Curriculum for

Diploma Programme in

AUTOMOBILE ENGINEERING

SIXTH SEMESTER

MOTOR VEHICLE ACT AND TRANSPORT MANAGEMENT

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RATIONALE

A diploma holder in Automobile Engineering is supposed to have knowledge about significance of vehicle accident, accidental vehicle claim procedure from insurance company and about Motor Vehicle Act. Therefore, it is essential to teach Motor Vehicle Act features and appropriate practices covering Motor Vehicle Act. Further, knowledge of transport management systems and techniques would also be an asset to him.

LEARNING OUTCOMES :

At the end of this subject, students will be able to:

- Describe different section under Motor Vehicle Act
- Explain various types of insurance used in vehicle and work role of surveyor
- Drive vehicle in different road conditions
- Analyze different aspects of transport modes
- Explore variety in garage with its types
- Manage an auto shop related to storage of different parts

DETAILED CONTENTS

1. Motor Vehicle Act (10 Periods)

.Motor Vehicle Act - Main Provisions
Salient features of Motor Vehicle Act. Requisites and formalities for following:

- Licensing of drivers and conductors of motor vehicles.
- Registration of old and new vehicles
- Control of transport vehicles
- Transfer of vehicle - Local and State to State
- Different forms, application for various uses
- Traffic offences, penalties and procedures

2. Inspection and Fitness of Vehicle (05 Periods)

a. Fitness of vehicle -meaning and purpose, provisions in the act,
b. Detailed procedure and requirements for vehicle inspection
c. Road Worthiness requirements

3. Insurance of Vehicles (06 Periods)

Meaning of Insurance and its necessity
Different types - comprehensive and third party insurance
Procedure to get Accidental claim and compensation
Surveyor duties
Relation between Insurance company and surveyor
Duties of driver in case of accident and injury to a person
Analysis of accident loss

4. Driving (07 Periods)

a) Principle of driving
b) Driving procedure
c) Driving precautions
d) Driving in abnormal conditions, like hilly area, night, fog, heavy traffic and rain
e) Driving License - purpose, importance and requirements
f) Different types of driving license
g) Procedure to get driving license

5. Road Safety (04 Periods)

Road Signs/signals
Traffic rules
Duties of Driver, Conductor and Helper towards safety of vehicles/passengers/goods and self

6. Transport Management (16 Periods)

History of transport with special reference to road transport in India
Modes of Road transport

Organization- Service station and its functions, General layout of modern service station, Spare parts section and dealership service section, Accounts and books, Different types of cards and their use in maintaining service station records Use of Computers in maintaining.

Structure of fleet organization
State transport - optimum utilization of fleet, theory of fares/freight
Maintenance of logbook, History sheet, Economy of replacement, Assessment of used vehicles for sale and purchase,
6.7 High security registration plates

INSTRUCTIONAL STRATEGY

Teacher should lay emphasis on basic principles and practices covering Motor Vehicle Act and fleet management. Visits should be organized to service stations for understanding of topics.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

1. Automobile Engineering Vol.I by Dr. Kirpal Singh, Standard Publishers, Distributors, Delhi.

2. Transport Management Vol. III & IV by Central Institute of Road Transport, Pune.

3. Motor Vehicle Act of India (with Latest Amendments).

4. Motor Vehicle Act with Rules by B.S. Kohli.

5. Motor Transportation: Principles and Practices by WJ Hudson and James; Ronald Press Company, New York.

6. Transport in Modern India by KP Bhatnagar, Satish Bahadur, DN Aggarwal and SC Gupta.

7. Central Motor Vehicle Rules.

8 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	10	20
2	05	10
3	06	14
4	07	14
5	04	08
6	16	34
Total	**48**	**100**

6.2 PRODUCTION ENGINEERING

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RATIONALE

A diploma holder in Automobile Engineering is supposed to look after the planning, scheduling and production control activities in the industry. He is also required to have knowledge about cost estimation of new and repaired components, material management, quality aspects and productivity. Therefore it is essential to teach above topics.

