

CURRICULUM
for
DIPLOMA PROGRAMME
in
AUTOMOBILE ENGINEERING
3rd Year (5th & 6th Semester)
FOR THE STATE OF HIMACHAL PRADESH



June, 2019

Study & Evaluation Scheme

5th Semester Automobile Engineering

S.N.	Subjects	Hrs/ Week		Evaluation Scheme								Total Marks
				Internal Assessment			External Assessment					
		Th	Pr	Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
5.1	Basics of Management & Entrepreneurship Development*	4	-	50	-	50	100	3	-	-	100	150
5.2	Elements of Design & Mechanics of Vehicles	5	-	50	-	50	100	3	-	-	100	150
5.3	Auto Engine – II	3	-	50	-	50	100	3	-	-	100	150
5.4	Auto Electrical and Electronic Equipment	4	2	30	20	50	100	3	50	3	150	200
5.5	Mechatronics**	4	2	30	20	50	100	3	50	3	150	200
5.6	Auto Repair and Maintenance	-	6	-	50	50	-	-	100	3	100	150
5.7	Driving Practice - II	-	6	-	50	50	-	-	100	3	100	150
5.8	Practices In Communication Skills*	-	2	-	50	50	-	-	50	3	50	100
Student Centered Activities		-	2	25	-	25	-	-	-	-	-	25
***Industrial training		-	-	-	50	50	-	-	-	-	50	100
Total		20	20	235	240	475	500	-	350	-	900	1375

* Common with other Diploma programmes

**Common with Diploma in Mechanical Engineering

***Industrial training will be conducted in the vacations before start of the semester

***Note:** Apart from the above mentioned number of hours for each subject (Theory & Practical), at least **TWO** hours/week for each class should be allocated for Library to motivate the students to attend library compulsory. The attendance of library period should be added in master attendance.*

Study & Evaluation Scheme

6th Semester Automobile Engineering

S.N.	Subjects	Hrs/Week		Evaluation Scheme								Total Marks
				Internal Assessment			External Assessment					
		Th	Pr	Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
6.1	Automotive Refrigeration and Air conditioning	4	-	50	-	50	100	3	-	-	100	150
6.2	Automobile Reconditioning	4	-	50	-	50	100	3	-	-	100	150
6.3	Production Planning and Costing	4	-	50	-	50	100	3	-	-	100	150
6.4	Motor Vehicle And Transport Management	4	-	50	-	50	100	3	-	-	100	150
6.5	Elective 6.5.1 Tractor and Farm Equipment 6.5.2 Automotive Body 6.5.3 Heavy Earth Moving Machinery	4	-	50	-	50	100	3	-	-	100	150
6.6	Auto reconditioning Workshop	-	6	-	50	50	-	-	100	3	100	150
6.7	Major Project	-	10	-	100	100	-	-	100	3	100	200
Student Centered Activities		-	4	-	25	25	-	-	-	-	-	25
Total		20	20	250	175	425	500		200		700	1125

***Note:** Apart from the above mentioned number of hours for each subject (Theory & Practical), at least **TWO** hours/week for each class should be allocated for Library to motivate the students to attend library compulsory. The attendance of library period should be added in master attendance.*

5.1 BASICS OF MANAGEMENT & ENTREPRENEURSHIP DEVELOPMENT

L T P

4 - -

RATIONALE

In present scenario, there is an urgent need to develop right kind of attitude, knowledge and skills amongst the Diploma engineers leading them to achieve gainful wage/ self-employment. There is a huge gap in perceptions of employers and employees regarding meeting the job requirements. Also the dual challenges of competing in global working environment and keeping pace with the rapid technological advancements call for re-design of curricula and thus enabling the importance of generic and managerial skills. Entrepreneurship development aim at developing conceptual understanding for setting up owns' business/enterprise to cope up with the problem of unemployment and also to promote the socio- economic development of our country. Both the subject areas, "Basics of Management and entrepreneurship development" are supplementary to each other. Knowledge and skills of these must be imparted to diploma engineering students for enhancing their employability and confidence in their personal and professional life.

