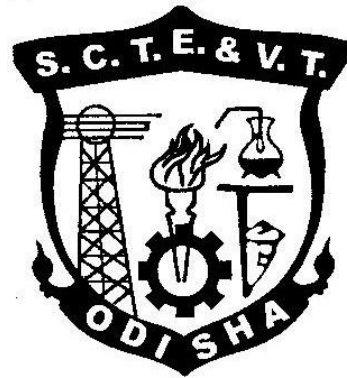


# **CURRICULLUM OF 6<sup>TH</sup> SEMESTER**

**For**

**DIPLOMA IN MECHANICAL  
ENGINEERING AUTOMOBILE**

**(Effective FROM 2020-21 Sessions)**



**STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,  
ODISHA, BHUBANESWAR**

## STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

**TEACHING AND EVALUATION SCHEME FOR 6th Semester (Mechanical Engg.Automobile.) (wef 2020-21)**

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
<b>Theory</b>									
Th.1		INDUSTRIAL ENGINEERING & MANAGEMENT	4		-	20	80	3	100
Th.2		AUTOMOBILE ENGINEERING AND HYBRID VEHICLES	4		-	20	80	3	100
Th.3		ELECTRIC VEHICLE	4		-	20	80	3	100
Th.4		ELECTIVE (any One)	4			20	80	3	100
Th.4a)		COMPOSITE MATERIALS							
Th.4b)		ADVANCE MANUFACTURING PROCESSES							
<i>Total</i>			16			80	320	-	400
<b>Practical</b>									
Pr.1		AUTOMOBILE ENGINEERING LAB	-	-	4	25	50	3	75
Pr.2		ELECTRIC VEHICLE LAB	-	-	4	25	50	3	75
Pr.3		PROJECT WORK PHASE -II			10	75	100	3	175
Pr.4		LIFE SKILL	-	-	2	25	-	-	25
		STUDENT CENTERED ACTIVITIES (SCA)			3				
<i>Total</i>			-	-	23	150	200	-	350
<b>Grand Total</b>			<b>20</b>	<b>-</b>	<b>19</b>	<b>200</b>	<b>550</b>	<b>-</b>	<b>750</b>

Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

**SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.**

**There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester**

## TH1. INDUSTRIAL ENGINEERING & MANAGEMENT

Name of the Course: Diploma in MECHANICAL AUTOMOBILE ENGINEERING			
Course code:		Semester	6 <sup>TH</sup> (SIXTH)
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

### A. RATIONALE:

Main objective of Mechanical Automobile Engineering is to produce goods and services for benefit to mankind. Such productions are done utilizing various resources like Men, Materials, machines and Money. Industrial engineering and quality control is the subject which allows optimized use of such resources and hence very important for a mechanical automobile engineer.

### B. COURSE OBJECTIVES:

After undergoing this course, the students will be able to:

1. Identify the place for a new plant set up and systematic arrangement of machinery and shop for smooth production.
2. Take right decisions to optimize resources utilizations by improving productivity of the lands ,buildings,people,material,machines,money,methods and management effectively.
3. Understanding of stock management and maintenance to reduce plant ideal time.
- 4 To use the charts to record the quality of products.
- 5.To eliminate unproductive activities under the control of the management, supervisor, worker and the design of products and processes.

## C. CHAPTER WISE DISTRIBUTION OF PERIODS

SI No.	Topic	Periods
1	PLANT ENGINEERING	10
2	OPERATIONS RESEARCH	10
3	INVENTORY CONTROL	10
4	INSPECTION AND QUALITY CONTROL	15
5	PRODUCTION PLANNING AND CONTROL	15

## D. COURSE CONTENT

### 1. PLANT ENGINEERING:

- 1.1 Selection of Site of Industry.
- 1.2 Define plant layout.
- 1.3 Describe the objective and principles of plant layout.
- 1.4 Explain Process Layout, Product Layout and Combination Layout.
- 1.5 Techniques to improve layout.
- 1.6 Principles of material handling equipment.

