RGPV ((DIPL) BHO	OMA WII PAL	NG)	OBE CURRIC	CULUM FOR THE DURSE	FORMA	T-3	S Ne	beet 0. 1/3
Branch			Me	chanical Engineeri	ing	Semester		VI	[
Course	Code			Course Name	HYBRID VE	HICLES			
Course (Dutcon	ne 1	Descr	ribe basics of hybr	id vehicles.		Teac Hrs	h	Marks
Learning	g Outc	ome 11	Expla vehic	ain construction, w les.	vorking of component	ts of hybrid	06+0	0	10
Contents	5		Electr and er impac	ric vehicles: Introdu nvironmental impor et of modern drive-t	action; basics of hybrid tance of hybrid and el trains on energy suppli	l and electric ectric vehicle es.	vehicl s; con	es; s npor	social nents,
Method	of Asse	essment	Theor	ry exam (Part of end	d semester theory exam	n-External)			
Learnin	g Outo	come12	Descr	ribe performance o	characteristics of veh	icles.	06+0	0	10
Contents	5		Basic transr perfoi	s of vehicle perforn nission characterist rmance.	nance, vehicle power s ics, and mathematical	ource charac models to de	terizat scribe	ion, vehi	icle
Method	of Asse	essment	Theor	y exam (Part of end	d semester theory exam	n-External)			
Course	Jutoon	no ?	Expla	ain energy storage	in a hybrid vehicle.	,			
Learning	g Outc	ome 21	Expla	ain energy storage	in electric, hybrid ve	hicles.	06+0	00	10
Content	S		Energ vehic super	y Storage: Basics of les, accumulators of capacitor based ene	of energy storage requi r battery storage, fuel of ergy storage, flywheel	rements in hy cell based ene based energy	vbrid a ergy st v stora;	nd e orag ge.	electric ge,
Method	of Asse	essment	Paper	pen Test (Part of p	rogressive test I - Inter	rnal)		<u> </u>	
Learning	g Outc	ome 22	Expla in a h	ain construction, ty	ypes, properties of ba	ttery used	06+0	00	10
Content	ts		Batter rate, s charae	ry: basics; types; pr state of charge, state cteristics, battery pa	operties. Battery Paran e of discharge, depth o ack design.	neters: Capac f discharge; t	city, di echnic	scha al	arge
Method	of Asse	essment	Theor	ry exam (Part of end	d semester theory exam	n-External)			
Course (Dutcon	ne 3	Expla syster	ain classification, c m of a vehicle.	construction, working	of an electr	ical pı	opu	llsion
Learning	g Outc	ome 31	Expla unit o	ain construction, w components.	orking of electrical p	ropulsion	07+0	00	10
Content	S		Electi vehic requir	ric Propulsion unit: les, DC & AC elect rements;	electric components u rical machines: motor	sed in hybrid and engine ra	and el ating;	lectr	ric
Method	of Asse	essment	Theor	ry exam (Part of end	d semester theory exam	n-External)			
Learning	g Outc	ome 32	Expla used i	ain configuration, in hybrid vehicles.	control of electrical n	notor drives	06+0	00	10

