			Government College of Engineering, F	Karad			
		Seco	ond Year (Sem – III) B. Tech. Mechanical	Engineering			
			IMI3331: Foundation of EV and Hybrid	Vehicle			
Teach	ning Schen	ne		Examination Schen	1e	T	
Lectur	res	02 Hrs/week		MSE		20	
Tutori	ials	-		ISE		20	
Total	Credits	02		ESE		60	
				Duration of ESE		02 Hrs	30 Min
Prere	quisite : B	asics of mechan	ical, Basics of electrical				
Cours	se Outcom	Explain the first	tion of the course the student will be able to				
$\frac{CO1}{CO2}$		Explain the lu	action of the second se	nood in a Uybrid yahi	ala		
CO_2		Domonstrate d	ifforent bettery technologies and charging statio		cie		
C03		Calculate mot	ors and motor controller sizing need in an EV	115			
04			Course Contents			CO	Hours
Unit	1 Intro	duction to EV	Course contents			CU	Hours
em	Fyn	ainingFV tech	nology and summarize Automotive revolu	ution_exploreFlectr	ical	CO1	(4)
	Reg	irement of a v	ehicle	ation, explorediced	icui	001	(1)
Unit	$\frac{1}{2}$ EV 1	avout and com	ponents:				
0	Expl	oring different	types of EV layouts and basic components	of Electric Vehicle		CO1	(4)
	F		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				()
Unit	3 Intro	duction to Hyb	rid electric vehicle:				
	Defi	ning Hybrid V	working principles and architecture.				
	Intro	duction, Batte	ry chemistry Efficiency Definition and	parameters for Hyl	orid	CO2	(4)
	Syste	ems					
Unit	4 Lavo	out and compor	ent of hybrid electric vehicle :				
	Elec	tric Motors .C	Generators , and Power electronics for Hy	vbrid systems, con	trol	GO2	
	svste	ems. Hybrid ele	ectric vehicle operation)		CO2	(4)
	5	<i>, ,</i>	1				
Unit	5 Iden	tify and demor	strate Battery Technology and charging stat	ion infrastructure:			
	Defi	ning Battery T	echnology, recognize different types of bat	teries and compone	ents	CO3	(4)
	of B	attery, describi	ng EV charging Infrastructure			COS	(4)
Unit	6 Adv	anced EV:					
	Listi	ng of Electr	ical Requirement needed in EV, state	e Power distribut	tion		
	spec	ifications, des	cribe Electronic control system, Listing	of EV standards	and	CO4	(4)
	class	sifications. Su	mmarize criteria for selection of elec	ctrical and electro	onic	C04	(4)
	com	ponents for EV	. brief outline of Motors need in EV				
Refer	ence Book	S					
1.	Julian Hap	ppian-Smith; Tra	nsport Research Laboratory (TRL) Introduction	to Modern Vehicle De	esign,	Publish	er:
	Elsevier- e	edition 2001					
2.	Heinz Hei	sler; Advanced V	ehicle Technology, Publisher: Butterworth-Heir	nemann Ltd; 2nd edit	ion- J	uly 2002	2
3.	Seth Leitr	nan, Bob Brant,	Leitman Seth; Build Your Own Electric Vehicle: I	Publisher: McGraw-H	ill - 3'	° edition	i-teb
D	2013						
Keter	rence link	S					
1.	nttps://w	ww.carbodydes	gn.com/				
2.	https://w	ww.team-bhp.c	:om/				
5.	https://au	itoprotoway.co	m/automotive-design-process/				
4.	https://w	ww.carbodydes	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	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 E	ngineering, k	Karad						
		Seco	nd Year (Sem – IV) B. Tech.	. Mechanical	Engineering						
			IMI3432:Automotive M	lechanics for	EV						
Teach	ing Schem	e			Examination Sch	eme	1				
Lectur	res	02 Hrs/week			MSE		20				