1.7 Plant maintenance.

1.7.1 Importance of plant maintenance.

1.7.2 Break down maintenance.

1.7.3 Preventive maintenance.

1.7.4 Scheduled maintenance.

## **2. OPERATIONS RESEARCH:**

2.1 Introduction to Operations Research and its applications.

2.2 Define Linear Programming Problem,

2.3 Solution of L.P.P. by graphical method.

2.4 Evaluation of Project completion time by Critical Path Method and PERT (Simple problems)-

2.5 Explain distinct features of PERT with respect to CPM.

## **3. INVENTORY CONTROL:**

3.1 Classification of inventory.

3.2 Objective of inventory control.

3.3 Describe the functions of inventories.

3.4 Benefits of inventory control.

3.5 Costs associated with inventory.

3.6 Terminology in inventory control

3.7 Explain and Derive economic order quantity for Basic model. (Solve numerical)

3.8 Define and Explain ABC analysis.

## **4. INSPECTION AND QUALITY CONTROL:**

4.1 Define Inspection and Quality control.

4.2 Describe planning of inspection.

4.3 Describe types of inspection.

4.4 Advantages and disadvantages of quality control.

4.5 Study of factors influencing the quality of manufacture.

4.6 Explain the Concept of statistical quality control, Control charts (X, R, P and C - charts).

4.7 Methods of attributes.

4.8 Concept of ISO 9001-2008.

4.9.1 Quality management system, Registration /certification procedure.

4.9.2 Benefits of ISO to the organization.

4.9.3 JIT, Six sigma, 7S, Lean manufacturing

4.9.4 Solve related problems.

## **5.0 PRODUCTION PLANNING AND CONTROL**

5.1 Introduction

5.2 Major functions of production planning and control

5.3 Methods of forecasting

5.3.1 Routing

5.3.2 Scheduling

5.3.3 Dispatching

5.3.4 Controlling

5.4 Types of production

5.4.1 Mass production

5.4.2 Batch production

5.4.3 Job order production

5.5 Principles of product and process planning.

**Syllabus to be covered before IA: Chapter 1,2,3**

<b>Learning Resources:</b>			
<i>Sl. No.</i>	<i>Name of Authors</i>	<i>Title of the Book</i>	<i>Name of the Publisher</i>
1	O.P.KHANNA	INDUSTRIAL ENGINEERING & MANAGEMENT	DHANPAT RAI & SONS
2	MARTAND TELSANG	INDUSTRIAL ENGG & PRODUCTION MANAGEMENT	S.CHAND
3	M.MAHAJAN	STATISTICAL QUALITY CONTROL	DHANPAT RAI & SONS
4			

## TH.2 AUTOMOBILE ENGINEERING AND HYBRID VEHICLES

Name of the Course: Diploma in MECHANICAL AUTOMOBILE ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

### A.RATIONALE:

Automobiles are the principal mode of transport system. Their manufacture and maintenance gives a major scope for employment. Many entrepreneur pass outs go for servicing of automobiles or trading/manufacturing of auto components. Thus automobile engineering is an important subject to be in the regular curriculum of the mechanical engineering.

### B.COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand automobile chassis, transmission, breaking and fuel system etc.
- Understand the basics of ignition system.
- Understand the fuel,cooling and lubrication system.

### C.TOPIC WISE DISTRIBUTION OF PERIODS

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SI No.	Topic	Periods
1	Introduction & Transmission System	12
2	Braking system	12
3	Ignition & Suspension System	12
4	Cooling and Lubrication	12
5	Fuel system	12

### C.COURSE CONTENTS

#### 1.0 INTRODUCTION & TRANSMISSION SYSTEM:

- 1.1 Automobiles: Definition, need and classification: Layout of automobile chassis with major components (Line diagram)
- 1.2 Clutch System: Need, Types (Single & Multiple) and Working principle with sketch
- 1.3 Gear Box: Purpose of gear box, Construction and working of a 4 speed gear box
- 1.4 Concept of automatic gear changing mechanisms
- 1.5 Propeller shaft: Constructional features
- 1.6 Differential: Need, Types and Working principle

#### 2.0 BRAKING SYSTEM:

- 2.1 Braking systems in automobiles: Need and types
- 2.2 Mechanical Brake
- 2.3 Hydraulic Brake
- 2.4 Air Brake
- 2.5 Air assisted Hydraulic Brake
- 2.6 Vacuum Brake

