCA).							
	Common Algor	rithms: Overview and implementa	ation basics of va	rious machine							
TT T L A	learning algorith	ms.			001	(05)					
Unit 2	Machine Learni	ing with Python:	Companying of Lagrant	una Alagorithuras	COI	(05)					
	Introduction to S	of algorithms like linear regression	Supervised Learni	decision trees							
	and SVM using	Scikit-learn Implementing Ung	supervised Learnin	a Algorithms:							
	Implementation	of algorithms like k-means cluster	ring hierarchical c	lustering using							
	Scikit-learn.	or argoritants like it means cluster	ing, moraronicar e	iustering using							
Unit 3	Feature Engine	ering & Model Selection:			CO2	(05)					
	Feature Extracti	on: Techniques for extracting fe	eatures from raw	data., Feature							
	Transformation:	Techniques for transforming	features to in	nprove model							
	performance., N	Iodel Selection: Strategies for s	electing the best	model, cross-							
	validation, and h	yperparameter tuning.			GO 1	(0.4)					
Unit 4	Deep Learning	Fundamentals:		Course locking al	CO3	(04)					
	Basics of neural	I networks, activation functions, a	and architectures.,	Convolutional							
	applications and	implementation basics	inetworks (Kinn	s): Structure,							
Unit 5	Natural Langua	oge Processing (NLP) and Commu	ter Vision•		CO3	(04)					
Cint 5	Text processing	sentiment analysis, and building	ing chatbots Co	mputer Vision	000						
	Fundamentals: Ir	nage processing techniques, object	detection, and reco	gnition.							
Unit 6	Big Data Funda	mentals and Advanced Data Min	ing Techniques:		CO4	(04)					
	Introduction to b	ig data, its importance, and challeng	ges., Overview of f	rameworks like							
	Hadoop., Introdu	ction to platforms like AWS, Azure	e for big data analy	tics., Advanced							
	Data Mining Te	chniques: Association rule learning	g, clustering, time	series analysis,							
T (D	and forecasting.										
1 Ether	KS n Alnovdin - "Inter	aduation to Machine Learning" M	$IT \mathbf{D}_{ross} (2020)$								
2. Aurélien Géron - "Hands-On Machine Learning with Scikit-Learn Keras and TensorFlow" - O'Reilly Media											
(2019	(2019)										
3. Richa	3. Richard Szeliski - "Computer Vision: Algorithms and Applications" - Springer (2010)										
4 Nath	an Marz and Jame	s Warren - "Big Data: Principles an 2015)	nd Best Practices o	f Scalable Realtin	ne Data S	ystems" -					
Reference	e Books	2013)									
1. Jiawe	ei Han, Micheline	Kamber, and Jian Pei - "Data Mi	ning: Concepts an	d Techniques" -	Morgan F	Kaufmann					
(201	l)		C		0.						

2.	Alice Zheng and Amanda Casari - "Feature Engineering for Machine Learning: Principles and Techniques for									
	Data Scientists" - O'Reilly Media (2018)									
3.	S. J. Wagh, Manisha S. Bhende, Anuradha D. Thakare "Fundamentals of Data Science, Tayler & Fransic CRC									
	press 2021				-					
Use	eful Links									
1.	https://nptel.ac.in/courses/106102220/									
2.	https://nptel.ac.in/courses/106106145/									
3.	https://nptel.ac.in/courses/106106212/									
4.	https://nptel.ac.in/courses/106105152/									

*Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

Mapping Table:

PO→	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	3	2	2	3	3	2	-	-	-	1	-	3
CO 2	2	3	2	3	3	1	-	-	-	2	-	2
CO 3	2	2	3	2	3	2	1	-	2	-	1	3
CO 4	2	3	3	3	3	1	1	1	2	3	1	3

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern

Knowledge Level	ISE	ESE
Remember	5	5
Understand	5	5
Apply	15	15
Analyse	15	15
Evaluate	10	10
Create	-	-
TOTAL	50	50

			Government College of	Engineering	g, Karad						
	Third	Year (Sem – '	7) OE- Institute Level- Ind	dustrial orie	ntated Open Elect	tive- A	IDSML				
		IOE3514: (pen Elective III AI Applic	cations and]	Emerging Techno	logies					
Teachir	ng Sche	me			Examination Sche	me					
Lectures	s	02 Hrs/week			ISE	50					
Tutorial	S	00 Hrs/week			ESE	50					
Total Cr	redits	02			Duration of ESE	As app	plicable				
Prerequ	uisite : A	Advanced AI In	egration								
Course	Outcor	nes (CO):Stude	nts will be able to								
CO1	Imple	ment reinforcer	ent learning algorithms and ap	pply them in a	utonomous systems.						
CO2	Utiliz	e GANs for gen	erating creative content and ex	plore advance	ed techniques like co	ondition	al GANs.				
CO3	Ensur	e AI models are	interpretable and address ethic	cal issues, inc	luding bias and fairn	ness.					
CO4	Deplo	y AI on edge de	vices and integrate with IoT for	or application	s in smart cities, indu	ustry, aı	nd health	care.			
			Course Conte	ents			CO	Hours			
Unit 1	Reinf	orcement Lear	ning and Autonomous System	ms:			CO1	(04)			
	Introd	luction to reinfo	rcement learning principles, A	Applications of	of reinforcement lea	rning					
	in au	tonomous syste	ms, Deep dive into algorith	ms such as	Q-learning and dee	pQ-					
	netwo	orks, Case studie	s on robotics, gaming, and cor	ntrol systems.							
Unit 2	Gene	rative Adversa	ial Networks (GANs) and C	Creative AI:			CO2	(04)			
	Under	rstanding the c	oncept of GANs and their a	rchitecture, A	pplications of GAN	Ns in					
	gener	ating realistic ir	ages, videos, and creative cor	ntent, Explorii	ng conditional GAN	s and					
TI 1 1 0	style transfer techniques, Case studies in art, design, and content creation.										
Unit 3	Expla	inable AI (XA) and Ethical AI:	1 4			003	(04)			
	rechi	iques for makin	g Al models interpretable and	i transparent, A	Addressing blas, fair	ness,					
	and accountability in AI systems, Etnical considerations in AI development and										
Linit 4	acprovinent, Responsible Al practices and guidennes.										
Unit 4	Deplo	ving AI algorit	ms on edge devices for real-	u. time processi	ng Integration of A	I with	04	(03)			
	InT e	cosystems for	smart applications Use case	es in smart of	ities industrial Iol	Γ and					
	health	care monitoring	Challenges and opportunities	s in edge AI a	nd IoT convergence.	, und					
Unit 5	Ouan	tum Machine	earning and Ouantum Com	puting:		-	CO1	(05)			
	Funda	amentals of qua	tum computing and quantum	machine lear	ning, Quantum algo	rithms					
	for op	timization and	attern recognition tasks, Poter	ntial application	ons of quantum com	puting					
	in AI	and data scienc	, Implications of quantum con	nputing for fu	ture AI advancemen	ts.					
Unit 6	AI fo	r Healthcare a	d Biomedical Applications:				CO4	(04)			
	Role	of AI in medie	al imaging analysis and diag	gnosis, AI-dri	ven drug discovery	and					
	person	nalized medici	e, Patient care managemen	nt using AI-l	based solutions, Et	thical					
	consid	derations and re	gulatory challenges in AI-drive	en healthcare.							
Text Bo	oks										
1. Ma	axim La	pan - "Deep Re	nforcement Learning Hands-C	On" - Packt Pu	blishing (2018)						
2. Da	vid Fos	ter - "Generativ	e Deep Learning: Teaching N	Machines to P	aint, Write, Compo	se, and	Play" - 0	O'Reilly			
	$\frac{20}{12}$	<u>19)</u> JoT and Edge (ementing for Anchiteste Coo	and Edition D	ananhaalt Immant	(Manal	2020				
3. Per	rry Lea	ior and Edge	omputing for Architects - Sec	cond Edition P	арегоаск – ппрогі, (o Marci	1 2020				
Keleren	ton Witt	KS	Jaching Lagming What Over	tum Computi	na Maana ta Data M	[inin a"	Aaadam	Draga			
I. [20	(16)	ek - Quantum	fachine Leanning. what Quan	num Compun	ing means to Data M	innig ·	- Academ	lic Fless			
$\frac{120}{2}$	Kevin Z	Zhou. Havit Gr	enspan, Dinggang Shen - "Γ	Deen Learning	for Medical Image	e Analy	sis" - A	cademic			
Pre	ess (201	7)		200p 2000.000	5 101 112001000 111008		515 11				
3. Pet	te Ward	en and Daniel	itunayake - "TinyML: Machin	ne Learning v	vith TensorFlow Lit	e on Ai	duino an	d Ultra-			
Lo	w-Powe	er Microcontroll	ers" - O'Reilly Media (2020)	-							
Useful l	Links										
1. <u>h</u>	ttma. //mm		110(10(120)								
	<u>ups.//np</u>	otel.ac.in/course	/106106139/								
2. <u>h</u>	ttps://np	otel.ac.in/course	/106105215/								

3. <u>https://nptel.ac.in/courses/106105158/</u>

4. https://nptel.ac.in/courses/106106213/

*Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	3	2	3	3	3	3	-	-	2	2	1	3
CO 2	2	3	1	2	3	-	-	-	3	-	3	2
CO 3	2	2	2	3	3	3	1	3	3	3	3	3
CO 4	2	2	3	3	3	-	-	1	2	3	3	3

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	ISE	ESE
Remember		
Understand	5	5
Apply	15	15
Analyse	15	15
Evaluate	15	15
Create	-	-
TOTAL	50	50

OPEN ELECTIVE OTHER THAN PARTICULAR PROGRAM (OE) Industry oriented Open Elective : AIOT