Tutori	als				ISE		20				
Total	Credits	02			ESE		60 02 H	20.14			
Duono	arriaita a D		al Design of electrical fundament	atole of EV	Duration of ESE		02 Hrs	30 Min			
Prere	quisite : Ba	asics of mechani	cal, Basics of electrical, fundame	entais of EV.	. 4.0						
COL	se Outcor	Describe and	ble down of the course the stude	nt will be able		•					
		Describe ven	cle dynamics and elements inv	volved in Auto	omobile engineer	ing					
CO2		Demonstrate	interent automotive sketching	techniques a	nd various creativ	ve sonv	vares				
CO3		Design variou	s systems of EV using advanc	e modeling te	chniques and sof	twares					
C04		Analyze adva	ice EV system using different	data analysis	software		00	TT			
T Init	1 T		Course Content	ts			CO	Hours			
Unit	Fund Whee	auction to vehi lamentalsof ve els, fundamenta	licle dynamics licle dynamics, different mec ls of Hybrid vehicle dynamics	chanisms and	dynamics involv	ved in	CO1	(4)			
Unit	2 Aero Basic dyna safet	dynamics and cs of aerodynar mics, Suspensi y,	oower train system nics, principles of aerodynamio on and Braking system, Vehic	cs, fluid mech le stability co	nanics and airflov ntrol and vehicle	v	CO1	(4)			
Unit	3 Sketo Intro and A	ketching of automotive EV design: ntroduction to Automotive sketching software, Overview of vehicle design process nd Automotive sketching, Basic sketching techniques.CO2(4)									
Unit	4 Softward	ware for EV dra c sketching tec details. creating	fting and designing iniques and tools in the softwa different views and angles of	are, sketching vehicle	car exteriors, int	teriors	CO3	(4)			
Unit	5 Adva Basic syste softw	ance EV model c vehicle desig ms, design and vares, advance	ng techniques using Solidwor principles, design and model modeling of braking and stee body design modeling.	ks : ing of chassis ering systems	and frame, suspo , automotive ske	ension tching	CO4	(4)			
Unit	6 Adva Anal settir	ance EV analys yse the EV des ng up modeling	s using different data analysis gned in modeling software us environment.	software ing advance o	lata analysis soft	ware,	CO4	(4)			
Defe	an as De el	~									
Keier		s nian_Smith. Tra	sport Pesaarch Laboratory (TPL)) Introduction	to Modern Vahiela	Decign	Dublich	or:			
1.	Elsevier- e	edition 2001	ισροιτικέσεαι τη ταυσιατοι λ (TRL)	introduction		Desigi1,	, ruuiisii	CI.			
2.	Heinz Hei	sler; Advanced \	ehicle Technology, Publisher: Bu	tterworth-Heir	nemann Ltd: 2nd e	dition- J	uly 2002	2			
3.	Seth Leitn 2013	nan, Bob Brant,	eitman Seth; Build Your Own Ele	ectric Vehicle: I	Publisher: McGraw	/-Hill - 3'	^d edition	-feb			
Refe	ence link	S									
1.	https://w	ww.carbodvdes	gn.com/								
2.	https://w	ww.team-hhn									
3.	https://au	toprotoway co	n/automotive-design-process/								
4.	https://w	ww.carbodvdesi	n.com/								
<u> </u>	1		, ,								

$PO \rightarrow$	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	I	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											
		Th	ird Year (Sem – V) B. Tech. Mechanical	Engineering								
			IMI3533:EV Design, Development and	Analysis								
Teach	ning Sche	me		Examination Sch	eme							
Lectur	res	03 Hrs/week		MSE		20						