LEARNING OUTCOMES:

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

- Apply the principles of costing in product costing
- Prepare budgets based on the level of activity and to use concept for production cost control
- Apply the principle and techniques in production planning and control of a production system
- Control quality by using different levels of inspection techniques of various stages of production

DETAILED CONTENTS

1 Productivity (06 Periods)

Definition of Production
Types of Production – Job, Batch and Mass production, Assembly Production,
Definition of productivity,
Difference between production and productivity
Importance of productivity
Factors affecting productivity,
Measurement of productivity
Causes of decrease in productivity

2 Assembly System and Line Balancing: (06 periods)

The assembly process,

Assembly system,
Manual assembly lines,
Line balancing problems – static balancing and dynamic balancing,
Flexible manual assembly line, Partial automation.

3 Production Planning and Control (14 Periods)

Necessity of planning and control
Functions of production, planning and control department,
Advantages of Production Planning & Control
Preplanning – product development, sales forecasting, Break-even analysis
Process planning, Process planning sheet, calculation of man and machine hours

Stages of P.P.C - process planning, routing, loading, scheduling, dispatching, follow up, inspection and evaluation; their purpose and procedure
Machine loading chart, Gantt chart,
Inventory control – need and benefits; ABC and JIT

4. Inspection (06 Periods)

Inspection - Need and Planning for Inspection
Modes of inspection – Accuracy testing of machine tools, Part/Product inspection, Process quality control
Types of Inspection – in-coming, in-process and final inspection; remedial, preventive and operative

inspection

Methods of inspection – 100% inspection, sampling inspection

Role of Operator and Inspector in Inspection

5. Quality Control (16 periods)

Quality Control and Quality Assurance - Meaning and Need

Statistical Quality Control

Acceptance Sampling

Control Charts for variables and Attributes

QC tools – cause and effect diagram, check sheet, control chart, Pareto chart, histogram, scatter diagram, flow chart

Concept of Six Sigma

Concept of Total Quality Management (TQM)

Introduction to 5S and Kaizan technique.

6. Standards and Codes (04 Periods)

National and International Codes

Concept, elements, benefits and implementation of Quality Management System (ISO 9000) and environmental Management System (ISO 14000), Quality Circles

7. Estimating and Costing (08 Periods)

Meaning and importance of estimating and costing.

Difference between estimating and costing.

Estimating procedures.

Elements of cost – Material cost – direct and indirect, Labour cost – direct and indirect, Expenses – direct and indirect, overheads.

Profits – Concepts and requirements

Variable and fixed cost, production cost

8. Marketing and Sales

Concept of marketing and sales,

Difference between sales and marketing

Types of marketing – through personal contact, through advertisement, through demonstration, multilevel marketing,

Market research – definition, necessity and objective

Types of sales

Identification of consumers

Effect of consumer behavior on sales

INSTRUCTIONAL STRATEGY

Efforts should be made to relate process of teaching with direct experiences in the industry. Students should be taken to various industrial enterprises for better conceptualization of specific topics such as production planning, inspection and quality control. Simple problems on costing should be given to students for comprehension

RECOMMENDED BOOKS

1. Production Estimating and Costing by M. Adithan and B.S. Pabla, Konark Publishers, Delhi

2. Industrial Engineering and Management by T.R Banga, and S.C. Sharma, Khanna Publishers, Delhi

3. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	04	06
2	08	12
3	08	12
4	12	20
5	04	06
6	02	04
7	20	32
8	06	08
Total	**64**	**100**

AUTO PROFESSIONAL PRACTICES – II

L	T	P
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RATIONALE

Acquiring professional skills is the most important part of learning for an automobile diploma student. This subject is required to learn about overhauling of various automobile systems so as to get them back in proper working order.

LEARNING OUTCOMES

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

- Diagnose the engine problems
- Remove and refit the engine to vehicle
- Overhaul petrol and diesel engines
- Overhaul various chassis and transmission components