#### 3.0 IGNITION & SUSPENSION SYSTEM:

- 3.1 Describe the Battery ignition and Magnet ignition system

- 3.2 Spark plugs: Purpose, construction and specifications
- 3.3 State the common ignition troubles and its remedies
- 3.4 Description of the conventional suspension system for Rear and Front axle
- 3.5 Description of independent suspension system used in cars (coil spring and tension bars)
- 3.6 Constructional features and working of a telescopic shock absorber

#### 4.0 COOLING AND LUBRICATION:

- 4.1 Engine cooling: Need and classification
- 4.2 Describe defects of cooling and their remedial measures
- 4.3 Describe the Function of lubrication
- 4.4 Describe the lubrication System of I.C. engine

#### 5.0 FUEL SYSTEM:

- 5.1 Describe Air fuel ratio
- 5.2 Describe Carburetion process for Petrol Engine
- 5.3 Describe working of various carburetor with neat schematic diagram'
- 5.4 Describe Multipoint fuel injection system for Petrol Engine
- 5.5 Describe the working principle of fuel injection system for multi cylinder Engine
- 5.5 Filter for Diesel engine
- 5.6 Describe the working principle of Fuel feed pump and Fuel Injector for Diesel engine
- 5.7 Describe various properties of fuel.

### D.SYLLABUS COVERED UP TO I.A-CHAPTERS 1,2 &3

<b>E.LEARNING RESOURCES:</b>			
<i>Sl. No.</i>	<i>Name of Authors</i>	<i>Title of the Book</i>	<i>Name of the Publisher</i>
1	R.B.Gupta	Automobile Engineering	Satya Prakashan
2	Dr Kirpal Singh	Automobile Engineering Vol- I & II	Standard Publishers
3	C.P.Nakra	Automobile Engineering	Dhanpat Rai Publication
4	W.H.Course	Automotive Engine	McGraw Hill

### TH.3 ELECTRIC VEHICLE

Name of the Course: Diploma in MECHANICAL ENGINEERING (AUTOMOBILE)			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

#### RATIONALE:

With the depleting source of fossil fuel coupled with the thread of global warming, search for an alternative, clean and viable source of energy is now a world-wide concern. Research and application of non-conventional sources of energy is rapidly taking place in India also. This elective is important for those wish to pursue their career in this emerging field.

#### COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the evolution of Electric vehicles and its components.
- Understand the properties of batteries.
- Understand the DC & AC Electrical Machines.
- Understand the Electric Vehicle Drive Train.
- Understand the concepts of Hybrid Electric Vehicles.

#### C.TOPIC WISE DISTRIBUTION OF PERIODS

Sl No.	Topic	Periods
1	Electric Vehicles	10
2	Battery	8
3	DC & AC Electrical Machines	15
4	Electric Vehicle Drive Train	15
5	Hybrid Electric Vehicles	12

#### DETAILED CONTENTS

##### 1.0 Electric Vehicles:

- 1.1 Evolution of Electric vehicles
- 1.2 Advanced Electric drive vehicle technology Vehicles-Electric vehicles (EV), Hybrid Electric drive (HEV), Plug in Electric vehicle (PIEV),
- 1.3 Components used Hybrid Electric Vehicle
- 1.4 Economic and environmental impacts of Electric hybrid vehicle
- 1.5 Parameters affecting Environmental and economic analysis
- 1.6 Comparative study of vehicles for economic, environmental aspects

##### 2.0 Battery:

- 2.1 Basics, Types.
- 2.2 Parameters: Capacity, Discharge rate, State of charge, State of Discharge, Depth of Discharge.
- 2.3 Technical characteristics, Battery pack Design, Properties of Batteries.



### 3.0 DC & AC Electrical Machines:

- 3.1 Motor and Engine rating; Requirements.
- 3.2 DC machines.
- 3.3 Three phase A/c machines.
- 3.4 Induction machines.
- 3.5 Permanent magnet machines.
- 3.6 Switched reluctance machines.

### 4.0 Electric Vehicle Drive Train:

- 4.1 Define Transmission configuration.
- 4.2 Components: Gears, Differential, Clutch, Brakes.
- 4.3 Regenerative braking, Motor sizing; Fuel efficiency analysis.

### 5.0 Hybrid Electric Vehicles:

- 5.1 Types: Parallel, Series, Parallel and Series configurations;
- 5.2 Drive train, Sizing of components.
- 5.3 Basics of Micro, Mild, Mini, Plug-in and Fully hybrid.