	Government College of Engineering, Karad										
	Second	d Year (Sem -	– III)	OE- Instit	ute Level	- Industria	al orien	tated Open E	Elective-	AIOT	
		IC	DE33 2	21: Open E	lective I	IoT Hardv	vare an	nd Sensors			
Teachin	g Scher	ne					Exa	mination Sche	me		
Lectures		03 Hrs/week					ISE		50		
Tutorials	5	00 Hrs/week					ESE		50		
Total Cr	edits	03					Dura	ation of ESE	As appl	icable	
Prerequ	isite : N	Aathematics, Pr	rogran	ming for pro	oblem solv	ving/Comput	ter funda	amentals			
Course	Outcon	nes (CO):Stude	ents wi	ll be able to							
CO1	Under	stand the found	lationa	l principles a	and hardw	are of IoT					
CO2	Apply	IoT circuit and	l progr	amming sof	tware:						
CO3	Develo	op AI models a	and inte	egrate with I	oT:						
CO4	Analy	ze and impleme	ent Ale	oT application	ons:					1	
				С	ourse Cor	ntents				CO	Hours
Unit 1	Intro	duction to IoT	Hard	ware:						CO1	(05)
	Overview of IoT development kits (e.g., Raspberry Pi, Arduino, ESP32) Understanding the										
	compo	onents and cap	pabiliti	es of IoT h	ardware p	platforms T	ypes of	sensors (temp	erature,		
	humid	lity, motion, I	light,	etc.) Exploi	ring actua	ators (motor	rs, serv	os, relays) an	d their		
TT 1 / 0	applic	ations in IoT.									
Unit 2	IoT Circuit and Programming Software:										(07)
		ircuit Designir	ng Sol	tware: Software:	ware with	drag & dro	op featu	ires to build a	circuit,		
	Block	Designer Soft	ware f	or Io1 Prog	ramming,	Introduction	$\frac{1}{2}$ to 101	hardware com	ponents		
	with loT development boards and songers										
Unit 2		d Drith on Drog	it boar	us and senso						CO3	(06)
Unit 5	AI and Block	Designer Sof	ftwara	for AI Pr	re: ogrammin	a Duthon	Direct	Software for	Duthon	COS	(00)
	Progra	mming Introd	luction	to AL con	cents and	g, Tytholi machine le	arning b	basics Develor	$\frac{1}{2}$ ying ΔI		
	model	s using block-b	hased 1	rogramming	a Impleme	enting Pythe	on script	ts for data analy	ris and		
	ALapr	lications Integ	oratino	AI models y	with IoT d	evices for st	nart soli	utions	sis and		
Unit 4	Intro	luction to Arti	ificial	Intelligence	and Inter	net of Thin	gs (Alo	T)		CO4	(09)
	Overv	iew of Artific	cial In	telligence ()	AD and it	s applicatio	ons acro	oss various ind	lustries.	001	()
	Introd	uction to the	Inter	net of Thi	ings (IoT) and its	signific	ance in the	modern		
	interco	onnected world	l. Unde	erstanding th	e concept	of Artificial	Intellig	ence of Things	(AIoT)		
	and its	s potential to re-	volutio	onize techno	logy integr	ration.	U	e e			
Unit 5	Conne	ecting Mobile	Device	es to IoT Ga	teways					CO1	(06)
	Explo	ring the role of	of IoT	gateways in	bridging	the gap bet	ween m	obile devices a	and IoT		
	netwo	rks. Technique	es for	establishing	seamless	connections	betwee	en mobile devi	ces and		
	IoT ga	ateways. Hands	s-on ex	ercises dem	onstrating	the setup a	nd confi	iguration of mo	bile-to-		
	IoT co	onnections.									
Unit 6	Senso	r Technologies	s and A	Academic C	Concepts					CO4	(07)
	Comp	rehensive over	view o	of sensor tec	hnologies	commonly	employe	ed in IoT appli	cations.		
	In-dep	oth exploration	of var	ous types of	f sensors a	nd their acad	demic u	nderpinnings. P	Practical		
	demor	istrations and e	experir	nents showc	asing the f	unctionality	and app	plications of set	nsors in		
	loT sy	stems.									
Text Bo	OKS	udaan ay 1 01	117	11	in a Ctart	J			1: 0014		
I. Ma	II RICha	rason and Shav	wn Wa	mace - "Gett	ing Starter	1 with Kaspl	berry Pi	- O'Reilly Me	aia - 2016)	
2. Eric	c Matthe	es - Python Cr	rash Co	burse - No S	Starch Pres	SS - 2019		www.c.clc!! VD7	F 2014		
5. Ars	snaeep I	Sanga and Vija	y Mad	isetti - "Intei	met of Thi	ngs: A Hand	us-On A	pproach - VP	1 - 2014	1	
Keferen	ce Bool	S	in C	-1-1		- 11- 2011					
I. M10	chael M	argolis - "Ardu	uno Co	okdook'' - C	J Reilly M	eaia - 2011					

2.	2. Patrick F. Dunn - "Fundamentals of Sensors for Engineering and Science" - CRC Press - 2010									
3.	Aurélien Géron - "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" - O'Reilly Media – 2019									
Use	seful Links									
1.	https://nptel.ac.in/courses/106105195									
2.	https://www.coursera.org/learn/iot									
3.	3. <u>https://www.tinkercad.com/things?type=circuits&sort=staff&view_mode=small</u>									
		-								

*Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	3	2	1	1	3	3	-	-	2	-	-	1
CO 2	2	2	2	2	3	1	-	-	3	-	3	2
CO 3	2	1	3	2	3	3	1	1	3	2	3	3
CO 4	2	2	3	3	3	2	1	-	2	1	3	3

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	ISE	ESE
Remember		
Understand	10	10
Apply	15	15
Analyse	15	15
Evaluate	10	10
Create		
TOTAL	50	50

		Governme	ent College of Engineering,	Karad							
Se	cond Year (Sem – III) OE- Ins	stitute Level- Industrial ori	entated Open	Elective- AIO	1					
	IO	E3322: Open Elect	tive -01 Lab - IoT Hardwar	e and Sensor	s Lab						
Laboratory	Scheme:			Examinat	ion Scheme:						
Practical		02 Hrs/week		ISE	25						
Total Credits	5	01		ESE	25						
Prerequisite	• : Mathemati	cs, Programming for	problem solving								
Course Out	comes (CO):	Students will be able	to								
CO1	Understand	IoT hardware fundan	nentals and development kits.								
CO2	CO2 Apply IoT circuit design and programming using software tools.										
CO3	CO3 Demonstrate proficiency in sensor technologies for IoT applications.										
CO4 Integrate AI concepts and Python programming with IoT devices for smart solutions.											
		(Course Contents			CO					
Implementa	tion of follov	ing concepts									
Experiment	1 Set	ting up Raspberry Pi	for IoT applications			CO1					
Experiment	2 Co	ifiguring Arduino for	r sensor data collection			CO1					
Experiment	3 Usi	ng ESP32 for wireles	ss communication in IoT			CO1					
Experiment	4 Dea	signing IoT circuits u	sing drag & drop software			CO2					
Experiment	5 Pro	gramming IoT device	es with block-based software			CO2					
Experiment	6 Me	asuring temperature a	and humidity with DHT11 sense	or		CO3					
Experiment	7 Det	ecting motion with P	PIR sensor			CO3					
Experiment	8 Co	ntrolling LEDs with r	elay modules			CO3					
Experiment	9 De	veloping AI models w	with block designer software			CO4					
Experiment	10 Im	lementing Python sc	ripts for data analysis			CO4					
Experiment	11 Inte	grating AI models w	vith IoT devices for smart applic	ations		CO4					
Experiment	12 Mi	i Project on the basis	s of learning			CO4					
List of Subn	nission:										
	Mi	vinum number of Ex	periments · 10								

 Minimum number of Experiments : 10

 *Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	3	2	1	1	3	3	2	-	1	1	1	1
CO 2	2	3	1	2	3	-	3	-	2	2	2	2
CO 3	2	1	3	2	3	3	3	1	3	2	3	3
CO 4	2	2	2	3	3	1	2	1	3	3	3	3
		1: Slight (Low)			2: Moderate (Medium)			3: 5	Substanti	al (High)		

Assessment Pattern:

Skill Level (as per	Exp	Avg											
CAS Sheet)	1	2	3	4	5	6	7	8	9	10	11	12	
Task I	15	15	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05	05	05
ISE	25	25	25	25	25	25	25	25	25	25	25	25	25

	Government College of Engineering, Karad										
Second Year (Sem – IV) OE- Institute Level- Industrial orientated Open Elective- AIOT											
IOE3423: Open Elective II Fundamentals of AIoT											
Teachin	g Scheme		Examination	Scheme							
Lectures	02 Hrs/week		ISE	50							
Tutorials	s 00 Hrs/week		ESE	50							
Total Cr	edits 02		Duration of E	SE As ap	pplicable						
Prerequ	isite : IoT Hardware &	Sensors, Programming for proble	em solving								
Course	Outcomes (CO):Stude	nts will be able to									
<u>CO1</u>	Understand the concepts of AloT and their significance in modern industries.										
CO2	Apply techniques to connect mobile devices to loT gateways, bridging the gap between different networks.										
<u>CO3</u>	Analyze sensor technologie	ologies in IoT and their academic f	toundations to showcase	practical une	derstandır	ıg.					
CO4	Develop and Evaluate	AloT applications to address real	-world challenges.		<u> </u>	**					
TT •4 1		Course Contents				Hours					
Unit I	Introduction to Arti	Licial Intelligence and Internet of	t Things (AloT)	in du stuis s		(04)					
	Introduction to the	Internet of Things (IoT) and	ita significance in t	industries.	02						
	interconnected world	Understanding the concept of	Artificial Intelligence	of Things							
	(AIoT) and its potenti	al to revolutionize technology inte	oration	of Things							
Unit 2	Connecting Mobile 1	Devices to IoT Gateways	gration.		CO1	(05)					
	Exploring the role of	IoT gateways in bridging the gat	o between mobile devic	es and IoT	CO2	(00)					
	networks. Techniques	s for establishing seamless connect	ctions between mobile of	levices and							
	IoT gateways. Hands	-on exercises demonstrating the s	setup and configuration	of mobile-							
	to-IoT connections.	C	1 0								
Unit 3	Sensor Technologies	and Academic Concepts			CO3	(04)					
	Comprehensive overv	iew of sensor technologies comm	only employed in IoT a	pplications.							
	In-depth exploration	of various types of sensors an	nd their academic und	erpinnings.							
	Practical demonstration	ons and experiments showcasing the	he functionality and app	lications of							
	sensors in IoT system	8.									
Unit 4	AIoT Application D	evelopment			CO4	(04)					
	Introduction to tools	and platforms essential for buil	ding AloT application	s. Practical							
	Aspects of AloT app	blications, including: Smart Traff	ic Signal System for C	Color Blind							
TT :4 5	Individuals Plant Hea	Ith Analysis Smart Door Access C	ontrol System.		<u> </u>	(04)					
Unit 5	Design and implor	ecasing with A101	acting system lovered	ring AloT	04	(04)					
	technologies Integra	ion of real-time weather data from	astillig system levelag	orithms for							
	accurate predictions	Hands-on exercises for building	ng testing and refinit	or weather							
	forecasting systems	Thinks on excretises for building	ig, testing, and termin	ig weather							
Unit 6	Unit 6: Smart Soluti	ons Development			CO4	(05)					
	Development and de	ployment of smart solutions utiliz	zing AIoT principles. C	ase studies							
	and real-world exam	bles of successful smart solutions	in various domains. Pr	oject-based							
	learning allowing students to conceptualize, design, and implement their own AIoT										
	solutions.										
Text Bo	oks										
1. Mic	chael Negnevitsky, "Ar	tificial Intelligence: A Guide to In	telligent Systems", Pear	son Education	n, 2021						
2. Raj	2. Rajkumar Buyya, Amir Vahid Dastjerdi, "Internet of Things: Principles and Paradigms", Morgan Kaufmann, 2016										
3. Mic	chael J. McGrath, "Sen	sor Technologies: Healthcare, Wel	Iness and Environmenta	I Application	is", Apres	s, 2013					
Referen	ce Books			·, .:	16 D	1					
1. Cha	andra Singh, Sairam,	Niranjan N Chiplunkar, Rathishc	handra R Gatti Create	citation, "S	elt-Power	red Aiot					
2 Kor	steins : <u>Apple Academi</u>	<u>c Fless</u> 2024 Jomas Newe Artificial Intelligence	e of Things (AloT). Nor	v Standarda '	Technolo	nies and					
	mmunication Systems	CRC Press 2024	c of rinings (A101). Nev	v Stanuarus,	1 0010	gies allu					
Useful I	inks										
1. ht	tps://www.linkedin.cor	n/learning/ai-in-connected-produc	ts-aiot		1						