DETAILED CONTENTS

1. Introduction to Management

(7 hrs)

- 1.1 Definitions and concept of Management
- 1.2 Functions of management- planning, organizing, staffing, coordinating and controlling
- 1.3 Various areas of management
- 1.4 Structure of an Organization

2. Self-Management and Development

(10 hrs)

- 2.1 Life Long Learning Skills, Concept of Personality Development, Ethics and Moral values
- 2.2 Concept of Physical Development; Significance of health, hygiene, body gestures
- 2.3 Time Management Concept and its importance
- 2.4 Intellectual Development: Reading skills, speaking, listening skills, writing skills (Note taking, rough draft, revision, editing and final drafting), Concept of Critical Thinking and Problem Solving (approaches, steps and cases)
- 2.5 Psychological Management: stress, emotions, anxiety and techniques to manage these.
- 2.6 ICT & Presentation skills; use of IT tools for good and impressive presentations.

3. Team Management

(10 hrs)

- 3.1 Concept of Team Dynamics. Team related skills, managing cultural, social and ethnic diversity in a team.
- 3.2 Effective group communication and conversations
- 3.3 Team building and its various stages like forming, storming, norming, performing and adjourning
- 3.4 Leadership, Qualities of a good leader

3.5 Motivation, Need of Motivation, Maslow's theory of Motivation

4. Project Management (5 hrs)

4.1 Stages of Project Management; initiation, planning, execution, closing and review (through case studies), SWOT analysis concept.

5. Introduction to Entrepreneurship (10 hrs)

5.1 Entrepreneurship, Need of entrepreneurship, and its concept, Qualities of a good entrepreneur

5.2 Business ownerships and its features; sole proprietorship, partnership, joint stock companies, cooperative, private limited, public limited, PPP mode

5.3 Types of industries: micro, small, medium and large

6. Entrepreneurial Support System (Features and Roles in Brief) (7 hrs)

6.1 District Industry Centers (DICs), State Financial Corporations (SFCs), NABARD,

6.2 MSME (Micro, Small, Medium Enterprises) – its objectives & list of schemes

7. Market Study and Opportunity Identification (7 hrs)

Types of market study: primary and secondary, product or service identification, assessment of demand and supply, types of survey and their important features

8. Project Report Preparation (8 hrs)

8.1 Preliminary Report, Techno-Economic Feasibility Report, Detailed Project Report (DPR)

LIST OF TUTORIAL EXERCISES

1. Understanding Self-Management and Development (Related to Chapter 02); through examples, cases, exercises, panel discussions, seminars, meditation and yoga techniques.
2. SWOT Analysis
3. Team Management (Related to chapter 03); through examples, cases, role plays, group discussions and panel discussions.
4. Market Study and Opportunity Identification (Related to Chapter 07); through literature reviewing, making questionnaires, conducting mock interviews and analyzing data for product/service identification and demand assessment.
5. Project Management and Project Report Preparation through exercises on making project reports on micro and small enterprises. Case studies and SWOT analysis of projects can be taken.

RECOMMENDED BOOKS

1. Generic Skill Development Manual, MSBTE, Mumbai
2. Lifelong Learning, Policy Brief (www.oecd.org)
3. Towards Knowledge Society, UNESCO Publication, Paris
4. Entrepreneurship Development by CB Gupta and P Srinivasan: Sultan Chand and sons: New Delhi
5. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill
6. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi
7. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr., Prentice Hall of India Pvt. Ltd, New Delhi
8. Entrepreneurship Development by S. L. Gupta and Arun Mittal: IBH Publication
9. A Handbook of Entrepreneurship, Edited by B S Rathore and Dr. J S Saini
10. Entrepreneurship Development and Small Business Enterprises by Poornima M: Pearson Education India
11. Handbook of Small Scale Industry by P M Bhandari

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	07	10
2	10	15
3	10	15
4	05	10
5	10	15
6	07	10
7	07	10
8	08	15
Total	64	100

5.2 ELEMENTS OF DESIGN & MECHANICS OF VEHICLES

L T P
5 - -

RATIONALE

Understanding of basic principles of designing of components like cylinder liner, piston, crank shaft, connecting rod, simple mechanism. This subject clears many concepts of quality and standardizations.

