

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE		FORMAT-3	Sheet No. 1/3
Branch	Mechanical Engineering			Semester	VI
Course Code		Course Name	HYBRID VEHICLES		
Course Outcome 1	Describe basics of hybrid vehicles.			Teach Hrs	Marks
Learning Outcome 11	Explain construction, working of components of hybrid vehicles.			06+00	10
Contents	Electric vehicles: Introduction; basics of hybrid and electric vehicles; social and environmental importance of hybrid and electric vehicles; components, impact of modern drive-trains on energy supplies.				
Method of Assessment	Theory exam (Part of end semester theory exam-External)				
Learning Outcome12	Describe performance characteristics of vehicles.			06+00	10
Contents	Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.				
Method of Assessment	Theory exam (Part of end semester theory exam-External)				
Course Outcome 2	Explain energy storage in a hybrid vehicle.				
Learning Outcome 21	Explain energy storage in electric, hybrid vehicles.			06+00	10
Contents	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.				
Method of Assessment	Paper pen Test (Part of progressive test I - Internal)				
Learning Outcome 22	Explain construction, types, properties of battery used in a hybrid vehicle.			06+00	10
Contents	Battery: basics; types; properties. Battery Parameters: Capacity, discharge rate, state of charge, state of discharge, depth of discharge; technical characteristics, battery pack design.				
Method of Assessment	Theory exam (Part of end semester theory exam-External)				
Course Outcome 3	Explain classification, construction, working of an electrical propulsion system of a vehicle.				
Learning Outcome 31	Explain construction, working of electrical propulsion unit components.			07+00	10
Contents	Electric Propulsion unit: electric components used in hybrid and electric vehicles, DC & AC electrical machines: motor and engine rating; requirements;				
Method of Assessment	Theory exam (Part of end semester theory exam-External)				
Learning Outcome 32	Explain configuration, control of electrical motor drives used in hybrid vehicles.			06+00	10

Contents	Configuration and control of DC motor drives, configuration and control of induction motor drives, configuration and control of permanent magnet motor drives, configuration and control of switch reluctance motor drives, drive system efficiency.		
Method of Assessment	Theory exam (Part of end semester theory exam-External)		
Learning Outcome 33	Perform speed control operation on electric motor drives.	00+15	15
Contents	Demonstration of 4 co-ordinate speed control operation for: DC motor drives, induction motor drive, permanent magnet motor drive, switch reluctance motor drives.		
Method of Assessment	Laboratory test by observation (Part of end semester practical exam-External)		
Course Outcome 4	Explain drive system of hybrid, electric vehicles.		
Learning Outcome 41	Explain construction, working of electric drive-trains.	06+00	10
Contents	Electric Drive-trains: Basic concept of electric traction, introduction to electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.		
Method of Assessment	Paper pen Test (Part of progressive test II - Internal)		
Learning Outcome 42	Explain construction, working of hybrid electric drive-trains.	06+00	10
Contents	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.		
Method of Assessment	Quiz (Part of term work)		
Learning Outcome 43	Explain sizing of drive system components of hybrid, electric vehicles.	06+00	10
Contents	Types: Parallel, series, parallel and series configurations; drive train; sizing of components; basics of micro, mild, mini, plug-in and fully hybrid.		
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 the internal combustion engine (ICE), sizing the propulsion motor, sizing the power electronics.		
Method of Assessment	Theory exam (Part of end semester theory exam-External)		
Course Outcome 5	Practice maintenance, servicing of hybrid electric vehicles.		
Learning Outcome 51	Practice maintenance, servicing, repairing procedures of hybrid vehicles.	00+15	15
Contents	Maintenance of hybrid vehicles: need and types of maintenance, maintenance procedure of engine, transmission system, electrical system, braking system and steering mechanism.		
Method of Assessment	Laboratory test by observation (Part of end semester practical exam-External)		

Learning Outcome 52	Identify problems, their causes and possible remedies of a given faulty hybrid vehicle.	00+10	10
Contents	Garage and service station for hybrid vehicles: types, layout, equipment, tools 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 electric vehicle (BEV).		
Method of Assessment	Laboratory test by observation (Part of lab work -Internal)		

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code		Course Code		CO Code	LO Code	Format No. 4
					<i>M</i>	<i>0</i>	<i>2</i>			<i>1</i>	
COURSE NAME	HYBRID VEHICLES										
CO Description	Describe basics of hybrid vehicles.										
LO Description	Explain construction, working of components of hybrid vehicles.										
SCHEME OF STUDY											
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks		
1	Electric vehicles: Introduction; basics of hybrid and electric vehicles; social and environmental importance of hybrid and electric vehicles; components, impact of modern drive-trains on energy supplies.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film.					
SCHEME OF ASSESSMENT											
S. No.	Method of Assessment	Description of Assessment		Maximum Marks	Resources Required				External / Internal		
1	Theory exam	a) Student will be asked the social and environmental importance of hybrid and electric vehicles. b) Student will be asked the impact of modern drive-trains on energy supplies.		05+05	Question paper + rating scale				External		
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)											
Part of end semester theory exam											