	Configuration and control of DC motor drives, configuration	and con	trol of
Contents Vethod of Assessment Learning Outcome 33 Contents Vethod of Assessment Course Outcome 4 Learning Outcome 41 Contents Vethod of Assessment Learning Outcome 42 Contents Vethod of Assessment Learning Outcome 43 Contents Vethod of Assessment Learning Outcome 44	induction motor drives, configuration and control of perman	ent magn	et motor
	drives, configuration and control of switch reluctance motor	drives, d	rive
Mothed of Aggagement	system efficiency.		
Nethod of Assessment	I neory exam (Part of end semester theory exam-External)	00 15	15
Learning Outcome 33	drives.	00+15	15
Contents	Demonstration of 4 co-ordinate speed control operation for:	DC moto	or drives,
	induction motor drive, permanent magnet motor drive, switc	h relucta	nce
	motor drives.		
Method of Assessment	Laboratory test by observation (Part of end semester practica	al exam-E	External)
Course Outcome 4	Explain drive system of hybrid, electric vehicles.		
Learning Outcome 41	Explain construction, working of electric drive-trains.	06+00	10
	Electric Drive-trains: Basic concept of electric traction, intro	duction t	0
Contents	electric drive-train topologies, power flow control in electric	drive-tra	ain
	topologies, fuel efficiency analysis.		
Method of Assessment	Paper pen Test (Part of progressive test II - Internal)		
Learning Outcome 12	Explain construction, working of hybrid electric drive-	06+00	10
Learning Outcome 42	trains.		
	Hybrid electric drive-trains: basic concept of hybrid traction	, introduc	ction to
Contents	hybrid drive-train topologies, power flow control in hybrid d	lrive-trair	1
	topologies, fuel efficiency analysis.		
Method of Assessment	Quiz (Part of term work)		
Learning Outcome 13	Explain sizing of drive system components of hybrid,	06+00	10
Learning Outcome 45	electric vehicles.	<u> </u>	
Contents	Types: Parallel, series, parallel and series configurations; dri	ve train;	sizing of
	components; basics of micro, mild, mini, plug-in and fully h	ybrid.	
Method of Assessment	Theory exam (Part of end semester theory exam-External)		
Learning Outcome 44	Calculate size of drive system components of hybrid, electric vehicles.	06+00	10
Contents	Sizing the drive system: matching the electric machine and t	he interna	al
	combustion engine (ICE), sizing the propulsion motor, sizing	g the pow	/er
	electronics.		
Method of Assessment	Theory exam (Part of end semester theory exam-External)		
Course Outcome 5	Practice maintenance, servicing of hybrid electric vehicle	es.	
Learning Outcome 51	Practice maintenance, servicing, repairing procedures	00+15	15
	Of Hydrid vehicles. Maintenance of hybrid vehicles: need and types of maintana	nce mair	tenance
Contents	proceedure of ongine, transmission system, electrical system	hroleina	nenance
	and stooring machanism	oraking s	system
Mathad of American	and steering mechanism.		
iviethou of Assessment	Laboratory test by observation (Part of end semester practica	11 exam-E	zxiernal)

Learning Outcome 52	Identify problems, their causes and possible remedies of	00+10	10
Learning Outcome 52	a given faulty hybrid vehicle.		
	Garage and service station for hybrid vehicles: types, layout,	equipme	ent, tools
Contents	and service procedure (problems, causes and remedies).		
Method of Assessment	Laboratory test by observation (Part of lab work -Internal)		
Learning Outcome 53	Identify type, configuration, application of a given hybrid vehicle.	00+10	10
Contents	Case Studies: A hybrid electric vehicle (HEV), A battery ele	ctric vehi	icle
	(BEV).		
Method of Assessment	Laboratory test by observation (Part of lab work -Internal)		

-	RGPV (Dip	loma Wing) Bhopal	SCHEME FOR	LEARNING	Br	anch (Code	Course (Code	CO Code	LO Code	Format No. 4
	× 1	V (Diploma Wing) Bhopal SE E iption Describe basics of hybrid point iption Explain construction, iption Iption Explain construction, iption Iption Iption Explain construction, iption Iption Iption Explain construction, iption Iption <th>OUTC</th> <th>OME</th> <th>М</th> <th>0</th> <th>2</th> <th></th> <th></th> <th>1</th> <th>1</th> <th></th>	OUTC	OME	М	0	2			1	1	
C	OURSE NAME	HYBRID VEHICI	LES								1	1
COI	Description	Describe basics of h	ybrid vehicles.									
LOI	Description	Explain constructio	n, working of compone	nts of hybrid ve	hicles.							
				SCHEME O	F STU	DY						
S. No.	Le	earning Content	Teaching – Learning Method	Description Process	of T-L S	T I	'each Hrs.	Pract. /Tut Hrs.	LF	ls Requir	ed	Remarks
1	Electric vehicles: Introduction; I of hybrid and electric vehicles; s and environmental importance of hybrid and electric vehicles; components, impact of modern of trains on energy supplies.		sics Interactive cial classroom teaching, demonstration, ive- quiz, assignments, tutorial	Teacher will ex the contents an provide handou students. Teach conduct assign quiz/tutorial to students practic knowledge.	xplain d its to her will ments/ make ce their	06		00	Hand board book film.	outs, chal l, PPT, tex , charts, vi	k kt ideo	
				SCHEME OF A	SSESS	MEN	Γ					
S. N	o. Meth	od of Assessment	Description of A	ssessment	Max M	imum arks		Re	sources	Required	d	External / Internal
1	Theo	ory exam	 a) Student will be asked environmental importan and electric vehicles. b) Student will be asked modern drive-trains on a supplies. 	the social and ce of hybrid the impact of energy)5+05		Questio	n paper	+ rating so	cale	External
			ADDITIONAL INSTR	RUCTIONS FO	R THE	HOD	/ FACU	JLTY (IF AN	Y)			
			P	Part of end semes	ter theo	ry exai	m					