2. <u>https://www.coursera.org/learn/iot</u>

3. https://www.tinkercad.com/things?type=circuits&sort=staff&view_mode=small

*Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

РО→	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO ↓												
CO 1	3	1	2	1	2	2	-	-	-	-	-	2
CO 2	2	2	1	2	3	2	-	-	-	1	-	2
CO 3	3	2	3	3	3	2	2	1	1	1	1	3
CO 4	2	3	2	3	3	2	1	-	1	2	1	3

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	ISE	ESE
Remember	5	5
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	15	15
Create	-	-
TOTAL	50	50

			G	overnmen	t College	of Engiı	neeri	ng, Karad				
Third Year (Sem – V) OE- Institute Level- Industrial orientated Open Elective- AIOT												
IOE3524: Open Elective III Cloud Services for IoT												
Teachi	ng Sche	me						Examinatio	on Sche	me		
Lecture	s	02 Hrs/week						ISE		50		
Tutoria	s	00 Hrs/week						ESE		50		
Total C	redits	02						Duration of	ESE	As appli	cable	
Prereq	uisite :	Fundamentals o	of Alo	Т								
Course	Outco	mes (CO):Stude	lents w	vill be able to)							
CO1	Unde	rstand cloud con	mputi	ng's benefits	for IoT an	d grasp v	various	s cloud servi	ce mode	els.		
CO2	Apply cloud storage solutions for IoT data storage and retrieval.											
CO3	Imple	ment cloud con	mpute	services to d	leploy, mai	nage IoT	applic	cations & its	security	concerns	•	
CO4	Integr	ate AI/ML capa	abiliti	es into IoT p	orojects usi	ng cloud	servic	es and ensur	e cloud	security a	nd comp	oliance
	for Io	T data.										
				(Course Co	ntents					CO	Hours
Unit 1	Intro	oduction to Cl	loud	Computing	5						CO1	(03)
	Over	view of cloud	l comj	outing and i	ts benefit	s for IoT	, Unc	lerstanding	differe	nt cloud		
	servi	ce models (Iaa	aS, Pa	aS, SaaS)								
Unit 2	2 Cloud Storage Solutions									CO2	(04)	
	Intro	duction to clou	ud sto	orage servic	es (Amaz	on S3, G	doogle	e Cloud Sto	rage) e	xercises		
	on st	oring and retrie	ieving	data from	cloud stor	age plat	forms	5.				
Unit 3	Clou	d Compute Se	Servic	es:							CO2	(05)
	Over	view of cloud	d con	nputes serv	vices (An	nazon E	C2, 0	Google Cor	npute	Engine)		
	Depl	oying IoT appl	olicati	ons on clou	d compute	e instanc	es.					
Unit 4	AI/M	L Services in t	the Cl	oud:	-						CO4	(04)
	Intro	luction to AI/M	AL set	vices provid	led by clou	ud platfor	rms (A	Amazon Sag	eMaker	, Google		
	AI P	atform, Azure	AI), 1	Integrating A	AI/ML cap	abilities	into I	oT applicati	ons usii	ng cloud		
	servio	ces.										
Unit 5	Clou	d Security and	l Com	pliance:			~				CO3	(05)
	Secur	rity best practi	tices	for cloud-ba	ased IoT	solutions	s. Co	mpliance re	quireme	ents and		
TI 4 C	regula	ations for loT da	lata sto	ored in the cl	loud.						<u> </u>	(05)
Unit 6	Proje	ect Work and C		studies:	· · · · 1 · · · ·		1	A 1		1	CO3,	(05)
	Deve	loping and deple	loying	101 application	tions lever	aging clo	ua ser	vices Analyz	zing cas	e studies	C04	
Toyt Be		cessiui ioi pio	ojecis	using cloud	plationits							
1 F	Ruvva R	Vecchiola C. S	Selvi	S T "Masteri	ing Cloud (Computir	ησ" N	AcGraw Hill	Educati	ion (India)	2013	
2. Pr	 Buyya K, Veceniola C, Selvi S i Mastering Cloud Computing , McGraw Hin Education (India), 2015 Praveen Kukreti Google Cloud Platform All-In-One Guide: Get Familiar with a Portfolio of Cloud-based Services 									ervices		
in GCP,2023												
3. Pawan Varma "Cloud Native Development with Azure: A practical guide to build cloud-native apps on Azure												
clo	oud plat	form, 2024										
Reference Books												
1. Cl	1. Cloud Computing Bible, Barrie Sosinsky ,Wiley Publishing Inc. 2011											
2. Cloud Computing from Beginning to End by Ray J Rafaels												
3. Cloud Computing: Concepts, Technology & Architecture by Zaigham Mahmood, Ricardo Puttini, Thomas Erl												
Useful	Links			/ 1 .	•							
$1.$ \underline{h}	ttps://w	ww.udemy.com	<u>n/cour</u>	se/exploring	<u>-aws-10t/</u>	Line 1		11				
2. <u>h</u>	ttps://w	ww.coursera.or	rg/spe	cializations/r	niops-mac	nine-lear	ning-c	<u>luke</u>				
3. <u>https://learn.microsoft.com/en-us/training/paths/microsoft-azure-architect-design-prerequisites/</u>												

*Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

$PO \rightarrow$	PO	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓	1											
CO 1	3	2	2	1	3	-	-	-	-	-	-	1
CO 2	2	2	3	2	3	1	-	-	-	-	-	2
CO 3	3	3	2	3	3	2	1	1	1	-	2	1
CO 4	2	2	2	3	3	1	1	1	1	1	1	2

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	ISE	ESE
Remember	5	5
Understand	10	10
Apply	15	15
Analyse	10	10
Evaluate	10	10
Create	-	-
TOTAL	50	50
OPEN ELECTIVE OTHER THAN PARTICULAR PROGRAM (OE) Industry orientated Open Elective : ARVR

			Gov	vernment	t College	of Engineer	ing, Kara	d			
	Secon	d Year (Sem -	- III) C)E- Instit	ute Level	- Industrial	orientate	d Open E	lective-	ARVR	
		IOE3	3331: C	Open Elec	ctive I AR	/VR Applic	ation Dev	velopment			
Teachi	ng Sche	me					Examin	ation Sche	me		
Lecture	s	03 Hrs/week					ISE		50		
Tutoria	ls	00 Hrs/week					ESE		50		
Total C	redits	03					Duration	n of ESE	As app	olicable	
Prereq	uisite :	Mathematics, Pr	rogram	ming for pr	oblem solv	/ing/Compute	er fundamer	ntals			
Course	Outco	mes (CO):Stude	ents will	l be able to)						
CO1	Recal	l fundamentals a	and real	l-time 3D c	content crea	ation basics &	k scripting.				
CO2	Unde	rstand software	interfac	e and tools	s for scene	creation and	optimizatio	on.			
CO3	Apply	y 3D modeling,	animati	on, and ph	ysics in 3d	design tool.					
CO4	Analy	ze and optimize	e audio,	visual effe	ects using h	nardware and	performan	ce in softwa	are.		
				C	ourse Con	tents				CO	Hours
Unit 1	Intro	duction to Rea	al-time 3	3D Conten	nt & Unity	Game Engin	ne:			CO1	(05)
	Unde	rstanding 3D co	ontent c	reation: Th	he concept	of real-time	rendering,	comparisor	n with		
	offlin	e rendering, an	nd the ir	nportance	of optimiz	ation, Explo	ring differe	ent game er	igines		
	featur	res and capabilit	ties, Un	ity compor	nents and it	s features.					
Unit 2	Fund	lamentals of Ur	nity Ga	me Engine	e:	<i>.</i> .				CO2	(07)
	Explo	oring Unity's in	iterface	and tools:	Scene vie	w, Game vi	ew, Hierard	chy, Projec	t, and		
	Inspe	ctor windows, y	various	tools Tran	isform, Cre	eating and or	ganising sc	enes and o	bjects		
	in Un	ity from scratch	h, impor	rting 3D m	odels, texti	ures, audio fi	les, and oth	er resource	s into		
TI		, and optimizing	g them 1	for use in t	ne project.					<u> </u>	(07)
Unit 3		o of 2D modelli	nation, a	and Physic	cs:	iguas Anim	ting object	a and ahara	atora	COS	(07)
	Dasic	s of 5D modelli retanding law fr	ing conc	imotion al	, and techn	iques. Anima	ning object	s and chara	cters:		
	onim	istinuing Key II	ation to	Initu's n	hysics on	ring and con	nnononte 1	iko Digid	body		
		der and Physics	s materi	als Implen	nenting has	sic physics in	teractions	ike Kigiu	bouy,		
Unit 4	User	Interface Desig	on & A	nnlication	Scrinting bas	•	teractions.			CO1	(08)
Omt 4	Princ	iples of UI/UX	design.	creating U	I elements	• using Unity	s UI systen	n (Canvas.	Image.	COI	(00)
	Text.	Button, etc.).	Basics	of C# pro	gramming	language. s	vntax, vari	ables, data	types.		
	contr	ol structures, f	function	s, and cla	sses. Writ	ing scripts	for various	applicatio	ns, UI		
	intera	ctions, and codi	ing to re	einforce lea	arning.	0 1		11	,		
Unit 5	Audi	o, Visual Effect	ts, and	Optimizat	tion:					CO4	(06)
	Addi	ng and managin	ng audio	o assets, ii	mplementii	ng sound eff	ects, backg	round must	ic, and		
	spatia	al audio. Incorp	orating	visual effe	ects for en	hanced imme	ersion (VF2	X Graph) c	reating		
	partic	ele effects, sh	naders,	post-proce	essing eff	ects, and o	other visua	al enhance	ments.		
	Tech	niques for optim	nizing p	erformance	e in Unity	projects, LOI	D (Level of	Detail), ba	tching,		
	occlu	sion culling, and	d more.								
Unit 6	Augn	nented Reality	& Virt	ual Reality	y Developi	ment:	D			CO4	(07)
	Unde	rstanding AR a	and VR	: hardware	e, setting u	ip AR sessio	ons. Detecti	ing and tra	cking		
	surfac	ces, placing vir	rtual ob	jects in th	ie real woi	rid, and inter	ractions. D	eveloping	a VK		
	exper	montine VD	ivieta Q	uest platto	orm, confi	guring Unity	inc the M	us develop	ment,		
	niple	rmanco	teraction	us (graddin	ig, ieieport	ation), optim	izing the V	r experience	le for		
Toyt D.		mance.									I
	JUKS Jactorin	a Unity 2D Cor	me Dav	elonment	Second E	dition Ashla	v Godbold	Simon Inc	kson De	ockt Dub	lishing
	October 2	2016, ISBN: 978	817864	63456			y UUUUUUU,		. soli, ra		usining,
2. 2	eynep 020	racgin, "virtua	u and A	ugmented	Keanty: A	In Education	ai Handboo	uk, Cambr	lage Scl	notars P	uonsner,