Tutori	als	00 Hrs/week		ISE		20						
Total	Credits	03		ESE		60						
D	• • .			Duration of ESE		02 Hrs	30 Min					
Prere	quisite :	Basics of mechan	cal, Basics of electrical, fundamentals of EV									
Cours	se Outco	nes:After comple	tion of the course the student will be able to									
C01		Demonstrate v	arious tools and techniques of modeling and si	mulation of EV								
C02		Apolyzo EV p	wartrain components									
C03		Examine and a	imulate thermal management in EV powertrain	n								
04		Examine and	Course Contents	1		CO	Hours					
Unit	1 Ess	ential for design	ing and simulation using MATLAB.			0	nours					
· · · · ·		erview and envi	conment Basic variables syntax comman	ds commands M-	files							
	and	types Operator	s decision making and loops vector matri	x and arrays color	11105	CO1	(4)					
	not	ation and number	rs string and functions	and und und ys, color	1	001	(-)					
	not	anon and name.	is, sump and functions									
Unit	2 Fu	damentals of F	V system using MATLAB									
0		motor characte	istics induction to motor characteristics S	imulink model to								
	cal	culate vehicle co	nfiguration Solar PV based charger DC-D	C converter motor		CO1	(4)					
	cor	troller design	inigaration, solar i v based enarger, D e D	e converter, motor								
Unit	3 De	sign and modeli	ng of EV system using MATLAB									
Designing DC motor and induction motor multilevel inverter designing												
Unit	4 Mc	deling of EV pc	wer train in Solid works:									
	Int	oduction to EV	Power train. Modeling architecture of EV	Powertrain. Model	ing of							
	EV	powertrain con	ponents. Battery pack modeling in solidwo	orks		CO2	(4)					
		F	F									
Unit	5 An	alysis of EV poy	ver train components:									
	Mo	deling and simu	lation of EV powertrain components in AN	SYS.		CO3	(4)					
		8	I I I I I I I I I I I I I I I I I I I	· · · · · ·			. ,					
Unit	6 Sin	nulation of Ther	nal management system for EV									
	Ba	terv manageme	t system modeling, simulation li-ion batter	v pack using MA	ГLAB	CO4	(4)					
		5 0	,				, ,					
Refer	ence Boo	ks										
1.	Julian H	appian-Smith; Tra	nsport Research Laboratory (TRL) Introduction	to Modern Vehicle	Design,	Publish	er:					
	Elsevier	edition 2001										
2.	Heinz H	eisler; Advanced V	/ehicle Technology, Publisher: Butterworth-He	inemann Ltd; 2nd e	dition- J	luly 2002)					
3.	Seth Lei	tman, Bob Brant,	Leitman Seth; Build Your Own Electric Vehicle	Publisher: McGraw	'-Hill - 3'	rd edition	-feb					
	2013											
Refer	ence lin	ks										
1.	https://	www.carbodydes	gn.com/									
2.	https://	www.team-bhp.o	eom/									
3.	https://a	autoprotoway.co	m/automotive-design-process/									
4.	https://	www.carbodydes	gn.com/									
		1	- ·									

$PO \rightarrow$	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

		Govern	ment College of Engineering,	Karad						
		Third Year	(Sem –V) B. Tech. Electrical	Engineerir	ng					
		IMI35.	34:3D modelling and simulati	on Lab						
Laboratory	Scheme:			Examinat	ion Scheme:					
Practical		2 Hrs/week		ISE						
Total Cred	its	1		ESE						
		0)		TOTAL:	50	-				
Course Ou	tcomes (C	0):								
Students wi	ll be able t	0								