DETAILED CONTENTS

1. Diagnosing the engine for overhauling.
2. Removal of engine from vehicle.
3. Dismantling of engine.
4. Overhauling of petrol/diesel engine:-
   Decarbonising and cleaning of engine blocks, combustion chamber, piston crown and valve parts.
   Inspection and testing of cylinder bore using cylinder dial gauge for ovality & taperness.
   Inspection of piston, piston ring grooves and gudgeon pin for wear.
   Testing of connecting rod for bend, bow and twist.
   Inspection of crankshaft - bearing replacement and setting of main journal & big end bearings; measuring bearing clearances by gauges.
   Surface testing and resurfacing of cylinder heads, cylinder blocks and manifolds on surface grinding machine.
   Removal and refitting of cylinder liners.
   Assembling of the engine after replacing/repairing defective/worn-out parts.
   Engine testing for performance
5. Overhauling of valves and valve mechanism.
6. Overhauling of gear box.
7. Overhauling of differential and propeller shaft.
8. Overhauling of wheels and axles.
9. Overhauling of brakes.
10. Overhauling of clutch

INSTRUCTIONAL STRATEGY

1. Guide the students to follow safety rules.
2. Provide on hand practice to students
3. Tell the students to identify the various components and arrange them in order while dismantling/removal.
4. Use relevant tools and equipment.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva-voce

RECOMMENDED BOOKS

1. Car maintenance and repair by Arthur W. Judge
2. Automobile Engineering Vol. I & II by Dr. Kirpal Singh; Standard Publisher, Delhi.
3. Automobile Engineering by Sh. R.B. Gupta; Satya Prakashan, New Delhi.
4. Maintenance and Repair of Motor Vehicle by H.O. Geneva; Dialogue, R-686, New Rajinder Nagar, New Delhi.
5. Automotive Mechanics by William H. Crouse, Tata McGraw Hill, Delhi.
6. Auto Mechanics: Theory & Service by W.J.deKryger et all.
7 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

L	T	P
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RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added that an entrepreneurial mindset with managerial skills helps the student in the job market. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

LEARNING OUTCOMES

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

- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- Explain the principles of management including its functions in an organisation.
- Have insight into different types of organizations and their structures.
- Inculcate leadership qualities to motivate self and others.
- Manage human resources at the shop-floor
- Maintain and be a part of healthy work culture in an organisation.
- Use marketing skills for the benefit of the organization .
- Maintain books of accounts and take financial decisions.
- Undertake store management.
- Use modern concepts like TQM, JIT and CRM.

DETAILED CONTENTS

SECTION – A ENTREPRENEURSHIP

1. Introduction (10 Periods)

- Concept /Meaning and its need
- Qualities and functions of entrepreneur and barriers in entrepreneurship
- Sole proprietorship and partnership forms and other forms of business organisations
- Schemes of assistance by entrepreneurial support agencies at National, State, District – level, organisation: NSIC, NRDC, DC, MSME, SIDBI, NABARD, NIESBUD, HARDICON Ltd., Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. Market Survey and Opportunity Identification/Ideation (08 Periods)

- Scanning of the business environment
- Salient features of National and Haryana State industrial policies and resultant business opportunities
- Types and conduct of market survey
- Assessment of demand and supply in potential areas of growth
- Identifying business opportunity
- Considerations in product selection
- Converting an idea into a business opportunity

3. Project report Preparation (06 Periods)

- Preliminary project report
- Detailed project report including technical, economic and market feasibility
- Common errors in project report preparations
- Exercises on preparation of project report
- Sample project report

SECTION –B MANAGEMENT

4. Introduction to Management (04 Periods)

- Definitions and importance of management
- Functions of management: Importance and process of planning, organizing, staffing, directing and controlling
- Principles of management (Henri Fayol, F.W. Taylor)
- Concept and structure of an organization
- Types of industrial organizations and their advantages

- Line organization, staff organization
- Line and staff organization
- Functional Organization

5. Leadership and Motivation (03 Periods)

a) Leadership

- Definition and Need
- Qualities and functions of a leader
- Manager Vs leader
- Types of leadership
- Case studies of great leaders

b) Motivation

- Definition and characteristics
- Importance of self motivation
- Factors affecting motivation
- Theories of motivation (Maslow, Herzberg, Douglas, McGregor)

6. Management Scope in Different Areas (06 Periods)

a) Human Resource Management

- Introduction and objective
- Introduction to Man power planning, recruitment and selection
- Introduction to performance appraisal methods

b) Material and Store Management

- Introduction functions, and objectives
- ABC Analysis and EOQ

c) Marketing and sales

- Introduction, importance, and its functions
- Physical distribution
- Introduction to promotion mix
- Sales promotion

d) Financial Management

- Introductions, importance and its functions
- knowledge of income tax, sales tax, excise duty, custom duty, VAT, GST

7. Work Culture (04 Periods)

Introduction and importance of Healthy Work Culture in organization
Components of Culture
Importance of attitude, values and behavior
Behavioral Science – Individual and group behavior.
Professional ethics – Concept and need of Professional Ethics and human values.