DETAILED CONTENTS

1. **Introduction** (6 hrs)
 - Design considerations, design procedure
 - Basic requirements, classifications of design and principles of good economic design.
 - Standardization, interchangeability of Automobile parts with reference to IS-specifications.
 - Limits, fits and tolerances
 - Material selection and economics
 - Designing for strength
2. **Design of keys and couplings** (15 hrs)
 - 2.1 Concept of Sunk Keys, Rectangular Keys, Square, Parallel, Crosshead, Woodruff Key
 - 2.2 Design of rectangular key
 - 2.3 Flange coupling
 - 2.4 Muff coupling
 - 2.5 Clamp coupling
3. **Design of Engine Parts** (25 hrs)
 - Cylinder liner and cylinder head
 - Piston
 - Connecting Rod
 - Clutch- Single Plate and Multi plate Clutch
 - Brakes- Internal Expanding shoe brake
4. **Simple Mechanism** (6 hrs)
 - Definition of link, kinematic pair, kinematic chain, Mechanism, inversions and machines.
 - Simple examples of mechanism with: Lower pairs, Four bar chain, Slider crank chain, Double slider crank chain, Higher pairs
5. **Motion and Turning Moment** (10 hrs)
 - Displacement, velocity and acceleration of piston
 - Angular velocity and angular acceleration of connecting rod
 - Calculations of piston effort and crank effort at different angles
 - Fly wheel: types, weight and moment of inertia
 - Fluctuation of energy for fly wheel
 - Turning moment diagrams with reference to internal combustion engines
 - Analysis of Hooke's Joint
6. **Power Transmission** (10 hrs)
 - Flat belt, V-belt and chain drives
 - Ratio of tension of two sides of the belt with and without centrifugal tension
 - Horse power transmitted and condition for maximum horse power transmitted

- Velocity ratios transmitted by Belts
- Simple, compound and epicyclic gear box

7. Vehicle Control (8 hrs)

- Braking friction and limits of braking
- Retardation and Braking force, calculations in case of front wheel, rear wheel and all wheel braking
- Weight transfer during braking
- Stopping distance and stopping time
- Ackermann Steering Mechanism, Correct Steering angle

RECOMMENDED BOOKS

1. Machine Design by P.C. Sharma & Aggarwal
2. Machine Design by Pandya & Shah
3. Machine Design by R.S. Khurmi
4. Machine Design by A.P. Verma
5. Theory of Machines by R.S. Khurmi
6. Automobile Engineering Vol-I, II, Dr. Kirpal Singh, Standard Publishers and Distributor, New Delhi
7. Theory of Machines by D.R. Malhotra; Satya Parkashion
8. Theory of Machines by PL Balaney; Khanna Publishers, Delhi.
9. Design of Machine Elements by VB Bhandari

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	6	10
2	15	20
3	25	25
4	6	10
5	10	15
6	10	10
7	8	10
Total	80	100

5.3 AUTO ENGINE – II

L T P
3 - -

RATIONALE

This subject is in continuation to Auto Engine – I. It covers diesel engines and other types of engines. It also includes combustion, performance of I.C engine. Brief description of engines of modern vehicles has also been included in this subject.