CO1	Demons	strate various soft	wares needed for 3D modellin	ıg						
CO2	Design	3D model of EV	components							
CO3	O3 Analysis 3D data with different simulation softwares									
CO4	CO4 Thermal analysis of battery components									
Course Contents										
Experimen	tl	Introduction to S	olidworks			COI				
Experimen	t 2	3D modelling of I	D modelling of EV components							
Experimen	t 3	Drafting of EV co	omponents in solidworks			CO2				
Experimen	t 4	Visualization tech	iniques for 3D data			CO2				
Experimen	t 5	Basic sketching tee	chniques need for EV componen	ts		CO3				
Experimen	t 6	Introduction to AN	SYS AND ABAQUS			CO2				
Experimen	t 7	Introduction to 2D	D meshing,3D meshing			CO2				
Experimen	t 8	Mesh modelling o	of 3D data			CO2				
Experimen	t 9	Modelling and simu	ulation of EV powertrain compone	nts in MAT	LAB	CO1				
Experiment 103D modelling of EV powertrain components in ANSYSC										
Experimen	t 11	simulation of EV	powertrain components inANS	YS		CO3				
Experimen	t 12	Thermal simulation	of EV Battery system in ANSYS			CO4				
List of Sub	mission:									
Minimum n	umber of H	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	Avg
Task I									
Task II									
Task III									
ISE									

			Governmer	nt College of Engineerin	g, Karad						
		Thi	rd Year (Sem	– VI) B. Tech. Mechani	cal Engineering						
		IMI3635:E	V Product Dev	elopment,Homologatio	n and Hydrogen FC	CEV					
Teach	ing Schem	e			Examination Sch	neme					
Lectur	res	02 Hrs/week			MSE		20				
Tutori	als				ISE		20				
Total	Credits	02			ESE		60				
					Duration of ESE		02 Hrs	30 Min			
Prere	quisite : Ba	asics understand	ing of EV								
Cour	se Outcon	nes: After com	pletion of the c	ourse the student will be	able to						
CO1		Explain fund	amentals of EV	business management							
CO2		Classify diffe	rent EV testing	parameters							
CO3		State differen	t product devel	opment methods							
CO4		Describe Hydrogen vehicle and Fuelcell in Hybrid vehicles									
		· · · · · · · · · · · · · · · · · · ·		Course Contents			CO	Hours			
Unit	1 Intro	duction to Bus	iness managem	ent:							
	Intro stand speci	Introduction to EV market and opportunities, EV market categories, regulations and standards, product development plan segment selection, product design plan, product specification-competitor analysis, development methods (4)									
Unit	2 Busin Procuideat	Business plan and product launch: Process of making business plans, different marketing methods, product launch ideation and executionsCO1(4)									
Unit	3 EV t FAN EV c	EV testing and Homologation:FAME India and manufacturing guidelines,, EV certification process, standards forEV charging and retrofitting, EV motor parameter guidelines, batter selection criteria.									
Unit	4 Prod Desig for m produ proto	Product development methods: Design feasibility, Selection of off the shelf parts, product design validation, design for manufacturing, Vehicle dynamics selection, product planning, segment selection, product design plan, product specification, product development methods, working prototyping methods. CO3 (4)									