RG	SPV (Diplo	ma Wing) Bhopal		SCHEME FOR	LEARNING	Br	anch (Code	Co	urse C	ode	CO Code	LO Code	Format No. 4
				00100	JNE	M	0	2	2			1	2	
CO NA	URSE ME	HYBRID VEHI	CLES											
CO Des	scription	Describe basics of	f hybr	id vehicles.										
LO Des	cription	Describe perform	ance	characteristics of ve	ehicles.									
		1			SCHEME O	F STU	DY							
S. No.	Lear	ming Content	Tea	ching –Learning Method	Description of Process	T-L	Teac Hrs.	h /	Pract. /Tut Hrs.	L	Rs Re	quired		Remarks
1	1 Basics of vehicle performance, vehicle power source characterization, transmission characteristics and mathematical models to describe vehicle performance		Intera teachi quiz, a tutoria	ctive classroom ng, demonstration, assignments, al	Teacher will exp the contents and provide handou students. Teach will conduct assignments/ quiz/tutorial to students practic their knowledge	plain l ts to er make e s.	06		00	Hand board charts	outs, l, PPT, s, videc	chal text book o film.	k <,	
				S	SCHEME OF AS	SSESS	MENI	י						
S. No.	Metho	od of Assessment		Description of As	ssessment	Max M	kimum arks		ŀ	Resour	ces Ree	quired		External / Internal
1	1	Theory exam	Stu der cha	ident will be asked to monstrate performa aracteristics of vehi	nce cles.		10		Ques	stion pa	iper + r	ating scal	e	External
			AD	DITIONAL INSTR	UCTIONS FOR	R THE	HOD/	FAC	CULTY (I	F ANY	<u>()</u>			
				Р	art of end semest	er theo	ory exar	n						

RG	RGPV (Diploma Wing) Bhopal	SCHEM	E FOR LEARN	NING	Br	anch C	ode	Co	ourse Co	ode	CO Code	LO Code	Format No. 4	
		8) I		OUTCOME		M	0	2				2	1	
CO NA	URSE ME	HYBRID VEHIC	LES					1	1		1		1	1
CO Des	cription	Explain energy sto	rage in a hybrid	vehicle.										
LO Des	cription	Explain energy stor	rage in electric,	hybrid vehicles	•									
				SCH	EME O	F STU	DY							
S. No.		Learning Conte	nt	Teaching – Learning Method	Descri H	ption o Process	of T-L	Te: H	ach rs.	Pract /Tut Hrs.	•	LRs Req	uired	Remarks
1	S. No. Learning Content 1 Energy Storage: Basics of energy storage requirements in hybrid and electric vehicles, accumulators or battery storage, fuel cell based energy storage, super capacitor based energy storage, flywheel based energy storage.			Interactive classroom teaching, demonstration , quiz, assignments, tutorial	Teacher the com provide student: will con assignn quiz/tut student: their kn	r will e tents an hando s. Teac nduct nents/ torial to s practi nowledg	xplain nd uts to her o make ce ge.	0	6	00	Ha bo bo fil	andouts, c ard, PPT, ok, charts m	halk text , video	
	1			SCHEM	E OF A	SSESS	MENT							1
S. No.	Metho	od of Assessment	Description	on of Assessmer	nt	Max M	imum arks]	Resour	ces Re	quired		External / Internal
1	Pap	per pen test	asked to describ orage.	be		10	T	est pape	er + Rat	ing sca	le		Internal	
	1		ADDITIONAL	INSTRUCTIO	NS FOF	R THE	HOD/	FACU	LTY (IF ANY)			1
				Part of	of progre	ssive te	est-I							