DETAILED CONTENTS

- 1. Combustion in I.C. Engines (10 hrs)**
Phenomenon of combustion in S.I. engine- phases of combustion, Turbulence, Abnormal combustion, Pre ignition and Detonation, Octane rating, Phenomenon of combustion in C.I. engines-phases of combustion. Methods of producing air movements namely squish and swirl, various types of combustion chambers for diesel engine, diesel knock, cetane rating
- 2. Fuel Supply System in Diesel Engine (12 hrs)**
 - 2.1. Layout of fuel supply system in diesel engine and their types, Modern common rail direct injection system and individual pump system
 - 2.2 Fuel filters – primary and secondary, priming and fuel feed pumps. Fuel injection pumps –plunger and barrel type, distributor type. Fuel injectors, governing and types of governors. Supercharging of engines – function, advantages and disadvantages, types and location of superchargers, turbochargers
- 3. Specialized Types of Engine (8 hrs)**
 - 3.1 Wankel engine
 - 3.2 Electrical / hybrid system/plug-in hybrid system
 - 3.3 Fuel cell engine
 - 3.4 Homogeneous Charge Compression Ignition (HCCI) engine
 - 3.5 Wheel motors
- 4. Performance of Engines (6 hrs)**
 - 4.1 Effect on engine performance due to atmospheric temperature & pressure, compression ratio, engine speed, dirt, desert, altitude and their remedial measures.
 - 4.2 Performance curves
- 5. Emission Control (6 hrs)**
Effects of pollutants from petrol and diesel engines on human beings and other materials, exhaust pollutants, sources of automotive emission, methods of emission control (by improvement in engine design and by exhaust gas treatment, positive crankcase ventilation, exhaust gas recirculation, catalytic converters for petrol and diesel engines, particulate filter selective catalytic reduction technique, NOX absorbers). Emission norms (Bharat Stage).
- 6. Hybrid vehicle and Fuel cells (6 hrs)**
Introduction, functional classification, start/stop system, mild hybrid, full hybrid, batteries for hybrid vehicles, series hybrid drives, parallel hybrid drive trains, control of hybrid vehicles

Hybrid system configuration of BMW, FIAT, VOLVO and TOYOTA
Hydrogen and fuel cells, description of fuel cell system, fuel cell components, properties of fuel cell, merits and demerits

RECOMMENDED BOOKS

- 1 Automobile Engineering Vol. II by Dr. Kirpal Singh., Standard Publishers, Delhi
- 2 Automobile Engineering by RB Gupta, Satya Parkashan, New Delhi
- 3 IC Engines by ML Mathur and Sharma, Dhanpat Rai and Sons, Delhi
- 4 Automobile Engineer by Dr. Kirpal Singh.(in Hindi), Standard Publishers, Delhi
- 5 Automotive Engine by Srinivasan, TMH, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (hrs)	Marks Allotted (%)
1	10	20
2	12	30
3	8	16
4	6	12
5	6	12
6	6	10
Total	48	100

5.4 AUTO ELECTRICAL AND ELECTRONIC EQUIPMENT

L T P

4 - 2

RATIONALE

Diploma holders in Automobile Engineering have to deal with different types of batteries, their charging and testing, regulators, ignition system, lighting system and various other electrical accessories used in Automobile Engineering. Hence the subject of automotive electric equipment is very essential for these technicians.

DETAILED CONTENTS

- 1. Introduction (3 hrs)**
Various Electrical components/systems in Automobile. Their functions and demands, earth return system, types of earthing, 6V, 12V & 24V system.
- 2. Lead Acid Batteries (12 hrs)**
 - Construction, working, elements, types, materials used, electrolyte and its strength, effect of added plate area and temperature, rating, capacity, efficiency, temperature characteristics, terminal voltages, charging and discharging.
 - Battery Testing: Electrolyte testing by hydrometer, voltage test, high discharge and cadmium test (voltage).
 - Battery Charging: Constant potential and constant current, initial charging, normal charging, trickle charging, intermittent charging, boost charging.
 - Battery Defects: Sulphation, plates decay, working, erosion, cracking, sedimentation, separator defects, short circuits, overcharging.
 - Alkaline Batteries: Construction, working, merits and demerits of Ni-Fe, Ni-Cd, Ag-Zn cells.
- 3. Charging System (6 hrs)**
 - Circuits, function and various components of alternator, types, construction, working, advantages and disadvantages of alternators, drives, cut out relay.
 - Regulation: Functions of various components of two unit, three unit and heavy duty Regulators, Regulators for alternators.
- 4. Starting System (7 hrs)**
 - Function of various components, torque terms, principle and constructional details of starter motor, switches, types, starter to engine drive and their types, Starter alternators.
- 5. Ignition System (7 hrs)**
 - Constructional details of coil, distributor, condenser, meaning of cam angle, ignition timing, ignition advancing mechanisms, centrifugal and vacuum type, transistorized ignition system, construction and working details of magneto ignition system.
 - Spark Plugs: Constructional details of spark plugs, classification as per reach, heat range, diameter, and effect of leaded fuels, care and maintenance of spark plug.