### Syllabus covered up to I.A-Chapters 1,2 & 3

<b>E.LEARNING RESOURCES:</b>			
<i>Sl. No.</i>	<i>Name of Authors</i>	<i>Title of the Book</i>	<i>Name of the Publisher</i>
1	A.K. Babu	Electric & Hybrid Vehicles	Khanna Publishing House, New Delhi, 2018
2	Iqbal Hussain	Electric & Hybrid Vehicles –Design Fundamentals	Second Edition, CRC PRESS-2011
3	James Larminie	Electric Vehicle Technology Explained	John Wiley & Sons, 2003
4	Mehrdad Ehsani, Yimin Gao, Ali Emadi,	Modern Electric, Hybrid Electric, and Fuel Cell Vehicles:FUNDAMENTALS	CRC Press, 2010
5	Sandeep Dhameja	Electric Vehicle Battery Systems	Newnes, 2000.

## Th-4a-COMPOSITE MATERIALS (ELECTIVE)

Name of the Course: Diploma in MECHANICAL ENGINEERING(auto)			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

**RATIONALE: Composite material is the advanced engineering material and plays an important Role in design of engineering products.it is s.a valuable subject for mechanical engineer**

### **COURSE OBJECTIVES:**

At the end of the course the students will be able to:

- Understand the basic concept of composite materials
- Understand the Classification of Composites
- Understand the Mechanical Properties of Composites
- Understand the Laminates
- Understand the Joining Methods and Failure Theories.

### **Topic Wise Distribution of Periods**

Sl No.	Topic	Periods
1	Introduction	15
2	Classification of Composites	8
3	Mechanical Properties of Composites	12
4	Laminates	15
5	Joining Methods and Failure Theories	10

## **CHAPTERS**

### **1.0 Introduction:**

- 1.1 Classifications of Engineering Materials, Concept of composite materials.
- 1.2 Matrix materials, Functions of a Matrix, Desired Properties of a Matrix, Polymer Matrix (Thermosets and Thermoplastics), Metal matrix, Ceramic matrix, Carbon Matrix, Glass Matrix etc.
- 1.3 Types of Reinforcements/Fibers: Role and Selection or reinforcement materials.
- 1.4 Types of fibers, Glass fibers, Carbon fibers, Aramid fibers , Metal fibers, Alumina fibers, Boron Fibers, Silicon carbide fibers, Quartz and Silica fibers, Multiphase fibers, Whiskers, Flakes etc.,
- 1.5 Mechanical properties of fibers.

### **2.0 Classification of Composites:**

- 2.1 Classification based on Matrix Material: Organic Matrix composites, Polymer matrix composites (PMC), Carbon matrix Composites or Carbon-Carbon Composites, Metal matrix composites (MMC), Ceramic matrix composites (CMC).
- 2.2 Classification based on reinforcements: Fiber Reinforced Composites, Fiber Reinforced Polymer (FRP) Composites, Laminar Composites, Particulate Composites.
- 2.3 Comparison with Metals, Advantages & limitations of Composites.

### **3.0 Mechanical Properties of Composites:**

- 3.1 Geometrical aspects – volume and weight fraction.
- 3.2 Unidirectional continuous fiber, discontinuous fibers, Short fiber systems, woven

reinforcements – Mechanical Testing.

3.3 Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

#### 4.0 Laminates:

4.1 Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Computation of Stresses.

4.2 Types of Laminates - Symmetric Laminates, Antisymmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angle ply Laminate. Orthotropic Laminate.

4.3 Laminate Moduli, Hydrothermal Stresses.

#### 5.0 Joining Methods and Failure Theories:

5.1 Joining –Advantages and disadvantages of adhesive and mechanically fastened joints.

5.2 Typical bond strengths and test procedures.

**Syllabus covered up to I.A-Chapters 1, 2 & 3**

<b>E.LEARNING RESOURCES:</b>			
<i>Sl. No.</i>	<i>Name of Authors</i>	<i>Title of the Book</i>	<i>Name of the Publisher</i>
1	A.K Bhargava	Engineering Materials: Polymers, Ceramics and Composites	Prentice Hall India
2	G. Dieter	Mechanical Metallurgy	Mc-Graw Hill
3	R.F. Speyer	Thermal Analysis of Materials	Marcel Decker

## TH 4b ADVANCE MANUFACTURING PROCESSES

Name of the Course: Diploma in MECHANICAL ENGINEERING(auto)			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

### RATIONALE:

Advance manufacturing processes is the field of production by advance nontraditional methods which give the conversion of raw materials into finished product..

### COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the working principle of modern machining processes.
- Understand the Plastic Processing
- Understand the additive manufacturing process
- Understand the Special Purpose Machines
- Understand the Maintenance of Machine Tools

### Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Modern Machining Processes	20
2	Plastic Processing	10
3	Additive Manufacturing Process	15
4	Special Purpose Machines	7
5	Maintenance of Machine Tools	8

### DETAILED CONTENTS

#### 1.0 Modern Machining Processes:

- 1.1 Introduction – comparison with traditional machining.
- 1.2 Ultrasonic Machining: principle, Description of equipment, applications.
- 1.3 Electric Discharge Machining: Principle, Description of equipment, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, applications.
- 1.4 Wire cut EDM: Principle, Description of equipment, controlling parameters; applications.
- 1.5 Abrasive Jet Machining: principle, description of equipment, Material removal rate, application.
- 1.5 Laser Beam Machining: principle, description of equipment, Material removal rate, application.
- 1.6 Electro Chemical Machining: principle, description of equipment, Material removal rate, application.
- 1.7 Plasma Arc Machining – principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications.
- 1.8 Electron Beam Machining - principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications.

#### 2.0 Plastic Processing:

- 2.1 Processing of plastics.
- 2.2 Moulding processes: Injection moulding, Compression moulding, Transfer moulding.

2.3 Extruding; Casting; Calendering.

2.4 Fabrication methods-Sheet forming, Blow moulding, Laminating plastics (sheets, rods & tubes), Reinforcing.

2.5 Applications of Plastics.

### 3.0 Additive Manufacturing Process:

3.1 Introduction, Need for Additive Manufacturing

3.2 Fundamentals of Additive Manufacturing, AM Process Chain

3.3 Advantages and Limitations of AM, Commonly used Terms

3.4 Classification of AM process, Fundamental Automated Processes, Distinction between AM and CNC, other related technologies.

3.5 Application –Application in Design, Aerospace Industry, Automotive Industry, Jewelry Industry, Arts and Architecture. RP Medical and Bioengineering Applications.

3.6 Web Based Rapid Prototyping Systems.

3.7 Concept of Flexible manufacturing process, concurrent engineering, production tools like capstan and turret lathes, rapid prototyping processes.

### 4.0 Special Purpose Machines (SPM):

4.1 Concept, General elements of SPM, Productivity improvement by SPM, Principles of SPM design.

### 5.0 Maintenance of Machine Tools:

5.1 Types of maintenance, Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping. Introduction to Total Productive Maintenance (TPM).

### Syllabus covered up to I.A-Chapters 1,2 &3

<b>E.LEARNING RESOURCES:</b>			
<i>Sl. No.</i>	<i>Name of Authors</i>	<i>Title of the Book</i>	<i>Name of the Publisher</i>
1	O.P.KHANNA	Production technology –Vol-II	Dhanpat Rai Publication
2	B.S. Raghuwanshi	Workshop Technology, Vol – II	Dhanpat Rai Publication
3	HMT, Bangalore	Production Technology	Tata Mc-Graw Hill
4	1. Chua C.K., Leong K.F. and LIM C.S,	Rapid prototyping: Principles and Applications	WORLD SCIENTIFIC PUBLICATION, THIRD EDITION, 2010
5	Stephen F. Krar & Arthur Gil	Exploring Advanced Manufacturing Technologies	1. Industrial Press

## Pr.1 AUTOMOBILE ENGINEERING LAB

Name of the Course: Diploma in MECHANICALAUTOMOBTE ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Sessional	25
Maximum marks:	75	End Semester Examination:	50

### COURSE OBJECTIVES

At the end of the course the students will be able to

#### List of Practical Experiments:

1. Study of Automobile chassis.
2. Study the differential mechanism of an automobile.
3. Study the electrical system of automobile.
4. Study of barking system (Hydraulic /Air brake).
5. Study of multiple Clutch of automobile.
6. Study and demonstration of different circuit of carburetor.
7. Checking the spark plug and setting the port and check the ignition in the spark plug.
8. Study the assembly of car engine.
9. Calibration of Bourdon's tube Pressure gauge.
10. Air pollution testing of CO<sub>2</sub>, CO, HC, NOX