8. Basic of Accounting and Finance (04 Periods)

a) Basic of Accounting:

- Meaning and definition of accounting
- Double entry system of book keeping

- Trading account, PLA account and balance sheet of a company

b) Objectives of Financial Management

- Profit Maximization v/s Wealth Maximization

9. Miscellaneous Topics (03 Periods)

a) Total Quality Management (TQM)

- Statistical process control
- Total employees Involvement
- Just in time (JIT)

b) Intellectual Property Right (IPR)

- Introduction, definition and its importance
- Infringement related to patents, copy right, trade mark

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment, seminar or case study method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organisations on visit. Approach extracted reading and handouts may be provided.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development and Management by J.S.Narang; Dhanpat Rai &Sons, Delhi.
3. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
4. Handbook of Small Scale Industry by PM Bhandari
5. Entrepreneurship Development and Management by MK Garg
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	20
2	08	16
3	06	14
4	04	10

5	03	06
6	06	14
7	04	08
8	04	08
9	03	06
Total	48	100

ELECTIVE
6.5.1. TRACTOR AND SPECIAL PURPOSE VEHICLES

RATIONALE

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Diploma holders in Automobile Engineering may have to deal with repair and maintenance of tractors and earth moving machinery. This subject provides knowledge about such vehicles and equipment

LEARNING OUTCOMES :

At the end of the subject, students will be able to:

- Explain the classifications and function of tractors and their functions.
- Explain the functions of hydraulic system and supplementary system
- Specify wheels and tyres
- Describe the working principles of earth moving machinery like loader, cranes, excavator, fork lift truck dumper etc.
- Identify common faults in tractors

DETAILED CONTENTS

1. Tractor (08 periods)

Definition, classification of tractors, main tractor assemblies, types of engine used, human factor in tractor design, applications of tractors, Basics trends in tractor design, forces acting on a tractor on move, parallel pull and rolling resistance, tractive effort, tractor stability, longitudinal and lateral stability, weight transfer concept.

2. Tractor Chassis (04 periods)

Types of clutch used in tractors, types of transmission boxes used in tractors, , final drive, reduction gear, tractor brake systems; operator seat design

3 Supplementary System (08 periods)

Power take off shaft, draw bar working, double clutch system, traction control unit: mechanical and hydraulic, belt pulley three point linkages

4 Tractor Wheels and Tyres (06 periods)

Salient features of wheels, tyres, and wheel base/wheel tracks and ground clearance. Classification of tractor tyres, Specifications of wheels and tyres, tread types and their applications, dual versus tandem tyres,. differential lock.

5 Hydraulic system (08 periods)

Principle and Functions of hydraulic system, hydraulic system layout, various components of hydraulic system and their functions. Methods of attaching implements, various control systems – depth control, position control, draft control, combination control. Working of hydraulic control levers, other uses of hydraulic control system

6 Tractor Operation, Maintenance and repair (06 periods)

Common control and safety levers; Tractor indicators, safe tractor operating procedure, maintenance checks before starting the engine, periodic maintenance procedure of tractor, faults and their rectification, prominent makes of Indian tractors, selection criteria for tractor.

7 Special Purpose Vehicles (08 periods)

Earth Moving Machinery **–** Introduction, general layout and classification of earth moving machinery. Layout, working and applications of Dozer, Loader, Excavator, Fork Lift Truck, Tipper and Crane, Motor Grader.

INSTRUCTIONAL STATREGY

The students may be taken to workshops dealing in Repair of Tractors and Heavy Earth Moving Machinery and given practical demonstration, expert lectures will also be beneficial.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

RECOMMENDED BOOKS

1. Farm Machines and Equipment by CP Nakra; Dhapat Rai and Sons, New Delhi.
2. Manual of Tractors by J Konard, Asia Publishing House.
3. Tractors and Agriculture Equipment by Jain and Roy.
4. Agriculture Engineering by Michael and Ojha.