- 6. Lighting System (8 hrs)**
- Various lighting circuits, head lamp, type and constructional details, sealed beam, double filaments, fog light, side light, brake light, instrument light, indicator lights, reversing light.
 - Wiring: HT and LT, their specifications, cable colour codes, wiring Harness, Wiring diagrams of cars and two wheeler, Fuses, faults and rectification.
- 7. Electrical Accessories (5 hrs)**
- Fuel gauges:- bimetallic and balancing coil type, Air pressure gauges, temperature gauges, warning light, wind screen wipers, horns, horn relay, electric fuel pump, Faults and rectification.
- 8. Miscellaneous Electrical Equipment (4 hrs)**
- Impulse Speedometer, tachometer, heaters, defrosters and Electric door locks, window actuation.
- 9. Computer Controlled Sensors (6 hrs)**
- Principle and application of sensor in engine management: Air flow sensor, manifold pressure sensor, speed sensor, throttle position sensor, oxygen sensor, temperature sensor.
- 10. Electronics and Computer Applications in Automobiles (6 hrs)**
- Brief introduction of circuit-symbols, Integrated circuits, Logic gates, Analog and digital devices, communication chips, multiplexed wiring, working of ECU.

LIST OF PRACTICALS

1. Testing of Battery with hydrometer and high rate discharge tester, charging of Batteries.
2. Testing and measurement of ignition timing and dwell angle with timing light and cam angle tester.
3. Testing, cleaning and setting of spark plug on spark plug cleaning and testing machine.
4. Testing of alternator rotor and stator winding for short circuit, ground and broken circuit using alternator test bench.
5. Testing and setting of horn and relay.
6. Testing and fault tracing of field winding, armature and magnetic switch for short circuit, grounding of a starter using starter test bench.
7. Identification of colour codes for continuity test in a wiring harness.
8. Study and sketching of complete wiring circuit of an Indian vehicle.
9. Fault tracing and diagnosis of electronic ignition system through engine car scanner.
10. Study and demonstration of MPFI and CRDI system.

RECOMMENDED BOOKS

1. Automobile Engineering by Kirpal Singh
2. Automotive Electrical Equipment by P.L. Kohli
3. Automotive Electrical Equipment by William H. Crouse
4. Automobile Engineering by R.B. Gupta
5. Automotive Electrical and Electronics by AK Babu

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	3	04
2	12	18
3	6	10
4	7	12
5	7	10
6	8	12
7	5	08
8	4	06
9	6	10
10	6	10
Total	64	100

5.5 MECHATRONICS

L T P

4 - 2

RATIONALE

In this increasingly competitive environment of the day, the rapid advancements in the field of electronics engineering, information technology, automation and system engineering etc have been responsible for involving new concepts aimed at developing highly precision and sophisticated machine tools, system etc. for hence productivity. Hence, the diploma holders need knowledge and skills on the multi-disciplinary area and linking with the mechanical engineering. This subject e.g. Mechatronics aims at developing required knowledge and skills in this area.

DETAILED CONTENTS

- 1. Introduction (5 hrs)**
 - 1.1 Introduction to Mechatronics
 - 1.2 Mechatronic system
 - 1.3 Measurement systems
 - 1.4 Control system-open Loop, Close loop and sequential
 - 1.5 Microprocessor based controllers
 - 1.6 The Mechatronics approach

- 2. Sensors and Transducers (10 hrs)**
 - 2.1 Sensors and transducers
 - 2.2 Performance terminology
 - 2.3 Displacement, position and motion sensors
 - 2.4 Electromechanical sensors and transducers
 - 2.5 Force sensors
 - 2.6 Liquid flow sensors
 - 2.7 Temperature sensors
 - 2.8 Light sensors
 - 2.9 Selection of sensors
 - 2.10 Simple problems

- 3. Data Presentation Systems (8 hrs)**
 - 3.1 Displays
 - 3.2 Data presentation elements
 - 3.3 Magnetic recording
 - 3.4 Data acquisition systems
 - 3.5 Measurement systems
 - 3.6 Testing and calibration
 - 3.7 Simple problems