RG	RGPV (Diploma Wing) Bhopa	oma Wing) Bhopal	SCHEM	E FOR LEAR	NING	Br	anch (Code	Co	ourse Co	ode	CO Code	LO Code	Format No. 4
		8/ 1		OUTCOME		M	0	2				2	2	
	URSE AME	HYBRID VEHIC	CLES						1				1	
CO De	scription	Explain energy stor	rage in a hybrid	vehicle.										
LO Des	scription	Explain construction	on, types, proper	ties of battery u	ised in a	hybrid	l vehic	le.						
				SCH	EME O	F STU	DY							
S. No.		Learning Cont	ent	Teaching – Learning Method	Descri	iption o Process	of T-L	Tea H	ach rs.	Pract. /Tut Hrs.		LRs Req	uired	Remarks
1	INO. Learning Content 1 Battery: basics; types; properties. Battery Parameters: Capacity, discharge rate, state of charge, state of discharge, depth of discharge; technical characteristics, battery pa design.		es. discharge rate, ge, depth of stics, battery pack	Interactive classroom teaching, demonstration , quiz, assignments, tutorial	Teache the cor provide student will co assignr quiz/tu student their kn	er will e ntents an e hando ts. Teac nduct nents/ torial to ts praction nowledge	xplain ad uts to her o make ce ge.	0	6	00	Ha bo fili	indouts, c ard, PPT, ok, charts m.	halk text , video	
				SCHEM	E OF A	SSESS	MENT	Γ	1		1			
S. No.	Meth	nod of Assessment	Descripti	on of Assessmer	nt	Max M	imum arks			Resourc	es Ree	quired		External / Internal
1	Theory exam Theory exam Construction/ t design of batter vehicle.			asked to explain bes/properties/pa v used in a hybrid	ıck d		10		Q	uestion p	aper +	- rating sc	ale	External
			ADDITIONAL	INSTRUCTIO	ONS FO	R THE	HOD	/ FACU	LTY (IF ANY)			<u> </u>
				Part of en	d semes	ter theo	ry exa	m						

RG	PV (Diplo	oma Wing) Bhopal		SCHEME FOI	R LEARNING	Br	anch C	ode	Co	urse Co	ode	CO Code	LO Code	Format No. 4
	` -			OUTC	OME	M	0	2				3	1	
COU NA	URSE ME	HYBRID VEHI	CLES			- '			•	•				
CO Des	cription	Explain classificat	ion, co	onstruction, worki	ng of an electrica	l prop	ulsion s	ystem	of a vel	nicle.				
LO Des	cription	Explain constructi	on, w	orking of electrical	l propulsion unit	compo	onents.							
		1			SCHEME O	F STU	DY							
S. No.	Lear	rning Content	Tea	ching –Learning Method	Description of Process	T-L	Teacl Hrs.	n P /Tu	ract. 1t Hrs.	L	Rs Rec	quired		Remarks
1	S. No. Learning Content 1 Electric Propulsion unit: electric components used in hybrid and electric vehicles, DC & AC electrical machines: motor and engine rating; requirements;		Inter teach demo assig tutor	active classroom ning, onstration, quiz, nments, ial	Teacher will exp the contents and provide handout students. Teache conduct assignm quiz/tutorial to n students practice knowledge.	olain s to er will nents/ nake e their	07		00	Hando PPT, video	outs, ch text bo film.	nalk board ok, chart	1, S,	
					SCHEME OF A	SSESS	MENT							
S. No.	Metho	od of Assessment		Description of A	ssessment	Max M	imum arks		J	Resour	ces Rec	luired		External / Internal
1]	Гheory exam	Stu con ele	ident will be asked nstruction and work ctrical propulsion u	to describe ing of a given nit component.		10		Ques	stion pa	per + ra	ating scal	e	External
			AD	DITIONAL INST	RUCTIONS FOR	R THE	HOD/	FACU	LTY (I	F ANY	`)			
]	Part of end semest	er theo	ry exan	1						