## PR.2 ELECTRIC VEHICLE LABORATORY

NAME OF THE COURSE: DIPLOMA IN MECHANICAL ENGINEERING (Auto)			
COURSE CODE:		SEMESTER	6TH
TOTAL PERIOD:	60	EXAMINATION	3 HRS
THEORY PERIODS:	4 P/W	SESSIONAL	25
MAXIMUM MARKS:	75	END SEMESTER	50

### A. RATIONALE:

An automobile engineer should be capable of making different mechanism or part of an automobile. This allows them to satisfy their inventive / developmental skill as well as get an intimate knowledge about the function of the mechanism / part. An automobile engineer, throughout his working life will be involved with automobile in one way or another. It is therefore, absolutely essential for an automobile engineer to learn to recent advancements and new technologies as well as the mechanisms used in electric powered vehicles. This course also gives the students opportunity to learn how to do maintenance work of electric vehicles.

### B. OBJECTIVES

After undergoing the Project Work, the student will be able to:

- The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences.
- Maintenance of electric vehicles

### C. COURSE CONTENTS:

1. Develop block diagram of Electric vehicle and identify parts
2. Case study- Compare minimum four vehicles for economic and environmental analysis
3. Develop schematic diagram of hybrid electric vehicle and identify the components fluorescent lamp.
4. Prepare report on Plug in Electric vehicle by visiting a charging station
5. Inspect and install inverter of given lead acid battery
6. Prepare a report on batteries used from market survey
7. Collect specifications of converters and inverters used for Electric vehicles a single lamp control by two switches
8. Diagnose, repair and maintain battery used in electric vehicle
9. Prepare test procedure for equipment used in Electric vehicle
10. List safety procedures and schedule for handling HEVs and EVs

## Pr3. PROJECT Phase - II

Name of the Course: Diploma in Mechanical Engineering (auto)			
Course code:		Semester	6 <sup>th</sup>
Total Period:	150	Examination	3 hrs
Lab. periods:	10 P / week	Sessional	50
Maximum marks:	150	End Sem Examination	100

### RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mechanical engineering and practices in real life situations, so as to participate and manage a large Mechanical engineering projects, in future. Entire Project spreads over 5<sup>th</sup> and 6<sup>th</sup> Semester. Part of the Project covered in 5<sup>th</sup> Semester was named as *Project Phase-I* and balance portion to be covered in 6<sup>th</sup> Semester shall be named as *Project Phase-II*.

### OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Project design.
- To develop the skill of writing Project Report

### Project Phase-I and Phase-II

The Project work duration covers 2 semesters(5<sup>th</sup> and 6<sup>th</sup> sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of 5<sup>th</sup> semester under Project Phase-I. The students were allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work and Design of the system also have to be complete in Phase-I. Development may also begin in this phase. Project Milestones are to be set so that progress can be tracked .

In Phase-II Development, Testing, Documentation and Implementation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-II in 6<sup>th</sup> semester there shall be one presentation by each group on whole Project work undertaken by them.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in table below:



Sl. No.	Performance Criteria
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations to such an exhibition.

The Project Report need to be prepared as per standard format and following is the indicative format. The Teacher Guide may make minor alteration keeping the sense in tact.

#### Organization of Project Report

##### 1. Cover page:

It should contain the following ( in order)

- (i) Title of the Project
- (ii) “Submitted in partial fulfillment of the requirements for the Diploma in <Branch Name>”
- (iii) By Name of the Student(s)
- (iv) Logo of the Institution
- (v) Branch Name/Depart Name and Institution Name with Address
- (vi) Academic Year

##### 2. 1<sup>st</sup> Inner page

Certificate:

It should contain he following

“This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>” during session <session > in <Branch /Department Name> of <Institute name> and this work is the original work of the above student(s).