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					M	0	2				1	2	
COURSE NAME		HYBRID VEHICLES											
CO Description		Describe basics of hybrid vehicles.											
LO Description		Describe performance characteristics of vehicles.											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks						
1	Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal								
1	Theory exam	Student will be asked to demonstrate performance characteristics of vehicles.	10	Question paper + rating scale	External								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of end semester theory exam													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					<i>M</i>	<i>0</i>	<i>2</i>				<i>2</i>	<i>1</i>	
COURSE NAME	HYBRID VEHICLES												
CO Description	Explain energy storage in a hybrid vehicle.												
LO Description	Explain energy storage in electric, hybrid vehicles.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required						Remarks	
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 will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required				External / Internal					
1	Paper pen test	Student will be asked to describe given energy storage.	10	Test paper + Rating scale				Internal					
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of progressive test-I													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					M	0	2				2	2	
COURSE NAME		HYBRID VEHICLES											
CO Description		Explain energy storage in a hybrid vehicle.											
LO Description		Explain construction, types, properties of battery used in a hybrid vehicle.											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks						
1	Battery: basics; types; properties. Battery Parameters: Capacity, discharge rate, state of charge, state of discharge, depth of discharge; technical characteristics, battery pack design.	Interactive classroom teaching, demonstration , quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal								
1	Theory exam	Student will be asked to explain construction/ types/properties/pack design of battery used in a hybrid vehicle.	10	Question paper + rating scale	External								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of end semester theory exam													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					<i>M</i>	<i>0</i>	<i>2</i>				<i>3</i>	<i>1</i>	
COURSE NAME	HYBRID VEHICLES												
CO Description	Explain classification, construction, working of an electrical propulsion system of a vehicle.												
LO Description	Explain construction, working of electrical propulsion unit components.												
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks				
1	Electric Propulsion unit: electric components used in hybrid and electric vehicles, DC & AC electrical machines: motor and engine rating; requirements;	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	07	00	Handouts, chalk board, PPT, text book, charts, video film.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment		Maximum Marks	Resources Required			External / Internal					
1	Theory exam	Student will be asked to describe construction and working of a given electrical propulsion unit component.		10	Question paper + rating scale			External					
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of end semester theory exam													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					<i>M</i>	<i>0</i>	<i>2</i>				<i>3</i>	<i>2</i>	
COURSE NAME		HYBRID VEHICLES											
CO Description		Explain classification, construction, working of an electrical propulsion system of a vehicle.											
LO Description		Explain configuration, control of electrical motor drives used in hybrid vehicles.											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks				
1	Configuration and control of DC motor drives, configuration and control of induction motor drives, configuration and control of permanent magnet motor drives, configuration and control of switch reluctance motor drives, drive system efficiency.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film, and lab manual.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required			External / Internal						
1	Theory exam	Student will be asked to describe configuration, control of electrical motor drives used in hybrid vehicles.	10	Question paper + rating scale			External						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of end semester theory exam													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME		Branch Code			Course Code			CO Code	LO Code	Format No. 4
				<i>M</i>	<i>0</i>	<i>2</i>				3	3	
COURSE NAME	HYBRID VEHICLES											
CO Description	Explain classification, construction, working of an electrical propulsion system of a vehicle.											
LO Description	Perform speed control operation on electric motor drives.											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks					
1	Demonstration of 4 co-ordinate speed control operation for: DC motor drives, induction motor drive, permanent magnet motor drive, switch reluctance motor drives	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	00	15	Handouts, chalk board, PPT, text book, charts, video film.						
SCHEME OF ASSESSMENT												
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required			External / Internal					
1	Laboratory test by observation	Student will be asked to perform speed control operation on a given electric motor drive.	15	Observation schedule/check-list /rating scales /rubrics			External					
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)												
Part of end semester practical exam												

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					M	0	2				4	1	
COURSE NAME		HYBRID VEHICLES											
CO Description		Explain drive system of hybrid , electric vehicles.											
LO Description		Explain construction, working of electric drive-trains.											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks						
1	Electric Drive-trains: Basic concept of electric traction, introduction to electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required			External / Internal						
1	Paper pen test	Student will be asked to explain construction, working of a given electric drive-train.	10	Test paper + Rating scale			Internal						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of progressive test-II													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					M	0	2				4	2	
COURSE NAME		HYBRID VEHICLES											
CO Description		Explain drive system of hybrid, electric vehicles.											
LO Description		Explain construction, working of hybrid electric drive-trains											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	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.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film,							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required			External / Internal						
1	Quiz	Explain construction, working of a given hybrid electric drive-train.	10	Test paper + Rating scale			Internal						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of term work													