5 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	08	16
2	06	08
3	08	16
4	06	12
5	08	18
6	08	12
7	04	18
Total	**48**	**100**

6.5.2 DESIGN OF AUTOMOTIVE COMPONENTS

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RATIONALE:

Automobile component design is applied technology subject, which requires study of Mechanisms, Strength of materials, Material sciences- Manufacturing processes & Mechanical engineering drawing. This subject deals with fundamental principles of machine design applied to automobile components. It also gives exposure to standard codes of practices, CAD & Use of Design Data Book.

LEARNING OUTCOMES

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

- Analyze the loads, type of induced stresses and resisting areas.
- Identify modes of failure.
- Apply the relevant theory for problem solving.
- Choose the type of material, its shape, colour and surface finish for designing
- Design automobile components according to functional requirement
- Use design data book to standardize component dimensions, and to select dimensional tolerances.

DETAILED CONTENTS

1. Basic concepts of Design (14 hours)

Introduction to design
Classification of design
Design consideration
Design procedure
Types of external loads
Types of induced stresses: tensile, compressive, shear, Crushing and bearing pressure, bending, torsion, thermal stresses, creep, proof stresses, resilience, principal stresses
Stress – strain diagram for ductile & brittle material & its importance
Variable stresses in machine parts, fatigue & endurance limit, stress – time diagrams for variable stresses
Working stresses for static load, variable or fatigue load, Factor of safety, selection of factor of safety.
Stress concentration causes and remedies
Introduction to theories of failure –Maximum principle stress theory, Maximum shear stress theory, Distortion energy theory.
Selection of material and justifications for Automobile components. Advanced Materials for automotive components
Concept of standardization, Preferred numbers & interchangeability in design practice.
Post design aspects - Ergonomic aspect, Aesthetic consideration (shape, color, surface finish) for Automobile

2. Design of machine elements (6 hours)

Design of knuckle joint
Design of propeller shaft – for bending, torsion, critical speed
Design of rear axle.

Design of couplings- muff, flange, and bush pin type flexible.

3. Design of levers (6 hours)

Types of levers
Design of rocker arm
Design of bell crank lever
Design of hand lever
Design of pedals for rectangular cross-section & fulcrum pin only

4. Design of Chassis Components (8 hours)

Design of clutch- Single plate & Multi plate
Teeth calculation of gears for sliding mesh/constant mesh gear box for given data
Design of semi elliptical leaf spring, helical spring – for Torsion and Compression

5. Design of engine components (14 hours)

Data of engine specifications and calculations of cylinder dimensions for given power
Design of cylinder head thickness and bolts
Design of valve seat & valve lift
Design of piston crown by bending strength and thermal considerations.
Design of piston rings and skirt length
Design of piston pin for bearing, bending & shear considerations
Design of connecting rod for cross -section (I section).
Design of big end, cap and bolts.

INSTRUCTIONAL STRATEGY

The course content should be taught by showing actual components/models, measuring their dimensions and compare them with the design data to develop better understanding of designing the automobile components. Use of design data book should be taught to each student by giving assignments.

MEANS OF ASSESSMENT

- Design and drawing
- Assignments and quiz/class tests, mid-term and end-term written tests

RECOMMENDED BOOKS

1. V.Bhandari, “Machine Design”, Tata McGraw Hill publication,
2. R.K. Jain, “Machine Design”, Khanna Publishers, New Delhi.
3. P.C.Sharma and D.K.Aggarwal, “Machine Design”, S.K. Kataria & sons.
4. A.Kolchin and V.Demidov, “Design of Automotive Engines”, MIR Publishers, Moscow.
5. R S Khurmi and J K Gupta, “Machine Design”, S Chand & Co., Delhi
6. K. M. Agrawal, “Automobile Design Problems” Satya Prakashan, New Delhi Problems
7. Design Data Book by PSG Coimbatore
8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	14	30
2	06	12
3	06	12
4	08	16
5	14	30
Total	**48**	**100**

DRIVING PRACTICE – II

L	T	P
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RATIONALE

After learning the basics of driving the emphasis should be given to gain proficiency and shift to driving under hard condition such as during fog, rain, steep gradient etc. Suitable practice needs to be given to the students to make them aware of different situation in driving of the vehicle.