R	GPV (Diple	oma Wing) Bhopal	SCHEME FOR	R LEARNING	Br	anch C	Code	Со	urse C	ode	CO Code	LO Code	Format No. 4
			0010	OME	M	0	2				3	2	
CO N	URSE AME	HYBRID VEHICI	LES			-	·		-				
CO De	escription	Explain classification	n, construction, working	ng of an electrica	l prop	ulsion s	systen	m of a vel	hicle.				
LO De	scription	Explain configuratio	n, control of electrical	motor drives us	ed in h	ybrid v	vehicle	les.					
		1		SCHEME O	F STU	DY							
S. No.	Lea	arning Content	Teaching – Learning Method	Description of Process	T-L	Teacl Hrs.	1] /T	Pract. Fut Hrs.		LRs I	Required		Remarks
1	Configurat motor drive control of i drives, con of permane drives, con of switch re drives, drive	ion and control of DC es, configuration and induction motor figuration and control ent magnet motor figuration and control eluctance motor we system efficiency.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will exp the contents and provide handout students. Teacher conduct assignm quiz/tutorial to r students practice knowledge.	olain es to er will nents/ nake e their	06		00	Hando text b film,	outs, ch ook, ch and lab	halk board harts, vide manual.	l, PPT, o	
				SCHEME OF A	SSESS	MENT	1						
S. No.	Meth	od of Assessment	Description of A	ssessment	Max M	timum arks		I	Resour	ces Re	quired		External / Internal
1	Th	eory exam	Student will be asked configuration, control motor drives used in h	to describe of electrical ybrid vehicles.		10		Que	estion _I	paper +	rating sca	ale	External
			ADDITIONAL INST	RUCTIONS FO	R THE	HOD/	FAC	CULTY (I	F ANY	<i>(</i>)			
]	Part of end semest	ter theo	ory exar	n						

RG	PV (Diplo	oma Wing) Bhopal	SCHEME FO	R LEARNING	Br	anch C	ode	Co	urse C	ode	CO Code	LO Code	Format No. 4
	× I	8/ 1	OUTC	COME	M	0	2				CO Code LO Code 3 3 ut LRs Handouts, cl board, PPT, book, charts video film. equired hedule/check-list ubrics	3	
COU NA	URSE ME	HYBRID VEHIC	LES							1	1	1	1
CO Des	cription	Explain classification	on, construction, work	ing of an electric	cal prop	ulsion s	syste	em of a ve	hicle.				
LO Des	cription	Perform speed cont	rol operation on electr	ic motor drives.									
		1		SCHEME ()F STU	DY							
S. No.		Learning Co	ntent	Teaching – Learning Method	Descr T-L	iption o Process	of ;	Teach Hrs.	Prac H	ct. /Tut Irs.	LRs	Require	ed Remarks
1	Demonstration of 4 co-ordinate speed control operation for: DC motor drives, induction motor of permanent magnet motor drive, switch reluctance motor drives		speed control induction motor drive, switch reluctance	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teache explain conten provid handou studen Teache condue assign quiz/tu make s practic knowl	er will n the ats and le uts to ts. er will ct ments/ atorial to students ce their edge.	0	00		15	Hando board, book, video	outs, chal PPT, tex charts, film.	k <t< td=""></t<>
	1			SCHEME OF A	SSESS	MENT							
S. No.	Meth	od of Assessment	Description of A	Assessment	Max Ma	imum arks		F	Resour	ces Req	uired		External / Internal
1	I c	Laboratory test by observation	Student will be asked speed control operation electric motor drive.	to perform on on a given		15		Ob /rat	servati	on sche ales /rub	dule/chec prics	k-list	External
			ADDITIONAL INST	RUCTIONS FO	R THE	HOD/	FAC	CULTY (I	F ANY	<u>(</u>)			
			F	Part of end semest	er practi	cal exa	m						