3	Joe Hocking, Unity in Action: Multiplatform Game Development in C# with Unity, Manning Publications, 2018										
4	Alan Craig, William Sherman and Jeffrey Will, "Developing Virtual Reality Applications, Foundations of										
	Effective Design", Morgan Kaufmann, 2009										
Ref	erence Books										
1.	Steven M. LaValle, "Virtual Reality", Cambridge University Press, 2016										
2.	John Vince, "Virtual Reality Systems", Pearson Education Asia, 2007.										
3.	Joe Hocking Unity in Action: Multiplatform Game Development in C# with Unity 5										
Use	ful Links										
1.	https://stanford.edu/class/ee267/syllabus.html Prof. Ivan Sutherland, Standford University										
2.	https://nptel.ac.in/courses/106/106/106106138/ Prof. Steve Lavalle,IIT Madras.										
3.	https://nptel.ac.in/courses/121/106/121106013/ Prof. Dr. M. Manivannan,IIT Madras.										

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	3	2	1	-	1	-	-	-	-	-	-	1
CO 2	2	3	2	2	2	-	-	-	-	-	-	1
CO 3	3	3	3	2	3	1	-	-	1	-	1	2
CO 4	2	2	3	3	3	1	1	-	2	1	-	3
: Slight (Low) 2: Moderate (Medium))	3: Substantial (High)							

Knowledge Level	ISE	ESE
Remember	10	10
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	-	_
TOTAL	50	50

			Governmer	nt College of Engineering, l	Karad							
Second	l Yea	r (Sem	– III) OE- Insti	tute Level- Industrial orien	ntated Open E	lective- AR	RVR					
	IOF	E 3332:	Open Elective -	01 Lab - AR/VR Application	on Developmer	nt Lab						
Laboratory	y Sche	eme:			Examination	Scheme:						
Practical			02 Hrs/week		ISE	25						
Total Credit	ts		01		ESE	25						
Prerequisit	t <mark>e :</mark> Ma	athemati	ics, Programming	for problem solving								
Course Out	tcome	es (CO):	Students will be a	ble to								
CO1 Apply real-time 3D scene creation with basic physics interactions.												
CO2 Design user interfaces utilizing UI system for game or application prototypes.												
CO3Develop and test C# scripts to control game behaviour and player interactions.												
CO4	Integ	grate auc	lio-visual effects a	and optimize performance.								
			С	ourse Contents			CO					
Implement	ation	of follo	wing concepts									
Experiment	t 1	Create a	real-time 3D scer	ne in Unity incorporating basic	physics interacti	ons.	CO1					
Experimen	t 2	Design a	and implement a u	ser interface for a game or app	lication prototyp	e using	CO2					
	1	Unity's V	UI system.									
Experiment	t 3	Write ar	nd test scripts in C	# to control game behavior, suc	ch as player mov	ement and	CO3					
	(object ir	nteractions.									
Experiment	t 4	Integrate	e audio effects and	l visual enhancements into a Ui	nity project to en	hance	CO4					
	j	immersi	on. e. Optimize a	Unity project for performance	on different platf	orms,						
	1	focusing	g on techniques lik	te LOD, batching, and occlusio	n culling.							
Experiment	t 5	Experim	ent with augment	ed reality using Unity's AR Fou	undation package	e to	CO1					
	(develop	basic AR interact	ions.	1		~~ 1					
Experimen	t 6	Develop	a VR experience	for the Meta Quest platform, in	nplementing VR		CO1					
F	1		ons like grabbing	and teleportation.			001					
Experimen	t7	Develop	a simple web-bas	visual effects	bGL, incorporati	ng basic	COI					
Evnerimen	t S	Greate a	$\frac{1}{n}$ AR sample and	for Android devices using Unit	wand AR Found	lation	CO2					
Experimen							C02					
Experimen	t 9	Impleme	ent AR features su	ich as plane detection, object pl	acement, and ba	S1C	CO3					
T	1	Interacti	ons like tapping to	o spawn virtual objects.		N 1	CO4					
Experiment	IL I	Develop	a VK sample app	for the Meta Quest platform u	sing Unity and C	oculus	C04					
10 Evnorimon	f	Decign i	Ion. Immercive VP en	vironments and implement VP	internations usin	a Oqulus	CO4					
		control1		monifients and implement VK		goculus	004					
Fynerimen	t 1	Ontimiz	e the VR evnerion	ce for smooth performance on	the Meta Ouest 1	neadset	CO4					
12	u	consider	ing factors like fr	ame rate and rendering quality	ine meta Quest I	icauset,	0.04					
List of Sub	missid	n	ing fuetors like lit	and rate and rendering quality								
		Mini	mum number of F	Experiments : 10								

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓		2										
CO 1	3	2	2	2	3	1	1	2	-	-	1	2
CO 2	2	1	3	2	3	2	2	1	2	2	2	2
CO 3	3	2	3	2	3	-	1	2	1	2	3	2
CO 4	2	3	2	3	3	2	2	-	2	2	1	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per	Exp	Avg											
CAS Sheet)	1	2	3	4	5	6	7	8	9	10	11	12	
Task I	5	5	5	5	5	5	5	5	5	5	5	5	5
Task II	10	10	10	10	10	10	10	10	10	10	10	10	10
Task III	10	10	10	10	10	10	10	10	10	10	10	10	10
ISE	25	25	25	25	25	25	25	25	25	25	25	25	25

				Governmen	t College of En	gineerir	ng, Karad					
		Secon	d Year (Sem –	IV) OE- Instit	tute Level- Ind	ustrial o	rientated Open El	ective-	ARVR			
			IOE343 .	3: Open Electiv	ve II Fundamer	ntals of 1	Real-time Renderi	ng				
Tea	ching	g Sche	me				Examination Sche	me				
Lect	tures		02 Hrs/week				ISE	50				
Tuto	orials		00 Hrs/week				ESE	50				
Tota	al Cre	edits	02				Duration of ESE	As app	plicable			
Pre	requi	isite : /	AR/VR Applicat	tion Developmen	t							
Cou	irse (Outcon	nes (CO): Stude	ents will be able	to							
CC)1	Under	stand virtual pro	oduction technique	ues' historical evo	lution an	d applications.					
CC)2	Apply	green screen te	chnology effective	vely for virtual pr	oduction	setups.					
CC)3	Utiliz	e Game Engine	proficiently in vi	rtual production.							
CC)4	Imple	ment real-time r	endering techniq	ues for high-qual	ity visual	s in virtual environm	ent				
				0	Course Contents				CO	Hours		
Uni	it 1	Intro	duction to Virt	ual Production:					CO1	(03)		
		Histor	rical overview	and evolution of	f virtual produc	tion tech	iniques. Applications	s and				
		benefi	its of virtual pro	duction in film, t	elevision, and oth	ner media	industries					
Uni	it 2	Fund	amentals of Gr	een Studio:					CO2	(04)		
		Explo	ring Green Scre	en Studios, expl	oring green screet	n technol	ogy and its significar	nce in				
		virtua	l production. Se	tup and operation	n of green screen	studios a	nd Lighting techniqu	es.				
Uni	it 3	Unity for Virtual Production: CO3 (04)										
		Overv	view of Unity G	ame Engine and	its role in virtua	l product	tion. Importing asset	s and				
		setting	g up virtual envi	ronments in Uni	ty for production	purposes	•					
Uni	it 4	Real-	time Rendering	g & Visualisatio	n:				CO4	(05)		
		Real-t	ime Rendering	and Visualization	on, basies and it	s importa	ance in virtual prod	uction,				
		Techr	iques for achie	eving realistic v	isuals in real-tir	ne envir	onments. Utilizing U	Unity's				
		rende	ring capabilities	for high-quality	visual output.				G 01	(0.5)		
Uni	it 5	Virtu	al Design:	minainlag and lar	rout Designing	manager	a vintual anvinanna	nto for	COI,	(05)		
		v IIIua diffor	a set Design p	mode Income	out., Designing	dragaing	e virtual environment	honoo	CO4			
			ent production	needs., incorpor	rating props, set	aressing	, and fighting to er	inance				
Uni	46	Virtu	al Comoro syst	on and Soona a	magitian				CO2	(05)		
UII	ιο	Virtu	al Camera Syst	ms and their role	in virtual produc	otion Tw	pas of virtual camera	e and	CO_2 , CO_3	(03)		
		their	functionalities	Operating virtua	l comeros within	Uoli, Tyj	or scene composition	s and	005			
		frami	ng	Operating virtua	i cameras within	Unity It	of scene composition	i anu				
Toy	t Bor		iig.									
1 CA	Tc	mas A	kenine-Möller	Fric Haines and	Naty Hoffman R	l Peal-Time	e Rendering Fourth l	Edition	Δ K Pet	ers/CRC		
1.	Pr	ess. 20	18	Life Humes, and	ruty mominum, r		e Rendering, i ourur i	Lannon,	11 11 1 00			
2.	No	oah Ka	dner, The Virtua	al Production Fie	ld Guide, Epic Ga	ames, 202	20					
3.	Je	remy H	lanke and Mich	ele Yamazaki, G	reen Screen Made	e Easy: K	Keying and Composit	ing Tec	hniques f	for Indie		
	Fil	lmmak	ers, Michael Wi	ese Productions,	2017			e	1			
4	Je	ff Foste	er, The Green So	creen Handbook:	Real-World Proc	luction T	echniques, Sybex, 20	14				
Ref	ereno	ce Bool	ks									
1.	Jo	e Hock	ing, Unity in Ad	ction: Multiplatfo	orm Game Develo	pment in	C with Unity, Man	ning Pu	blication	s, 2018		
2.	Bl	ain Br	own, Cinemato	graphy: Theory	and Practice: In	mage M	aking for Cinemato	grapher	s and D	irectors,		
	Ro	outledg	e, 2016	· · · · ·		•		_				
3.	La	ura Fra	ank, Real-Time	Video Content fo	or Virtual Product	tion & Li	ve EntertainmentA L	earning	Roadma	ap for an		
TT	Ev	olving	Practice, Routle	edge, 2023								
Use		inks		1								
1.	nti	ups://ww	ww.udemy.com	course/unitycour	(101100012)							
2.	nti	ips://ar	cnive.nptel.ac.in	/courses/121/106	0/121106013/							
3.	htt	tps://un	ity.com/resourc	es		1 1.1	1 f					
4.	htt	tps://w	ww.classcentral	com/classroom/y	outube-learn-uni	ty-multip	player-free-complete-	course-1	netcode-f	or-		
	ga	me-obj	ecis-unity-tutor	141-2023-133/33								