LEARNING OUTCOMES

At the end of the subject, students will be able to:

- Drive the four wheeler passenger vehicle independently
- Carryout parallel parking of the four wheeler passenger vehicle
- Drive vehicle in abnormal weather conditions
- Inspect a vehicle thoroughly.

DETAILED CONTENTS

1. Driving practice on road to gain proficiency.
2. Maneuver in: Passing, Merging, Diverging, Overtaking, Crossing, Turning, Cornering, Reversing and Emergency stopping.
3. Driving on gradient.
4. Driving during abnormal weather conditions
5. Inspection of Vehicle for resale/ insurance claim in case of accident.

MEANS OF ASSESSMENT

Assignments and quiz/class tests, driving test

PROJECT WORK

L	T	P
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RATIONALE

Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period.

LEARNING OUTCOMES

After undergoing the project work, students will be able to:

Apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place the learner for project oriented practical training in actual work situation for the stipulated period with a view to:

- Develop understanding regarding the size and scale of operations and nature of field-work in which students are going to play their role after completing the courses of study
- Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- Develop first hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
- Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

General Guidelines

The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.
This practical training cum project work **should not be considered** as merely conventional industrial training in which students are sent at work places with either minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. Each teacher is expected to supervise and guide 5-6 students.

The projects given to students should be such for which some one is waiting for solution. Some of the suggested project activities are given below:

1. Projects connected with repair and maintenance of machines .
2. Estimating and costing projects.
3. Design of jigs / fixtures.
4. Projects related to quality control.
5. Project work related to increasing productivity.
6. Projects relating to installation, calibration and testing of machines.
7. Projects related to wastage reduction.

8. Project, related to fabrication.
9. Energy efficiency related projects.
10. Projects related to improving an existing system

NOTE: Each student has to take one project individually and one to be shared with a group of four-five students depending upon cost and time involved. There is no binding to take up the above projects as it is only a suggestive list of projects.

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

Sr. No.	Performance Criteria	Max. Marks	Rating Scale				
			Excell - ent	Very Good	Good	Fair	Poor
1.	Selection of project assignment	10%	10	8	6	4	2
2.	Planning and execution of considerations	10%	10	8	6	4	2
3.	Quality of performance	20%	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20%	20	16	12	8	4
5.	Sense of responsibility	10%	10	8	6	4	2
6.	Self expression/ communication skills	5%	5	4	3	2	1
7.	Interpersonal skills/human relations	5%	5	4	3	2	1
8.	Report writing skills	10%	10	8	6	4	2
9	Viva voce	10%	10	8	6	4	2
Total marks		**100**	**100**	**80**	**60**	**40**	**20**

The overall grading of the practical training shall be made as per following table.

In order to qualify for the diploma, students must get “Overall Good grade” failing which the students may be given one more chance to improve and re-evaluate before being disqualified and declared “not eligible to receive diploma ”. It is also important to note that the students must get more than six “goods” or above “good” grade in different performance criteria items in order to get “Overall Good” grade.

	Range of maximum marks	Overall grade
i)	More than 80	**Excellent**
ii)	79 < > 65	Very good
iii)	64 < > 50	Good
iv)	49 < > 40	Fair
v)	Less than 40	Poor

Important Notes

1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.

2. The criteria for evaluation of the students have been worked out for 200 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.

3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.

4. It is also proposed that two students or two projects which are rated best be given merit certificate at

the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

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

SOFT SKILLS – IV

RATIONALE

L	T	P
-	-	2

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. The diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market.

LEARNING OUTCOMES

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

- Communicate effectively.
- Apply techniques of effective time management
- Develop habits to overcome stress
- Face problems with confidence
- Exhibit attributes required to appear for an interview
- Learn about current and future career opportunities
- Exhibit entrepreneurial skills
- Use QC/QT tools

DETAILED CONTENTS

- Communication Skills - Presentation
- Time management
- Stress Management
- Problem solving
- Career opportunities-Current and future
- Entrepreneurial Skills
- Quality and Quality tools used in industry

In addition, the students must participate in the following activities to be organized in the institute

- Sports
- NCC/NSS
- Cultural Event

Note: Extension Lectures by experts may be organized. There will be no examination for this subject.