- 4. Pneumatic and Hydraulic Systems (8 hrs)**
 - 4.1 Actuation systems
 - 4.2 Pneumatic and hydraulic systems
 - 4.3 Directional control valves
 - 4.4 Pressure control valves
 - 4.5 Cylinders
 - 4.6 Process control valves
 - 4.7 Rotary actuators

- 5. Mechanical Actuation Systems (6 hrs)**
- 5.1 Mechanical systems
 - 5.2 Cams
 - 5.3 Gear trains
 - 5.4 Ratchet and pawl
 - 5.5 Belt and chain drives
- 6. Electrical Actuation System (9 hrs)**
- 6.1 Electrical systems
 - 6.2 Mechanical switches
 - 6.3 Solid-state switches
 - 6.4 Solenoids
 - 6.5 D.C. motors
 - 6.6 A.C. motors
 - 6.7 Stepper motors
- 7. Microprocessors & PLC (8 hrs)**
- 7.1 Microcomputer structure
 - 7.2 Microcontrollers
 - 7.3 Applications
 - 7.4 Programmable logic controller – applications
 - 7.5 Basic structure, input/output processing
- 8. Microcomputer controlled devices and applications (10hrs)**
- 8.1 SRS components
 - 8.2 Crash avoidance features (ESC, TCS and ABS)
 - 8.3 Electronic control transmission
 - 8.4 Collision avoidance radar warning system
 - 8.5 Keyless entry and automatic head lamps

RECOMMENDED BOOKS

1. Mechatronics by HMT, Tata McGraw Hill, New Delhi
2. Mechatronics: Electronic Control System in Mechanical Engineering by W. Bolton; Pearson Education, Singapore
3. Mechatronics-Principles, Concepts and Applications by Nitaigour Premch and Mahalik Tata McGraw-Hill Pub.
4. Automotive Electrical and Electronics by AK Babu

LIST OF PRACTICALS

1. To develop hydraulic circuit using different components
2. Layout of temperature sensor circuit.
3. Study and layout circuit of D.C. Shunt motor and stepper motor
4. Fault tracing of different sensors through engine car scanner
5. Fault tracing of supplementary restraint system (SRS)
6. Study of ABS, traction control system model
7. PLC basic circuits and control.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	05	10
2	10	15
3	08	12
4	08	12
5	06	10
6	09	14
7	08	12
8	10	15
Total	64	100

5.6 AUTO REPAIR AND MAINTENANCE

L T P

- - 6

RATIONALE

Testing and trouble shooting in an area which forms the main job of a diploma holder in automobile engineering. The competencies in knowing the working and testing of the engine, electrical system will go a long way in instilling confidence for a place in the world of work. The practice in above areas has thus been included in the curriculum. This also includes the driving practice without which testing of vehicle is not possible.

DETAILED CONTENTS

1. Inside and outside inspection/checking of vehicle, checking of engine oil, horn, starter, cooling water before starting of engine.
2. Servicing of Lubrication system : Flushing, crank case cleaning and replacing oil, filter element.
3. Servicing of fuel system : petrol feed system, cleaning and flushing fuel tank.
4. Servicing feed pump : mechanical pump, electrical pump and testing.
5. Overhauling of Petrol Engine.
6. Trouble shooting of engine : Diagnosing and rectifying to the following troubles - Engine overheating, high oil consumption, engine noises and knocks, high fuel consumption, starter turns the engine on but the engine does not start, engine fires but dies out, engine misfires, lack of power, poor acceleration, engine produces black or white smoke.
7. Practice of cylinder ridge removing using ridge cutter
8. Practice of fitting cylinder liner – sleeving and de-sleeving
9. Engine testing and finding out fuel consumption, Engine output and efficiency using engine test rig
10. Operation and use of engine Analyzer, Analysis of Petrol engine performance.
11. Alignment of connecting rod
12. Demonstration and Trouble Shooting in Refrigeration & Air Conditioning System of a Vehicle.