RG	SPV (Dipl	oma Wing) Bhopal		SCHEME FOR LEAF	RNING	Br	anch (Code	Co	ourse (Code	CO Code	LO Code	Format No. 4
		8 / 1		OUTCOME		M	0	2				4	1	_
CO NA	URSE AME	HYBRID VEHIC	CLES					I		-				1
CO Des	scription	Explain drive syste	m of hyb	rid, electric vehicles.										
LO Des	scription	Explain construction	on, worki	ing of electric drive-tra	ains.									
				SC	HEME O	F STU	DY							
S. No.		Learning Content		Teaching – Learning Method	Descri	ption o Process	f T-L	Teac Hrs	h . /	Pract Tut H	rs.	LRs Req	uired	Remarks
1	Electric I electric tr drive-trai control in topologie	Drive-trains: Basic con action, introduction to n topologies, power f electric drive-train s, fuel efficiency anal	ncept of o electric low lysis.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher the cont provide students will cor assignm quiz/tut students their kn	tents an handou s. Teach nduct nents/ orial to s practic owledg	plain d its to ier make ce e.	06		00	H b b f	Handouts, c poard, PPT, pook, charts ilm.	halk text , video	
				SCHEM	ME OF A	SSESS	MEN	Γ						
S. No.	Meth	od of Assessment	D	escription of Assessme	ent	Max M	imum arks			Resour	rces R	equired		External / Internal
1]	Paper pen test	Student constru electric	will be asked to explai action, working of a give drive-train.	n ven		10		Test	paper	+ Rati	ng scale		Internal
			ADDIT	TIONAL INSTRUCTI	ONS FO	R THE	HOD	' FACUI	LTY (IF AN	Y)			1
				Part	of progre	ssive te	st-II							

RG	RGPV (Diploma Wing) Bhopal		SCHEME FOR	R LEARNING	Br	anch C	ode	Co	ourse Co	ode	CO Code	LO Code	Format No. 4	
				0010	OME	M	0	2				4	2	
CO NA	URSE ME	HYBRID VEHI	CLES				-							·
CO Des	cription	Explain drive systemeters and the systemeters of th	em of l	hybrid, electric vel	hicles.									
LO Des	cription	Explain constructi	on, wo	orking of hybrid el	ectric drive-train	ns								
		1			SCHEME O	F STU	DY							
S. No.	Lea	rning Content	Tea	ching –Learning Method	Description of Process	T-L	Teach Hrs.	۱ [/]	Pract. Fut Hrs.	L	Rs Re	quired		Remarks
1	 Hybrid electric drive-trains: basic concept of hybrid traction, introduction to hybrid drive-train topologies power flow control in hybrid drive-train topologies, fuel efficiency analysis. 		Interac teachin quiz, a tutoria	ctive classroom ng, demonstration, assignments, l	Teacher will exp the contents and provide handout students. Teacher conduct assignm quiz/tutorial to r students practice knowledge.	blain s to er will nents/ nake e their	06		00	Handou PPT, te video fi	its, cha xt boo ilm,	alk board, k, charts,		
					SCHEME OF A	SSESS	MENT							
S. No.	Meth	od of Assessment		Description of A	ssessment	Max M	arks			Resourc	es Re	quired		External / Internal
1	(Quiz	Exp give	lain construction, n <mark>hybrid</mark> electric d	working of a Irive-train.		10		Test	paper +	Ratin	g scale		Internal
			AD	DITIONAL INST	RUCTIONS FOI	R THE	HOD/	FAC	ULTY (IF ANY)			
					Part of ter	m work	2							

RGPV (Diploma Wing) Bhopal			SCHEME FOR LEARNING			Branch Code			Course Code			LO Code	Format No. 4		
				OUTCOME			0	2				4	3		
CO NA	URSE ME	STRENGTH OF	MA	TERIALS											
CO Des	scription	Explain drive syst	em o	a of hybrid, electric vehicles.											
LO Des	scription	Explain sizing of c	lrive	system components of	hybrid, electr	ic vehi	cles.								
					SCHEME O	F STU	DY								
S. No. Learning Content				Teaching –Learning Method	Description Proce	of T-1 ss	L T I	each Irs.	Pract. /Tut Hrs	•	LRs Required			Remarks	
1	1 Types: Parallel, series, parallel and series configurations; drive train; sizing of components; basics of micro, mild, mini, plug- in and fully hybrid.			Interactive classroom teaching, demonstration, quiz, assignments, Tutorial	Teacher will the contents provide hand students. Tea will conduct assignments/ quiz/tutorial students prac their knowle	explai and louts to acher to mak ctice dge.	n Od	5	00	Ha PP vic	ndouts T, text leo film	, chalk bo book, cha ı.			
	-			SC	HEME OF A	SSESS	MEN	Т							
S. No.	Metho	od of Assessment		Description of Asse	essment	N	laxim Mark	um s	Resources Required					External / Internal	
1	Theory ex	kam	Stu cor	dent will be asked to size nponent of hybrid/elect	e of drive ric vehicles.	e 10			Question paper + rating scale					External	
	ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)														
				Part	of end semest	er theo	ry exa	ım							