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	2	1	1	1	2	2	-	-	-	-	-	2
CO 2	2	2	2	2	3	2	-	-	-	1	-	2
CO 3	3	2	3	2	3	2	2	2	1	1	1	3
CO 4	2	3	2	3	3	2	1	-	-	2	1	3

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern

Knowledge Level	ISE	ESE
Remember	5	5
Understand	10	10
Apply	10	10
Analyse	15	15
Evaluate	10	10
Create	-	-
TOTAL	50	50

	Government College of Engineering, Karad												
	Thire	d Year (Sem –	V) OE- Institute Level	- Industrial or	ientated Open Ele	ctive-	ARVR						
		IOE3534:	: Open Elective III Gan	ne Developmer	nt with Unreal Eng	gine							
Teach	ing Sche	me			Examination Sche	me							
Lecture	es	02 Hrs/week			ISE	50							
Tutoria	ıls	00 Hrs/week			ESE	50							
Total C	Credits	02			Duration of ESE	As ap	plicable						
Prerec	uisite : 1	Fundamentals of	f Real-time Rendering										
Cours	e Outcor	nes (CO):Stude	ents will be able to			1 .							
	Under	rstand the basics	s of game development Eng	ine, including ir	iterface navigation an	d asset	managen	nent.					
	Apply	advanced game	eplay mechanics, such as co	ontrols, moveme	in animation, and in	teractivi	ity.						
C03	Evolu	ze and impleme	ant visual effects, audio asso	ets, and concept	for distribution acro	n engin	e.	Unroal					
04	Evalu	ate and optimiz	e game performance, pre	paring projects	ioi distribution acro	ss plati	orms m	Unitedi					
-	Lingin		Course Co	ntents			CO	Hours					
Unit 1	Intro	duction to Unr	eal Engine:				CO1	(04)					
	Introduction to Unreal Engine: Overview of Unreal Engine and its interface, Installation												
	and se	etup, Basics of g	game assets and importing.	C									
Unit 2	2Fundamentals of Game development:CO2(04)												
	Game Development Fundamentals, Level design and environment creation, Introduction												
	to Blu	ueprint visual sc	ripting, Implementing basic	e gameplay meel	hanics.								
Unit 3	Gam	eplay and Blen	ding:				CO2	(04)					
	Adva	nced Gameplay	Mechanics, Player contr	ols and charact	er movement, Anim	ation							
T T •4 4	blend	ing and state ma	chines, Adding interactive	elements and ga	ime mechanics.		COA	(04)					
Unit 4	Virtu Andia	al effects:	on incompositing viewal off	acts and mantials	avatama integrating	andia	CO3	(04)					
	Audio	, and Multiplay	ts and music. Introduction	to networking a	ad multiplayer concer	auulo							
Unit 5	Ontir	nization and ne	erformance enhancement		ia manipiayer concep		CO4	(05)					
Ome	Tech	niques for optim	izing game performance, r	, profiling tools ar	nd performance moni	toring.	0.04	(00)					
	Best	practices for imp	proving frame rate and redu	cing memory us	age	,,							
Unit 6	Pack	aging and Distr	ribution:	<u> </u>	0		CO4	(05)					
	Packa	iging and Distri	bution, Preparing the game	e for distribution	n, Building and packa	aging							
	for di	fferent platform	s, Showcase and presentation	on of completed	projects.								
Text B	ooks												
1.	Joanna L	ee, "Learning U	nreal Engine Game Develo	pment" - Packt	Publishing, 2016.								
2. T	racy Ful	llerton, "Game	Design Workshop: A Pla	aycentric Appro	bach to Creating In	novative	e Games	", A K					
P P	eters/CR	<u>C Press, 2014.</u>			0014								
3. S	cott Roge	ers, "Level Up!	The Guide to Great Video	Jame Design [®] v	viley, 2014.								
Refere	nce Boo	KS	lawan Cama Dua anamin'n	A valita ativ	Notree les d. Com		Addiaan	Wasler					
I. J(osnua G	hazer, Mulup	layer Game Programmin	ig: Architecting	g Networked Game	es -	Addison	-wesley					
2. Ie	esse Sche	$\frac{1}{2013}$.	Game Design. A Book of L	enses" CRC Pre	ess 2008								
2. Je	son Gree	gory "Game En	gine Architecture" CRC Pr	$\frac{1}{2}$ ess 2018									
J. J.	Links	Sory, Guine En		2010.									
1.	https://w	ww.udemv.com	/course/unrealcourse/				I						
	https://ar	chive.nptel ac ir	/courses/121/106/1211060	13/									
2.	https://w	ww.udemv.com	/course/unreal-engine-5-the	e-complete-begin	nners-course/								
3.	https://w	ww.coursera.org	z/specializations/cplusplusu	inrealgamedevel	opment								
~													

$PO \rightarrow$	PO	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓	1											
CO 1	2	1	2	1	3	-	-	-	-	-	-	1
CO 2	2	2	3	2	3	1	-	-	-	-	-	2
CO 3	3	3	3	3	3	2	1	2	1	-	-	1
CO 4	2	2	2	2	2	1	1	2	1	1	1	2

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	ISE	ESE
Remember		
Understand	10	10
Apply	10	10
Analyse	15	15
Evaluate	15	15
Create	-	-
TOTAL	50	50

OPEN ELECTIVE OTHER THAN PARTICULAR PROGRAM (OE) ERP-SAP

			Government College of Engineering, Karad								
	Second Year (Sem – III) OE- Institute Level- Industrial orientated Open Elective- ERP-SAP										
		IOE334	1: Open Elective- I- ABAP Programming for SAP HANA								
Tea	ching	scheme	Examination Schem	e							
Lect	ures	03 Hrs/week	ISE 5	0							
Tuto	orials	00 Hrs/week	ESE 5	0							
Tota	ll Cre	dits 03									
D			Duration of ESE A	As applicabl	e						
Prei	requi	site : Database Mana	gement System								
COU	rse C 1 T	Inderstand SAP HAN	A concepts key technologies and use of SAPHANA Studio and A	DT							
	$\frac{1}{2}$	lentify and address A	BAP code performance issues and understand SAP HANA's technic	cal requirer	pents and						
		eployment options	BAT code performance issues and understand SAT TIATVA's teening	cai requirei	ients and						
CO	3 U	Itilize Enhanced Oper	SOL. Core Data Services (CDS), and develop with SAP HANA Na	tive SOL a	nd ABAP						
	N	Ianaged Database Pro	ocedures								
CO	4 In	ntegrate SAP HANA	models into ABAP, transport objects, and optimize reports with F	Full Text Se	arch and						
	A	LV IDA.									
			Course Contents	CO	Hours						
Uni	t 1	Introduction:									
		SAP HANA Basics a	and Technical Concepts, SAP HANA Studio, ABAP and SAP HANA	$\frac{A}{D}$ CO1	(08)						
		Introducing the ABA	AP Development Tools (ADT), Taking ABAP to SAP HANA, SA	P	`						
Uni	+ 2	HANA as Secondary	Database- Access via Open SQL.	o1							
	ι 2	Performance Issues	Guided Performance Analysis SOI Performance Rules for SA	P CO2	(07)						
		HANA. Database Inc	lependent Code-to-Data Classical Open SOL and Its Limitations.		(0)						
Uni	t 3	Enhanced Open SO	. The Basics of Core Data Services in ABAP. Associations in Cor	re							
		Data Services, Outlo	ok: More Interesting Features of CDS.SAP HANA specific Code-to	$^{-}$	(07)						
		Data, The Syntax o	f SAP HANA Native SQL, ABAP Managed Database Procedure	s_{s}	(07)						
		ABAP Managed Dat	abase Procedures.								
Uni	t 4	Use of SAP HANA	Information Models in ABAP, Advanced Topics, Transporting SA	P							
		HANA Objects with	ABAP Transport Requests.	CO 4	(05)						
		Using SAP HANA F	ull Text Search, ABAP List Viewer with Integrated Database Acces	ss CO 4	(07)						
		(ALV IDA), Case St Case Study: Optimi	ze a Report on Elight Customer Revenue								
Uni	t 5	Describing SAP H	ANA Understanding the Need for a Modern Digital Platforn	n							
		Describing How SA	AP HANA Powers a Digital Platform. Key Technologies of SA	P	(0.7)						
		HANA, Deploying	SAP HANA, Identifying the Key Roles in an SAP HANA	A CO1	(07)						
		Implementation.									
Uni	t 6	Technical Requirement	ents of SAP HANA, Technical Deployment Options		(04)						
		High Availability an	d Disaster tolerance, SAP HANA Lifecycle Management Tools	CO 2	(04)						
			1 1								
Text	t Boo	ks		·	f. OAD						
1.	Herr	Iann Ganm, Thorste	n Schneider, Unristiaan Swanepoel, Eric Westenberger, "ABAP Pr	ogramming	for SAP						
2	Herr	nann Gahm Thorste	n Schneider Fric Westenherger Thomas Jung "SAD HANA for		elopers"						
4.	SAP Press, ISBN-13: 978-1592298789, 2nd Edition										
3. Paul Hardy, "ABAP to the Future: Advanced, Modern ABAP 7.5x Programming Techniques", Espresso											
	Tuto	orials, ISBN-13: 978-	1946390073, 1st Edition	1 ,	1						
Refe	erenc	e Books									
1.	Reha	an Zaidi , "SAP ABA	P Advanced Cookbook", Packt Publishing, ISBN-13: 978-17821764	40 1 st Editio	on						

Use	eful Links		
1.	https://www.linkedin.com/learning/topics/sap		
2.	https://community.sap.com/t5/enterprise-resource-planning/c	t-p/erp	
3.	https://open.sap.com/		

 3.
 https://open.sap.com/

 *Note: End Sem Exam (ESE) will be conducted either theory or oral or presentation mode.