Unit	5 Intro Intro hydro hydro	duction to Hyc duction to futu ogen, Hydroca ocarbons in IC	lrogen vehicle: re mobility, Wl rbons terms in f engine	ny hydrogen based techno Tuels, energy, flammabili	ology, essentials of ty and safety, use of		CO4	(4)			
Unit	6 Fuel Hydr main fuelin vehic	Fuel cell in Hybrid electric vehicle: Hydrogen fuel cells techniques and systems. fuel cell engine safety and maintenance,Fuel vehicle Acts,codes,Regulations and Guidelines, maintenance and fueling Facility requirements,Fuel cells in Hybrid electric vehicle and pure electric vehicle,Auxiliary power generation using Hydrogen									
D C											
Kefer	ence Books	S		Laborator (TDI)			D. L.P. J				
1.	Julian Hap	pian-Smith; Tra	nsport Research	Laboratory (TRL) Introduct	ion to Modern Vehicle	e Design	, Publish	er:			
2		slar: Advanced V	Ahicle Technolo	av Publisher: Rutterworth	Hoinomann 1+d. and a	dition	101/2 2002)			
<u><u></u>.</u> 2		an Dah Dirai		By, Fublisher, butter wullth	alar Dublishan Marca			-			
J.	Seth Leith	ian, Bob Brant,	Leitman Seth; Bu	ind Your Own Electric Vehic	Lie: Publisher: McGraw	v-HIII - 3	eaition	1-2013			
Keter	ence link	8									
1.	nttps://w	ww.carbodydes	gn.com/								
2.	https://ww	ww.team-bhp.c	com/								
3.	https://au	toprotoway.co	m/automotive-c	lesign-process/							
4.	https://w	ww.carbodydes	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	1	-	-	-	-	2	3	2	1	2	1	2
CO 2	2	-	I	-	-	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

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										
		For	th Year ((Sem – VII) I	B. Tech. Mecha	nical I	Engineering			
				IMI3736:E	V FEA ANALY	YSIS				
Teaching	Schem	e					Examination Sch	eme	1	
Lectures		02 Hrs/week					MSE		20	
Tutorials							ISE		20	
Total Cred	lits	02					ESE		60	
							Duration of ESE		02 Hrs 30 Min	
Prerequis	ite : Ba	sic understandi	ng of EV a	and 3D modell	ing					
Course O	utcome	s:After comple	tion of the	course the stu	dent will be able	to				
		Design and and	alyze struc	cture of Electric	c vehicle					
C02	Demonstrate FEA analysis of EV									
CO3		Analyse EV m	nodel			1		• • • • • • • • • • • • • • • • • • • •		
04		Execute mode	1 testing to	or thermal anal	ysis of radiator an	nd exte	rnal cooling mech	anism	CO	Harris
Unit 1	EV 4	anion and atma			Contents				CO	Hours
Unit I		esign and structure $f EE A / C A$	Clural ana	119818: 1	E A		- 1 T 1	•	CO1	
	Ineo	ry of FEA/CA	E, Procec	ure of impler	nenting FEA /C.	AE an	alysis, introduct	10n to	COI	(4)
TT	hyper	mesh, creatin	ig and mo	difying geom	etry, Geometry	clean	up and defeature	,		
Unit 2	Mesh	model develo	opment us	ing Hyper me	esh:				~~ ^	
	Introduction to 2D meshing, 3D meshing ,element Quality, Mesh Edit, Introduction to CC							CO2	(4)	
	plastic mesh, Introduction 1D meshing, Modal analysis									
Unit 3	FEA analysis for EV engineering with Abaqus:									
	Introc	duction to Aba	iqus softw	vare, fundame	entals of FEA str	ress ,A	About Abaqus			
	Softw	are features, (Create ma	terial and Cre	eate assembly,Ci	create s	steps ,loads , bou	ndary	CO2	(4)
	condi	tions ,Generat	te mesh ,F	Result visualiz	zation,1 D Analy	ysis,Li	inear static analy	sis		
	and li	near buckling	analysis.							