RGPV (Diploma Wing) Bhopal				SCHEME FOR LEARNING			ranch	Code	Course (Code	ode CO Code		Format No. 4	
				OUICOME			0	2			4	4		
COU NA	URSE ME	HYBRID VEHIC	CLES						1				1	
CO Des	cription	Explain drive syste	m of hyb	orid, electric vehicles.										
LO Des	cription	Calculate size of dr	rive syste	m components of hyb	orid, electr	ic vehi	icles.							
				SC	CHEME O	F STU	DY							
S. No. Learning Content			Teaching – Learning Method	Description of T-I Process			Teac h Hrs.	Pract. /Tut Hrs.	LRs Required		Remarks			
1	1 Sizing the drive system: matching the electric machine and the internal combustion engine (ICE), sizing the propulsion motor, sizing the power electronics.			classroom teaching, demonstration, quiz, assignments, tutorial to make students practice their knowledge.				06	00	board, PPT, text book, charts, video film.				
				SCHE	ME OF A	SSESS	SMEN	T						
S. No.	Meth	od of Assessment	E	Description of Assessn	nent	Ma M	ximun [arks	n	Resou	rces Re	quired		External / Internal	
1	,	Theory exam Student will be asked to calculate siz of the propulsion motor, power electronics.					10		Question p	paper + 1	cating scale	e	External	
	ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
				Part of	end semest	ter theo	ory exa	am						

RGPV (Diploma Wing) Bhopal				SCHEME FOI	Branch Code				e Course Code		CO Code	LO Code	Format No. 4		
	_			ourc	M	0		2				5	1		
CO NA	URSE AME	HYBRID VEHI	CLES												
CO Des	scription	Practice maintena	nce, s	ervicing of hybrid	electric vehicles.										
LO Des	scription	Practice maintenan	ce, ser	vicing, repairing pr	ocedures of hybri	d vehic	eles.								
					SCHEME O	F STU	DY								
S. No.	Lea	rning Content	Tea	eaching –Learning Description of Method Process			L Teach Pr Hrs. /Tu			act. Hrs.	L	Rs Re	quired		Remarks
1	Maintenance of hybrid vehicles: need and types of maintenance, maintenance procedure of engine, transmission system, electrical system, braking system and steering mechanism.			active classroom ning, onstration, quiz, gnments, ial.	Teacher will exp the contents and provide handout students. Teacher conduct assignm quiz/tutorial to r students practice knowledge.	s to er will nents/ nake e their			15		PPT, text book, charts, video film. Lab manual			d, s, al	
					SCHEME OF A	SSESS	MEN'	Г							
S. No.	Meth	od of Assessment		Description of A	ssessment	Max M	kimum arks	l	Resources Required						External / Internal
1	Laborator observatio	ry test by on	Stu ma of	ident will be asked intenance, servicing a given hybrid vehi	to perform g and repairing cle.	15			Observation sc /rating scales /n			on sche ales /ru	edule/cheo brics	External	
	ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)														
				Р	art of end semeste	er pract	ical ex	am							