Mapping of COs and POs

РО	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
\rightarrow										10	11	12
CO↓												
CO 1	3	-	-	-	1	-	-	-	1	2	-	1
CO 2	3	2	-	3	3	-	-	-	3	3	-	1
CO 3	3	3	3	3	3	1	-	1	2	3	-	1
CO 4	3	3	3	3	3	1	-	1	3	3	2	1

Knowledge Level	ISE	ESE
Remember	8	8
Understand	8	8
Apply	8	8
Analyse	8	8
Evaluate	8	8
Create	10	10
TOTAL	50	50

	Governm	ent College of Engineering,	Karad	
Second Year	(Sem – III) OE- Inst	itute Level- Industrial orient	tated Open Elect	tive- ERP-SAP
	IOE3342 : OE I	Lab- ABAP programming ir	n Eclipse LAB	
Laboratory Schem	ne:		Examination Sch	neme:
Practical	2 Hrs/week		ISE 2	25
Total Credits	1		ESE 2	25
D	1			
Prerequisite : Data	base Management Syste	em hla ta		
Course Outcomes	(CO): Students will be a	Die to	aluding installation	and navigation
CO1 Explain the	A P projects by creating	editing and debugging reposito	ry objects using Ec	l and navigation
CO3 Assess ABA	AF projects by creating AP code performance at	d quality using static testing to	ols ARAP Unit T	Support $\Delta \mathbf{R} \Delta \mathbf{P}$
Profiler with	in Eclipse	in quality using static testing to		ests, and the <i>i</i> d <i>i</i> h
CO4 Design and	implement advanced	SAP applications, including	Web Dynpro com	ponents and ABAP
Dictionary (Objects, utilizing Eclipse	's development environment	7	1
	Co	urse Contents		CO
Experiment 1	Introduction to Eclip Eclipse	se, Understanding How SAP Us	es Eclipse, Installi	ing CO 1
Experiment 2	Defining an ABAP P	roject, Organizing Work with the	e Eclipse Workben	ch, CO 2
	The ABAP Developn	nent Cycle in Eclipse.		
Experiment 3	Creating Repository	Objects, Editing a Repository	Object, Debuggi	ing CO 2
F • 4.4	ABAP in Eclipse.	F		
Experiment 4	Function Groups and	Function Modules.		CO 2
Experiment 5	ABAP Dictionary Obj	ects in Eclipse, Working With Da	ata Element, Work	ing CO 4
Experiment 6	ABAP Objects and Ec	linse Creating a Global Class Re	efactoring	CO 4
Experiment 0	Web Dynpro Develor	mpse, creating a Global Class, K	monents	
Experiment 8	Navigating in Eclipse	Searching in Eclinse	inponents	
Experiment 0	Managing Vargian C	, Searching in Lenpse	In and Information	
Experiment 9	Wianaging Version Co	Shuroi, identifying Sources of Hel		
Experiment 10	Performing Static Tes	sting with the ABAP Test Cockpi	th the Syntax Che	ск, СОЗ
Experiment 11	Performing ABAP U Profiler.	nit Tests, Analysing Performat	nce with the AB.	AP CO 3
Experiment 12	Eclipse: An Extensib with Other SAP Tools	le Toolkit, Lesson: Extending	Eclipse Functional	lity CO 1
List of Submission	•			I
3.	Minimum number of E	Experiments : 10		

Mapping of COs and POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	2	-	-	-	2	2	-	1
CO2	3	1	3	2	2	-	-	-	2	2	-	1
CO3	3	3	3	3	2	-	-	1	3	3	-	1
CO4	3	2	3	3	3	1	1	1	3	3	1	1
		1: Slight(Low)			2: Moderate(Medium)			3: Subst	antial(Hig	gh)		

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05	05	05
ISE	25	25	25	25	25	25	25	25	25	25	25	25	25

			Governn	nent College	e of Eng	ineering,	, Karad				
	Second Year (Sem – IV) OE- Institute Level- Industrial orientated Open Elective- ERP-SAP										
			Ι	DE3443: OF	E II- SA	P HANA					
Teach	ing Sche	me					Examination Sch	eme			
Lectur	res	02 Hrs/week					ISE	50			
Tutori	als	00 Hrs/week					ESE	50			
Total	Credits	02									
							Duration of ESE	As ap	pplicable		
Prere	quisite :	Basics of ABAP	programming	5							
Cours	e Outcoi	mes (CO):Stude	nts will be ab	le to	1.			1	· CAD		
	Desc	ribe the fundame	entals of analy	/tical processi	ng, data	manageme	ent, and advanced at	nalytics	s in SAP	HANA	
C02	2 Develop calculation views, custom SQL data warehouses, and applications on SAP HANA 2 Evaluate the performance and interaction of SAP Dusiness Intelligence tools and SAP Dusiness Warehouse										
	Eval with	s A D LL A N A	ance and inte	egration of SF	AP Busii	less intern	igence tools and SA	P Bus	mess wa	renouse	
CO4	Desi	on and impleme	nt data tiring	o strategies	SAP Da	a Wareho	use Cloud solution	ns and	enternri	se suite	
	appli	cations on SAP	HANA	5 strategies, i	on Du	u wurone		is, and	enterpri	se suite	
	<u>r</u>			Course Co	ontents				CO	Hours	
Unit	1 Anal	ytical Processing	g with SAP H	IANA, Develo	oping Ca	lculation	Views with SAP H.	ANA,	CO 1,	(04)	
	Advanced Analytics with SAP HANA.										
Unit	2 Connecting SAP Business Intelligence Tools to SAP HANA, Data Management with SAP								CO 1,	(05)	
	HAN	A, Data Tiering	with SAP HA	ANA, Describ	ing Data	Acquisitio	on Tools.		CO 3,		
						~		~ . ~	CO 4		
Unit	3 Powe HAN	ering Data Ware	houses with S	SAP HANA, F	Running	SAP Busin	ness Warehouse on	SAP	CO3,	(05)	
Unit	4 Deve Clou	eloping Custom d.	SQL Data V	Warehouses v	with SA	P HANA,	SAP Data Wareh	ouse	CO 2, CO 4	(04)	
Unit	5 Runn	ning SAP Enterp	rise Suites or	n SAP HANA	A, Runni	ng SAP E	nterprise Suites on	SAP	CO 4	(04)	
Unit	6 Deve	loping Applicat	ons on SAP I	HANA, Devel	loping A	BAP appli	cations for SAP HA	NA,	CO 2,	(04)	
	Deve	loping Native S	AP HANA Aj	pplications.					CO 4		
Text I	Books										
1. H	Iermann	Gahm, Thorster	Schneider, (Christiaan Sw	anepoel,	Eric Wes	stenberger, "ABAP	Progra	amming f	for SAP	
H	<u>IANA", S</u>	SAP Press, ISBN	<u>-13: 978-149</u>	3213049, 3rd	Edition	т				1	
2. F	fermann SAP Press	Ganm, Thorster	1592298789,	2nd Edition	erger, 11	iomas Jun	ig , "SAP HANA f	or AB.	AP Deve	lopers",	
3. F	Paul Hard	y, "ABAP to th	e Future: Adv	anced, Moder	rn ABAI	7.5x Prog	gramming Techniqu	es", Es	spresso T	utorials,	
Ι	SBN-13:	978-194639007	3, 1st Edition		<u> </u>						
Refer	Reference Books										
1. Rehan Zaidi, "SAP ABAP Advanced Cookbook", Packt Publishing, 1 st edition, ISBN-13: 978-1782176440.											
Useful Links											
1. h	ttps://ww	w.linkedin.com	learning/topic	cs/sap							
2. h	ttps://con	nmunity.sap.con	n/t5/enterprise	e-resource-pla	nning/ct	-p/erp					
3. h	ttps://ope	en.sap.com/									

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO
CO↓										10	11	12
CO 1	3	-	-	-	1	-	-	-	1	2	-	-
CO 2	3	3	3	3	3	1	-	1	2	2	1	1
CO 3	3	3	3	3	3	1	-	1	3	2	2	1
CO 4	3	3	3	3	3	1	-	-	1	3	2	1

Knowledge Level	ISE	ESE
Remember	8	8
Understand	8	8
Apply	8	8
Analyse	8	8
Evaluate	8	8
Create	10	10
TOTAL	50	50

Government College of Engineering, Karad									
Third Year (Sem – V) OE- Institute Level- Industrial orientated Open Elective- ERP-SA									
IOE3544: OE III- SAP PROJECT									
Teachin	g Scher	ne			Examination Sch	eme			
Lectures		02 Hrs/week			ISE	50			
Tutorials	5	00 Hrs/week			ESE	50			
Total Cre	Credits 02								
					Duration of ESE	As applica	ıble		
Prerequ	isite : 1	Knowledge of S	SAP HANA						
Course	Outcon	nes (CO):Stude	ents will be able to						
CO1	Perfor	m detail literat	ture survey on the research to	pic of work.					
CO2	Carry out detailed mathematical modelling or experimental validation.								
CO3	Draw inferences from the findings and present conclusion.								
CO4	Develop presentation and technical report writing skills.								
			Course Co	ontents			CO		
	The st	tudent shall cho	oose any of the topics of inter	rest for Project v	vork using SAP. Pro	oject group	CO 1,		
	shall o	consists of min	inimum THREE and maximu	m FIVE student	s. The group is requ	uired to do	CO 2,		
	literat	ure survey, for	mulate the problem, propose	and execute met	hodology required to	or project.	CO 3,		
	•	Students will	Il prepare a technical report in	prescribed form	at based on their wo	ork.	CO 4		
	•	The assessm	nent of the project will be do	one at the end of	f the semester by a	committee			
		consisting of	t three faculty members from	the department a	along with Project G	luide.			
	•	The students	s will present their project we	ork before the c	ommittee. The prese	entation of			
	the project shall be of 45 min followed by viva voce.								
	• The project guide will award the marks to the individual student depending on the								
	group average awarded by the committee.								
Each Project Guide shall be allotted maximum TWO groups for guidance. Each group will									
	submi	t the copies of	the completed project report.						
	Subm	ussion: Project	et report in standard format	•					