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME		Branch Code		Course Code		CO Code	LO Code	Format No. 4
				<i>M</i>	<i>0</i>	<i>2</i>		<i>4</i>	<i>3</i>	
COURSE NAME	STRENGTH OF MATERIALS									
CO Description	Explain drive system of hybrid, electric vehicles.									
LO Description	Explain sizing of drive system components of hybrid, electric vehicles.									
SCHEME OF STUDY										
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks	
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 explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film.				
SCHEME OF ASSESSMENT										
S. No.	Method of Assessment	Description of Assessment		Maximum Marks	Resources Required			External / Internal		
1	Theory exam	Student will be asked to size of drive component of hybrid/electric vehicles.		10	Question paper + rating scale			External		
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)										
Part of end semester theory exam										

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME		Branch Code			Course Code			CO Code	LO Code	Format No. 4
				<i>M</i>	<i>0</i>	<i>2</i>				<i>4</i>	<i>4</i>	
COURSE NAME	HYBRID VEHICLES											
CO Description	Explain drive system of hybrid, electric vehicles.											
LO Description	Calculate size of drive system components of hybrid, electric vehicles.											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks			
1	Sizing the drive system: matching the electric machine and the internal combustion engine (ICE), sizing the propulsion motor, sizing the power electronics.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/quiz/tutorial to make students practice their knowledge.	06	00	Handouts, chalk board, PPT, text book, charts, video film.						
SCHEME OF ASSESSMENT												
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required			External / Internal					
1	Theory exam	Student will be asked to calculate size of the propulsion motor, power electronics.	10	Question paper + rating scale			External					
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)												
Part of end semester theory exam												

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME		Branch Code			Course Code			CO Code	LO Code	Format No. 4
				<i>M</i>	<i>0</i>	<i>2</i>				<i>5</i>	<i>1</i>	
COURSE NAME	HYBRID VEHICLES											
CO Description	Practice maintenance, servicing of hybrid electric vehicles.											
LO Description	Practice maintenance, servicing , repairing procedures of hybrid vehicles.											
SCHEME OF STUDY												
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks			
1	Maintenance of hybrid vehicles: need and types of maintenance, maintenance procedure of engine, transmission system, electrical system, braking system and steering mechanism.	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	00	15	Handouts, chalk board, PPT, text book, charts, video film. Lab manual						
SCHEME OF ASSESSMENT												
S. No.	Method of Assessment	Description of Assessment		Maximum Marks	Resources Required				External / Internal			
1	Laboratory test by observation	Student will be asked to perform maintenance, servicing and repairing of a given hybrid vehicle.		15	Observation schedule/check-list /rating scales /rubrics				External			
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)												
Part of end semester practical exam												

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME		Branch Code		Course Code		CO Code	LO Code	Format No. 4
				<i>M</i>	<i>0</i>	<i>2</i>			5	
COURSE NAME	HYBRID VEHICLES									
CO Description	Practice maintenance, servicing of hybrid electric vehicles.									
LO Description	Identify problems, their causes and possible remedies of a given faulty hybrid vehicle.									
SCHEME OF STUDY										
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required			Remarks	
1	Garage and service station for hybrid vehicles: types, layout, equipment, tools and service procedure (problems, causes and remedies).	Interactive classroom teaching, demonstration, quiz, assignments, tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	00	10	Handouts, chalk board, PPT, text book, charts, video film and lab manual.				
SCHEME OF ASSESSMENT										
S. No.	Method of Assessment	Description of Assessment		Maximum Marks	Resources Required			External / Internal		
1	Laboratory test by observation	Student will be asked identify problems, their causes and possible remedies of a given faulty hybrid vehicle.		10	Observation schedule/check-list /rating scales /rubrics			Internal		
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)										
Part of lab work										

RGPV (Diploma Wing) Bhopal		SCHEME FOR LEARNING OUTCOME			Branch Code			Course Code			CO Code	LO Code	Format No. 4
					M	0	2				5	3	
COURSE NAME		HYBRID VEHICLES											
CO Description		Practice maintenance and servicing of hybrid electric vehicles.											
LO Description		Identify type, configuration, application of a given hybrid vehicle.											
SCHEME OF STUDY													
S. No.	Learning Content	Teaching –Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks						
1	Case Studies: A hybrid electric vehicle (HEV), A battery electric vehicle (BEV).	Interactive classroom teaching, demonstration, quiz, assignments, Tutorial.	Teacher will explain the contents and provide handouts to students. Teacher will conduct assignments/ quiz/tutorial to make students practice their knowledge.	00	10	Handouts, chalk board, PPT, text book, charts, video film and lab manual.							
SCHEME OF ASSESSMENT													
S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal								
1	Laboratory test by observation	Student will be asked to identify type, configuration, application of a given hybrid/electric vehicle.	10	Observation schedule/check-list /rating scales /rubrics	Internal								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)													
Part of lab work													

DIPLOMA IN MECHANICAL ENGINEERING

SEMESTER: SIXTH SEMESTER

SCHEME: OCBC COURSE CODE:

NAME OF THE COURSE: HYBRID VEHICLES

LIST OF SUGGESTED EXPERIMENTS

S. NO.	NAME OF EXPERIMENTS
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.