Seal and signature of the Supervisor/Guide with date

##### 3. 2<sup>nd</sup> Inner Page

Acknowledgement by the Student(s)

##### 4. Contents.

##### 5. Chapter wise arrangement of Reports

##### 6. Last Chapter: Conclusion

It should contain

- (i) Conclusion
- (ii) Limitations
- (iii) Scope for further Improvement

##### 7. References

## Pr-4 LIFE SKILL (Common to All Branches)

Practical	2 Periods per week	Sessional	25 Marks
Total Periods	30 Periods	Total Marks	25 Marks

**Objective:** After completion of this course the student will be able to:

- Develop team spirit i.e. concept of working in team
- Apply problem solving skills for a given situation
- Use effective presentation techniques
- Apply task management techniques for given projects
- Enhance leadership traits
- Resolve conflict by appropriate method
- Survive self in today's competitive world
- Face interview without fear

### DETAIL CONTENTS:

#### 1. SOCIAL SKILL

Society, Social Structure, Develop Sympathy and Empathy

Swot Analysis – Concept, How to make use of SWOT

Inter personal Relation: Sources of conflict, Resolution of conflict ,  
Ways to enhance interpersonal relation

#### 2. PROBLEM SOLVING

Steps of Problem solving:

- Identify and clarify the problem,
- Information gathering related to problem,
- Evaluate the evidence,
- Consider alternative solutions and their implications,
- Choose and implement the best alternative,
- Review
- Problem solving techniques:

1) Trial and error, 2) Brain storming, 3) Lateral (Out of Box) thinking

#### 3. PRESENTATION SKILL

Body language , Dress like the audience

Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,

Voice and language – Volume, Pitch, Inflection, Speed, Pause

Pronunciation, Articulation, Language, Practice of speech.

Use of AV aids such as Laptop with LCD projector, white board etc.

#### 4. GROUP DISCUSSION AND INTERVIEW TECHNIQUES

*Group Discussion:*

Introduction to group discussion, Ways to carry out group discussion,

Parameters— Contact, body language, analytical and logical thinking,  
decision making

*Interview Technique :*

Dress, Posture, Gestures, facial expression, Approach

Tips for handling common questions.

#### 5. WORKING IN TEAM

Understand and work within the dynamics of a groups.

Tips to work effectively in teams,

Establish good rapport, interest with others and work effectively with them  
to meet common objectives,

Tips to provide and accept feedback in a constructive and considerate way ,

Leadership in teams, Handling frustrations in group.

#### 6. TASK MANAGEMENT

Introduction, Task identification, Task planning ,

organizing and execution, Closing the task

## **PRACTICAL**

**List of Assignment:** *(Any Five to be performed including Mock Interview)*

### **1. SWOT analysis:-**

Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.

- a) Your past experiences,
- b) Achievements,
- c) Failures,
- d) Feedback from others etc.

### **2. Solve the True life problem assigned by the Teacher.**

### **3. Working in a Team**

Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc. (One activity per group where Team work shall be exhibited)

### **4. Mock Interview**

### **5. Discuss a topic in a group and prepare minutes of discussion.**

### **6. Deliver a seminar for 5 minutes using presentation aids on the topic given by your teacher.**

### **7. Task Management**

Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management (with Break up into sub tasks and their interdependencies and Time)

**Note:** -1. Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic.

**Note:** -2. The following Topics may be considered for Seminar/GD in addition to other Topics at the discretion of the Teacher.

(Comparison with developed countries, Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Traffic Rules, Global Warming, Pollution, Environment, Labour Welfare Legislation, Labour Welfare Acts, Child Labour Issues, Gender Sensitisation ,Harassment of Women at Workplace)

## **METHODOLOGY:**

*The Teacher is to explain the concepts prescribed in the contents of the syllabus and then assign different Exercises under Practical to the students to perform.*

### **Books Recommended:-**

<b>Sl.No</b>	<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Name of the Publisher</b>
01	E.H. Mc Grath , S.J	Basic Managerial Skills for All	PHI
02	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
03	Adair, J	Decision making & Problem Solving	Orient Longman
04	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
05	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.

**EQUIPMENT LIST**

**AUTOMOBILE ENGINEERING LAB**

<b>SL.NO</b>	<b>NAME OF THE EQUIPMENTS</b>	<b>QUANTITY</b>
01	Chassis of a car	01 no
02	Differential of a Tractor	01 no
03	Hydraulic brake system of a car working model	01 no
04	Solex carburetor	01 no
05	Maruty car type carburetor	01 no
06	Cut section of a fuel pump	01no
07	New car engine	01 no
08	Gear box	01no