RGPV (Diploma Wing) Bhopal				SCHEME FOR LEARNING			anch (Code	Co	Course Code			LO Code	Format No. 4
				OUTC	M	0	2				5	2		
CO NA	URSE AME	HYBRID VEHIC	CLES											
CO Des	scription	Practice maintena	nce, se	ervicing of hybrid	electric vehicles.									
LO Des	scription	Identify problems, t	heir ca	uses and possible 1	remedies of a give	n fault	y hybri	d vehi	icle.					
					SCHEME O	F STU	DY							
S. No.	Lea	rning Content	Tea	ching –Learning Method	Description of Process	T-L	Teac Hrs.	h . /1	Pract. Fut Hrs.	LRs Required				Remarks
1	1 Garage and service station for hybrid vehicles: types, layout equipment, tools and service procedure (problems, causes and remedies).		Intera teach demo assig tutori	active classroom ing, onstration, quiz, nments, ial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.		00		10	10 Handouts, chalk board, PPT, text book, charts, video film and lab manual.			l, PPT, eo film	
	-				SCHEME OF A	SSESS	MENT	Γ						
S. No.	Meth	od of Assessment		Description of A	ssessment	Max M	kimum arks		ŀ	Resour	ces Re	External / Internal		
1	La	aboratory test by observation	Stu pro rem veh	dent will be asked blems, their causes nedies of a given fa hicle.	identify and possible ulty hybrid	10			Observation schedule/check-list /rat scales /rubrics			rating	Internal	
	ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
					Part of lal	o work								

RGPV (Diploma Wing) Bhopal				SCHEME FOR LEARNING OUTCOME			anch C	Code	Co	Course Code			LO Code	Format No. 4
							0	2				5	3	
COU NA	URSE ME	HYBRID VEHI	CLES											
CO Des	cription	Practice maintena	nce ar	nd servicing of hyb	rid electric vehic	les.								
LO Des	cription	Identify type, confi	guratio	on, application of a	given hybrid vehi	cle.								
					SCHEME O	F STU	DY							
S. No.	Lea	rning Content	Теа	ching –Learning Method	Description of Process	T-L	Teacl Hrs.	1 /'	Pract. Tut Hrs.		LRs	Required	ired Rema	
1	Case Studies: A hybrid Ir electric vehicle (HEV), A te battery electric vehicle de (BEV). T		Inter teach demo assig Tuto	ractive classroom ching, nonstration, quiz, ignments, orial. Teacher will exp the contents and provide handouts students. Teache conduct assignm quiz/tutorial to n students practice knowledge.		plain 00 1 ts to er will nents/ make te their			10	Handouts, chalk board, PPT, text book, charts, video film and lab manual.				
	1		1		SCHEME OF A	SSESS	MENI			1				1
S. No.	Meth	od of Assessment		Description of A	ssessment	Max M	timum arks		F	Resour	ces Ree	quired		External / Internal
1	Lal	boratory test by observation	Stu con hyl	ident will be asked to ifiguration, applicato id/electric vehicle		10	Observation schedule/check-l scales /rubrics			heck-list / ics	rating	Internal		
			AD	DITIONAL INST	RUCTIONS FOR	R THE	HOD/	FAC	CULTY (I	F ANY	<u>()</u>			1
					Part of lal	o work								

SEMESTER: SIXTH SEMESTER

DIPLOMA IN **MECHANICAL ENGINEERING** SE SCHEME: **OCBC** COURSE CODE: NAME OF THE COURSE: **HYBRID VEHICLES** LIST OF SUGGESTED EXPERIMENTS

a	
S .	NAME OF EXPERIMENTS
NO.	
1	Demonstration of construction and working of components of an electric vehicle
2	Demonstration of construction and working of components of an hybrid vehicle
3	Demonstration of 4 co-ordinate speed control operation for DC motor drive
4	Demonstration of 4 co-ordinate speed control operation for induction motor drive
5	Demonstration of 4 co-ordinate speed control operation for permanent magnet motor drive
6	Demonstration of 4 co-ordinate speed control operation for, switch reluctance motor drive
7	Servicing of hybrid vehicles
8	Engine tuning and adjustment for hybrid vehicles
9	Identification of starting troubles and their rectifications for electrical vehicles
10	Identification of starting troubles and their rectifications for hybrid vehicles
11	Battery servicing and charging.
12	Study of a electrical vehicle servicing centre:
	(a) Layout (b) Instruments/ Tools used (c) Servicing procedures.
13	Visit of a local hybrid vehicle service centre and prepare a report in respect of:
	(a) Layout (b) Instruments/ Tools used (c) Servicing/ Reconditioning/ Maintenance procedure.
14	Collect specifications for available hybrid vehicles and prepare a comparison table and their
	manuals.