Unit 4	Analy	yze EV dynam	nic and sir	nulation:						
	Basic	s of Finite-Ele	ement An	alysis (FEA)	along with ANS	SYS To	ool and Software	;	CO2	(4)
	Interf	face, Essential	Mechani	cal and Electr	rical Properties of	of Mat	terials, Various C	Case	02	(4)
	Studi	es on ANSYS	Mechani	cal						
Unit 5	CFD	analysis for E	V:							
	Basic	s of Computat	tional Flu	id Dynamics,	Simulation of E	Battery	y Thermal		CO3	(4)
	Mana	igement in Ele	ectric Veh	icle, Vibratio	n and Fatigue A	nalysi	is of Battery Pacl	k,		
Unit 6	Thern	nal analysis of I	EV:		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	•	•			
	Therr	nal Analysis o	of Liquid-	Cooled Radia	tor, CFD Study	of Ex	ternal Cooling		CO4	(4)
	Mech	anism for Bat	tery Pack	•			U			
Reference	Books									
Julian Hap	pian-Sn	nith; Transport	Research	Laboratory (TR	L) Introduction to	o Mode	ern Vehicle Desigr	n, Publis	her: Else	vier-
edition 20	01						C C			
Heinz Heis	ler; Adv	vanced Vehicle	Technolog	gy, Publisher: B	Butterworth-Heine	emann	Ltd; 2nd edition-	July 200)2	
Seth Leitman, Bob Brant, Leitman Seth; Build Your Own Electric Vehicle: Publisher: McGraw-Hill - 3 rd edition-feb 2013										
Reference links										
https://www.carbodydesign.com/										
https://www.team-bhp.com/										
https://aut	toproto	way com/auto	motive_d	esign_process	2/					
https://au	ww carb	odydesign com	n/	esign process	<i>)</i> /					
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	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

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										
		Fort	th Yea	ar (Sem – VI	II) B. Te	ch. Mechanica	l Engineering			
		IM	113837	CYBER SE	ECURITY	Y AND DATA	ANALYSIS			
Teaching	Schem	e					Examination Sch	eme		
Lectures		02 Hrs/week					MSE		20	
Tutorials							ISE		20	
Total Cree	lits	02					ESE		60	
							Duration of ESE		02 Hrs 30 Min	
Prerequisite : Basics understanding of EV										
Course O	utcome	es:After comple	etion of	f the course the	e student v	vill be able to				
C01		Describe Data	a analys	sis techniques	and metho	ods				
<u>CO2</u>		Demonstrate o	of softv	vare involved	<u>in data ana</u>					
CO3		Classify differ	rent tec	hniques of cyt	ber securit	y implementation	n			
C04		Explain differe	rent veh	iicle parking a	ind driving	methods			CO	Hanna
Unit 1	Trating	du ati an ta Dat	40.0m.0l		urse Cont	ents			CO	Hours
Unit I	Intro	duction to Dat	ta anal	ysis: utics and ann	liastion i	n outomotivo in	ductory data analy		COL	
	Introduction to Data analytics and application in automotive industry, data analysis							\$15	COI	(4)
II:4 2	Dete enclosis to de enclosed to de investo									
Unit 2	2 Data analysis tools and techniques:								CO1	(4)
TI ' ' ' '	EV data collection and analysis, data preprocessing, static analysis and of EV data,									
Unit 3	CO2								(4)	
T T •4 4	Over	view of differe	ent sof	tware used for	or data an	alysis.				
Unit 4	Cybe	r security for I	EV sys	stems:						
	Auto	motive megatr	rends,	automotive e	electrical a	and electronics,	automotive softw	are	CO3	(4)
	techn	ology, mobile	e apps	for connected	d vehicles	,				
Unit 5	Vehic	cle parking and	d char	ging Method	s:				CO3	(4)
	vehic	le sharing con	nnected	d parking and	automate	ed parking syst	ems			()
Unit 6	Auto	nomous vehicl	ele syst	ems:					CO4	(4)
	ADA	S and autonor	mous c	lriving, differ	rent vehic	le autonomous	classifications		001	(.)
Reference	e Books	5								
Julian Hap	pian-Sr	nith; Transport	t Resea	rch Laboratory	y (TRL) Inti	roduction to Mo	dern Vehicle Design	, Publis	her: Else	vier-
edition 20	01									
Heinz Heis	Heinz Heisler; Advanced Vehicle Technology, Publisher: Butterworth-Heinemann Ltd; 2nd edition- July 2002									
Seth Leitman, Bob Brant, Leitman Seth; Build Your Own Electric Vehicle: Publisher: McGraw-Hill - 3 rd edition-feb 2013										
Reference links										
https://www.carbodydesign.com/										
https://www.team-bhp.com/										
https://au	toproto	way.com/auto	omotiv	ve-design-pro	ocess/					
https://ww	ww.cark	odydesign.com	n/	<u> </u>						

$PO \rightarrow$	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