Mapping of COs and POs

$PO \rightarrow$	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO↓												
CO 1	-	1	1	1	3	2	2	1	3	2	3	3
CO 2	2	3	3	3	3	3	3	1	3	2	3	3
CO 3	3	3	2	3	3	3	3	3	3	1	3	3
CO 4	1	-	1	-	3	1	1	1	3	3	3	3

Knowledge Level	ISE	ESE
Remember	9	9
Understand	9	9
Apply	9	9
Analyse	9	9
Evaluate	9	9
Create	5	5
TOTAL	50	50

Multi-disciplinary Minor (Other Discipline) – Law

			G 1	Government College of Engineering, K	Karad		
			Second	Year (Sem – III) MDM-(Other Disc	cipline) – Law		
Teer	ahin a C	alaanaa		INIO3311: Constitutional Law	Energine tion Cale		
Teac	cning S	cneme			Examination Scheme	0	
Lect	ures		02 Hrs/ week			20	
	oriais	•4	00 Hrs/ week			20	
1018	al Cred	its	02	Ľ	LSE (50	
						0 H. 20 M	•
D	• • •	. D.		L .	Juration of ESE	02 Hrs 30 M	1N
Prer	requisit	e: Ba	isics of legal conce	able to			
	rse Ou	tcomes	s : Students will be	able to	of Dr. D. D. Amboo	tran in sha	aina tha
		nstitut	ion of India	non of constituent assembly and role	OI DI. D. K. AIIIDEC	ikar in shaj	jing the
CO	2 K	now a	bout the structure of	f the constitution.			
CO	3 K	now th	he significance of	fundamental rights and duties in order to	o sensitize towards the	constitution	nal goals
	w	hich ev	verv citizen shall ch	erish and preserve.		••••••••••••	Bours
CO	4 K	now th	ne composition of r	arliament, judiciary and emergency provi	sions.		
				Course Contents		CO	Hrs
Ur	nit 1	Maki	ing of constitution	and features		CO1	(04)
		Maki	ng of Indian Con	stitution ,Nature of constitution, Salient	t Features of the Indi	an	
		Const	titution .Preamble				
Ur	nit 2	Fund	lamental rights			CO2	(05)
		Right	to Equality (Art	14-18), Freedoms and Social Control V	Units (Art 19-22), Rig	ght	
		again	st Exploitation (A	rt 22-23), Right to Religion and Mino	ority Rights (Art 25-3	0),	
		Const	titutional and Lega	Remedies (Art 32).			
Ur	nit 3	Direc	ctive principles, fu	ndamental duties and social justice (art	t 35-51a)	CO3	(04)
		Unde	erlying object and	significance of Directive Principles, Clas	ssification of Directive	8,	
		Fund	amental Right and	Directive principles- Interrelationship, Fun	ndamental Duties.		
Ur	nit 4	Parli	ament			CO3	(04)
		Comp of Por	position, Election,	Jualifications, disqualifications and tenur	f the parliament Speek	ons	
		Chair	merson nowers and	functions	n me parnament, speak	cı,	
Ur	nit 5	Eme	rgency provisions	Tunetions.		CO4	(04)
	nt S	Natio	onal emergency- in	position and implications Failure of co	nstitutional emergency	in CO4	(04)
		the s	tate- grounds. Fin	ancial emergency – grounds and impli	ications. Misuse of sta	ate	
		emer	gency -safeguards l	v judicial pronouncements			
Ur	nit 6	Judio	ciary under consti	ution		CO.	(05)
		Inde	pendence of Judio	iary, High Court-Composition, Appoir	ntment, jurisdiction et	c., CO4	
		Supre	eme Court- comp	osition, Appointment procedure, jurisd	liction etc., Doctrine	of	
		Judic	ial Review, judicia	Activism- Nature and scope.			
Text	t Books	5					
1.	Dr. Pa	ndey J	.N.: "Constitutiona	l Law of India". Central Law Agency, 20	007.		
2.	D.D. I	Basu : '	"Shorter Constitution	on of India": Prentice Hall of India, Delhi	i,1996.		
3.	M.P.Ja	ain "In	dian Constitutional	Law", Wadhwa.			
Refe	erence l	Books					
1.	H.M. S	Seerva	i: "Constitution of	ndia" Vol. 1-3, Tripathi, Bombay, 1992.			
2.	D.D. H	Basu : '	"Shorter Constitution	on of India" Prentice Hall of India, Delhi,	1996.		
3.	Consti	tuent A	Assembly Debates	/ol. 1 to 12 (1989)			
4.	M.P.S	ingh (e	ed) V.N. Shukla : "	Constitutional Law of India" Oxford, 2000	0.		
5.	P.M.B	akshi,	"Constitution of In	dia", Universal.			
6.	The Fi	raming	of India's Constitu	tion in Six Volumes (B.Shiva Rao)			
Usef	ul Linl	KS					
1.	https:/	/www.	constitutionofindia	net/constitution-assembly-debates/			

2.	https://constitutionnet.org/
3.	https://www.india.gov.in/my-government/constitution-india

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	-	-	-	-	-	3	-	2	-	-	1	2	-	-
CO 2	-	-	-	-	-	3	-	2	-	-	1	2	-	-
CO 3	-	-	-	-	-	3	-	2	-	-	1	2	-	-
CO 4	-	-	-	-	-	3	-	2	-	-	1	2	-	-

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	5	5	15
Apply	5	5	10
Analyze	5	5	10
Evaluate	-	-	10
Create	-	-	-
Total	20	20	60

				overnment College of Engineer	ing, Karad			
			Second Y	ear (Sem – IV) MDM-(Other	Discipline) – Law			
			IM	3412: Human Rights and Intern	national Laws			
Teach	ing S	cheme			Examination Scheme			
Lectur	res		02 Hrs/Week		MSE	20		
Tutori	ials		00 Hrs/Week		ISE	20		
Total	Cred	its	02		ESE	60		
					Duration of ESE	02 Hr	s 30 Mii	1
Prerec	luisit	te: Basio	cs of legal concepts	and civics				
Cours	e Ou	tcomes :	Students will be ab	e to				
CO1	L	Understa	and the developmen	and sources of international laws				
CO2	2	Know th	ne role of internation	nal agencies like UN in creation	and maintenance of internat	tional	law in c	order to
		maintain	the peace and safe	у.				
CO3	3	Know th	e concept and deve	opment of human rights.				
CO4	1	Know th	e rights of vulnerab	le sections of the society and mech	nanism to protect the rights.			
				Course Contents			CO	Hrs
Unit	1	The co	ncept, nature, and	history of international law			CO1	(04)
		Definiti	ions and Nature of	International Law, Historical Deve	elopment of International La	nw,		
		Basis of	f International Law	Relationship between Internationa	al Law and Municipal Law.			
Unit	2	Source	s of international l	1W			CO2	(04)
		Custom	ns and Usages, Trea	ties - In general, Judicial Decisio	ns, Other Sources – Writing	s of		
		Jurists,	Equity, Resolution	of General Assembly, etc.				
Unit	3	Role of	united nations in	nternational law			CO2	(04)
		Historic	cal background, Or	ans of United Nations, Preamble a	and Purposes of United Nation	ons,		
		The Pri	nciples of United N	ations.				
Unit	4	Concer	ot and developmen	of human rights			CO3	(04)
		Meanin	g, Definition, Imp	ortance and Scope of Human Ri	ghts, Kinds of Human Rig	hts,		
		Human	Rights in India –C	nstitutional provisions, Role of Nl	HRC, SHRC in India.			
Unit	5	Interna	ational bill of right				CO4	(05)
		Univers	sal declaration of h	man rights, 1948, the international	l covenant on civil and polit	ıcal		
		rights,	1966, the internation	nal covenant on economic, socia	I and cultural rights, 1966,	role		
T T •4		and imp	portance of regional	organisations.			CO	(07)
Unit	0	Humar	n rights and vulner	able groups		1. (.	CO,	(05)
		women	and human right	s, children and human rights, ag	ged persons and human rig	nts,	CO4	
Treed D	1	disable	a persons and numa	i rights.				
1 ext B			al "International I	wy and Human Diahta? Control La	w Agapay Allahahad			
1.	п. (с и	J. Agarw	r "Dublic International L	wand Human Rights Central La	W Agency, Ananadad			
<u>2</u> .	<u>э.</u> г м	L. Kapool	n "Dublic Internation	nai Law, Central Law Agency, A	Italia0au.			
J. Defense	IVI.		ii, Fublic Internatio	liai Law 2024.				
1	Dr	S K Ko	noor "International	L aw? 2021				
1. 2	C 1	J. K. Ka	"Public Internation	al Law" Prontice Hell Dub Now"	Delhi 1008			
2.		Starko	"Introduction to In	an Law Trenuce-Hall Fub., New	Ω^{th} edition 1980			
<u></u> Л	J. U	Brierly	"The Law of Natio	" Oxford Publications London	o cuition, 1707.			
. 5	J. D Ian	Brownlie	"Principles of Pul	lic International I aw" Oxford Pub	lications London			
5. 6	NI	Z Javkur	nar "International"	aw & Human Rights" Levie Navie	c			
U. Usoful	T in	x. Jaynul	nar, mernanonar	Lexis Nexis	υ.			
1	http	s·//w/w/w/	un org/en/global ig	ues/human-rights				
2	http	<u>e•//</u>	ohchr org/en/what	are_human_rights				
2.	http	o.// w w w.	oneni.org/en/wildt-					
э.	mup	s.//mitc.i	11 C .111/					

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	-	-	-	-	-	3	-	2	-	-	1	2	-	-
CO 2	-	-	-	-	-	3	-	2	-	-	1	2	-	-
CO 3	-	-	-	-	-	3	-	2	-	-	1	2	-	-
CO 4	-	-	-	-	-	3	-	2	-	-	1	2	-	-

Knowledge Level	MSE	ISE	ESE
Remember	5	5	15
Understand	5	5	15
Apply	5	5	10
Analyse	5	5	10
Evaluate	-	-	10
Create	-	-	-
Total	20	20	60

Multi-disciplinary Minor (Other Discipline) – Management & Finance

			Government College of Engineering	g, Karad			
		Second Year	Sem – III) MDM-(Other Discipline) –	Management & l	Financ	e	
			IMO3321: Microeconomics	5			
Teac	ching S	cheme		Examination Scher	ne		
Lect	ures	02 Hrs/week		MSE	20		
Tuto	orials	00 Hrs/week		ISE	20		
Tota	l Credit	as 02		ESE	60		
				Duration of ESE	02 Hrs	30 Min	
Prer	requisit	e: Mathematics, C	mputer Fundamentals				
Cou	rse Ou	tcomes (CO): Stud	nts will be able to				
CO	D1 A	pply the principles	f microeconomics in real time scenarios.				
CO	02 U qu	se supply and dema antity.	id diagrams to analyze the impact of overall	changes in supply a	ind dem	and on p	rice and
CO	3 Id su	entify the impact bstitution effects.	of changes in price and income on a con	nsumer's decision v	ria shift	ing inco	me and
CO)4 A	nalyze the behavior	of firms in a perfectly competitive market in	n the short-run and th	ne long-	run	
			Course Contents			CO	Hours
Uni	t 1 B	asic of microecono	nics:			CO1	(05)
	E	conomy And Its B	sic Problems, Introduction, Objectives, Ba	asic Economic Prot	olem,		
	Pi	oblems of Choice a	nd Scarcity, Basic Economic Decisions, How	w the Market Mecha	nism		
	Se	plves the Basic Pro	blems, The Scope of Economics, Distinct	tion Between Micro	and		
	M	acro Economics, N	ethods of Analysis, Approaches To Econom	nic Analysis: Micro	And		
TInt		acro Analysis.				CO1	(04)
Uni		traduction Objection		Litility Theory I o	w of	COI	(04)
	D	iminishing Margin	1 Utility Consumer Equilibrium and The	e Law of Equi-Mar	w of ginal		
	U	tility. Derivation of	Demand Curve (Cardinal Utility Approach)). Drawbacks of Car	dinal		
	Ā	pproach, Ordinal U	ility Theory, The Diminishing Marginal Rat	e of Substitution			
Uni	t 3 D	emand analysis:				CO2	(04)
	D	emand, Introductio	, Objectives, The Law of Demand, Dema	and Curve and Der	nand		
	Se	chedule, Derivation	of Individual Demand Curve (Utility A	Analysis), Reasons	and		
	E	ceptions to The	aw of Demand, Determinants of Market	t Demand, Elasticit	y of		
	D	emand, Introductio	n, Objectives, Definition of Elasticity of	Demand, The Use	es of		
	E	asticity, Types of E	asticity of Demand			G0	
Uni	$t 4 P_1$	roduction and cost				CO2	(04)
	Fa	actors of Production	Introduction, Objectives, Production: Basic	c Concepts, Short Ru	in and		
		biostivos Laws of	Production The Law of Paturns to V	on Function, Introdu	Cost		
		upetion Introduction	Directives Cost Concepts Cost in Shor	t and Long Run and	their		
	In	portance Cost Fur	tions and Cost Curves: Meaning Types of	Cost Functions	1 then		
Uni	t 5 D	ifferent market st	ictures:	2350 Functions.		CO3	(05)
0	N	Iarket Structure, In	troduction, Objectives, Characteristics of	Market Structure, F	Perfect	000	()
	C	ompetition and Imp	erfect Competition, Features of Perfect Cor	mpetition, Market P	ricing,		
	Pı	icing Under Differ	ent Market Structures, Equilibrium and Su	pply Curve of The	Firm,		
	Pı	rice and Output	Determination Under Perfect Competit	tion, Price and O	Dutput		
	D	etermination In The	Long Run, Long-Run, Monopoly, Duopoly	And Oligopoly			
Uni	t6 P	ersonal economics				CO4	(04)
	C	ompound interest a	nd credit, financial markets, human capita	al and insurance, m	oney		
	m	anagement/ budget	ng, risk and return, saving and investing, ((self-study: role of	it in		
	fi	nancial market, it eo	onomics and data mining in stock market).				
Text	t Books			<u>0011 (II : 100 1</u>	7)		
1.	D. N.	Dwivedi, "Microe	onomics", Pearson Publication, New Delhi,	2011. (Unit 1,2,3,4,	<u>5)</u>	2(10(2))	2000
2.	Kach	el Siegel, Carol Yao	ht, "Personal finance", Publisher Saylor Fou	indation ISBN 13:9	/80982	361863,2	2009.

	(Unit 6)			
Ref	erence Books			
1.	Varian, Hal, "Intermediate Microeconomics: A Modern Appr	roach", l	Norton, 5th Edition, 1999.	
2.	Sen, Anindya, "Microeconomics: Theory and Applications",	Oxford	University Press, New Delhi	,1999
3.	Misra S.K. and V.K. Puri, "Advanced Microeconomic Theor	y", Hima	alay Publishing House, New	Delhi, 2001
Use	ful Links			
1.	https://nptel.ac.in/courses/112/107/112107209/ Dr. P. K. Jh	a IIT Ro	orkee	
2.	https://nptel.ac.in/courses/109/104/109104073/ Dr. S. Sinha	ı IIT Kar	npur	
3.	https://www.econlib.org/library/Topics/HighSchool/HighSc	choolTop	pics.html	

$PO \rightarrow$	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO	PO	PO	PSO	PSO
CO↓		2								10	11	12	1	2
CO 1	3	-	-	-	-	-	-	-	-	-	-	-	2	2
CO 2	-	3	-	-	-	-	-	-	-	-	-	-	2	2
CO 3	-	-	3	-	-	-	-	-	-	-	-	-	2	2
CO 4	-	-	-	3	-	-	-	-	-	-	-	-	2	2

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	10
Understand	5	5	20
Apply	5	5	10
Analyse	5	5	20
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60

Government College of Engineering, Karad									
Second Year (Sem – IV) MDM-(Other Discipline) – Management & Finance									
IMO3422: Corporate Social Responsibilities									
Teaching Scheme Examination Scheme									
Lectures	es 02 Hrs/week MSE						20		
Tutorial	8	-	ISE 20						
Total Cr	edits	02			ESE 60				
	Duration of ESE								
Course	Course Outcomes (CO): Students will be able to								
CO1	CO1 Define and Explain CSR Concept								
CO2	Unders	tand the Historic	al Evolution and Models of CSR.						
<u>CO3</u>	Euclon	CSD in Dolotic	to Covernance and Environmental	Daananaihility					
$\frac{005}{004}$	Explore	Maior Drivera	a to Governance and Environmental	Responsibility					
04	Assess	Contonts	lodes, and mitiatives in CSR			COs	Hours		
Unit 1	Introd	ustion to CSD.					(05)		
Unit I	Mooni	ng & Definition	of CSP History & evolution of CSI	Concept of	Charity Corporate	COI	(05)		
	nhilont	throny Cornerat	Citizanshin CSP on overlanning of	cheapt of Conce	chanty, Corporate				
	$\frac{p_{\text{IIII}}}{\delta_{\text{T}}}$ Stal	keholder Manag	e Chizenship, CSR-all overlapping c	line and Sus	tainable Business:				
	relation	n between CS	R and Corporate governance: e	nvironmental	aspect of CSR.				
	Chrone	ological evolution	of CSR in India: models of CSR in	India Carroll'	s model drivers of				
		naior codes on ($SR \cdot Initiatives in India$	india, Carron	s model, arrivers or				
Unit 2	Intern	ational framew	ork for corporate social Responsibi	ility:		CO2	(05)		
01110 -	Miller	nium Developn	ent goals. Sustainable development	poals. Relation	ship between CSR	001	(00)		
	and M	DGs. United Na	ions (UN) Global Compact 2011. U	N guiding prir	ciples on business				
	and hu	uman rights. O	CD CSR policy tool. ILO tri-part	ite declaration	n of principles on				
	multin	ational enterpris	es and social policy.		r r				
Unit 3	Unit 3 CSR-Legislation In India & the world :								
	Section	n 135 of Com	anies Act 2013.Scope for CSR	Activities und	ler Schedule VII,				
	Appoin	ntment of Indep	endent Directors on the Board, ar	nd Computatio	on of Net Profit's				
	Impler	nenting Process	n India.	•					
Unit 4	The D	rivers of CSR i	India:			CO4	(04)		
	Marke	et based pressure	and incentives civil society pressur	e, the regulate	ory environment in				
	India (Counter trends.	Performance in major business and	programs. Vo	oluntarism Judicial				
	activis	m.							
Unit 5	Identi	fying key stake	olders of CSR & their roles:			CO3	(04)		
	Role	of Public Sect	or in Corporate, government prog	rams that en	courage voluntary				
	respon	sible action of	corporations. Role of Nonprofit	&Local Sel	f Governance in				
	implementing CSR; Contemporary issues in CSR & MDGs. Global Compact Self								
	Assessment Tool, National Voluntary Guidelines by Govt. of India. Understanding roles and								
TT b <i>c</i>	respon	sibilities of corp	prate foundations.			<u> </u>	(0.1)		
Unit 6	Review	w current trend	and opportunities in CSR:	1		CO4	(04)		
	USK as a Strategic Business tool for Sustainable development. Review of successful								
	corporate initiatives & challenges of USK. Case Studies of Major USK Initiatives.								
Text Books									
1. Mark S. Schwartz, "Corporate Social Responsibility": An ethical approach, Broadview press limited, 2011.									
2. Wayne Visser and Nick Tolhurst, "The world guide to CSR, A Greenleaf publishing",2010									
3. Sanj	ay K Ag	garwal,"Corpora	e social responsibility in India", Sag	e response,200)8				
Reference Books									
1. C. V. Baxi and Ajit Prasad, "Corporate social responsibility": concepts and cases- The Indian experience, 2006.									
2. Sharma, J.P., "Corporate Governance and Social Responsibility of Business", Ane Books Pvt. Ltd. NewDelhi,2015									
Useful Li	nks	, r		,			,		
1 https://online.courses.nptel.ac.in/noc21_mg5//preview									
1. https://oninnecourses.npiei.ac.in/noc21_ing54/preview									

$PO \rightarrow$	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO	PO	PO	PSO	PSO
CO↓		2								10	11	12	1	2
CO 1	3	-	-	-	-	-	-	-	-	-	-	-	2	2
CO 2	-	3	-	-	-	-	-	-	-	-	-	-	2	2
CO 3	-	2	3	-	-	-	-	-	-	-	-	-	2	2
CO 4	-	2	-	3	-	-	-	-	-	-	-	-	2	2

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Knowledge Level	MSE	ISE	ESE
Remember	5	5	10
Understand	5	5	20
Apply	5	5	10
Analyse	5	5	20
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60