RECOMMENDED BOOKS

1. Automobile Repair by Abbay
2. Automobile Practical by N.K. Mangal
3. Car Maintenance & Repair W. Judge

5.7 DRIVING PRACTICE - II

L T P
- - 6

RATIONALE

After learning the basics of driving the emphasis has to shift to driving under hard condition such as in snow, fog, heavy traffic, at night and steep gradient etc. suitable practice needs to be given to the students to make them aware of different situation in driving of the vehicle.

DETAILED CONTENTS

1. Driving Techniques
 - 1.1 Revision
 - 1.2 Maneuver in: Passing, Merging, Diverging, Overtaking, Crossing, Turning, Cornering, Reversing, and Emergency stopping.
2. Use of bye pass, sub way, over bridge and fly over
3. Difficult driving- Night driving, Hill driving, Driving under special conditions like fog, heavy rain and snow etc.
4. Driving on highways: lane selection & lane discipline
5. Public relations and dealing with police
6. Fire Hazards
7. First Aid
8. Vehicle Repair & Maintenance: Break down recovery
9. Recovery from police: accident cases
10. Record keeping
11. Accounting
12. Practice on road up to 60 K.M. during the semester for each student.

5.8 PRACTICES IN COMMUNICATION SKILLS

L T P

- - 2

RATIONALE

For successful completion of diploma programme, the students should possess adequate command on language and communication skills so that they are able to express themselves with ease and felicity. The language used by the students should be appropriate to objectives and occasion. The contents of this subject shall provide them practical training through language laboratory.

LIST OF PRACTICALS

1. **Exercises on phonetics** (8 hrs)
 - 1.1 Identifications of English phonemes
 - 1.2 Stress and Intonation
 - 1.3 Speaking exercises with emphasis on voice modulation (reading and extempore)
2. **Group Discussion** (4 hrs)
3. **Exercises on** (4 hrs)
 - Self-assessment using tools like SWOT analysis
 - Listening skills
4. **Internet communication and Correspondence** (4 hrs)
 - 4.1 Resume writing
 - 4.2 Covering letter
 - 4.3 Agenda and Minutes of meeting
 - 4.4 Business Correspondence
5. **Exercises on** (4 hrs)
 - 5.1 Body language and Dress sense
 - 5.2 Etiquettes and mannerism in difficult situations like business meetings, table manners, Telephone etiquette
 - 5.3 Manners related to opposite gender
 - 5.4 Cross-cultural Communication
6. **Mock interviews** (telephonic/personal) (4 hrs)
7. **Role plays for effective Communication** (4 hrs)

6.1 AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING

L T P

4 - -

RATIONALE

Human comfort has gained priority in latest developments in automobile fields. Automobile air conditioning is now forming part of new technology vehicles. A diploma holder in Automobile Engineering must know basics of refrigeration and air-conditioning and their applications. Hence this subject provide overview of refrigeration and air-conditioning.

DETAILED CONTENTS

1. **Principles of Refrigeration** (12 hrs)
 - 1.1 Meaning
 - 1.2 Refrigeration Methods
 - 1.3 Units of Refrigeration
 - 1.4 Reversed Carnot Cycle
 - 1.5 Heat Pump
 - 1.6 Coefficient of Performance
 - 1.7 Rating of Refrigeration Machines

2. **Refrigeration Systems** (13 hrs)
 - 2.1 Air Refrigeration cycle-applications and its limitations
 - 2.2 Vapour Compression Cycle
 - 2.3 Effect of sub cooling and super heating
 - 2.4 Departure of actual vapour compression cycle from theoretical cycle
 - 2.5 Effect of varying condensing and suction temperature on coefficient of performance.
 - 2.6 Simple mathematical calculation with pressure • enthalpy charts
 - 2.7 Vapour absorption cycle
 - 2.8 Actual vapour absorption cycle and application

3. **Refrigerants** (07 hrs)
 - 3.1 Important properties of a refrigerant
 - 3.2 Properties and application of commonly used refrigerants such as R11, R12, R22, NH₃ and Water
 - 3.3 Newer refrigerants

4. **Refrigeration System, Components and Controls** (06 hrs)
 - 4.1 Function, types, specification and constructional details of components such as compressor, condenser, throttling device, evaporator, oil, separator, accumulator
 - 4.2 Various controls : solenoid valve, thermostat, low pressure/high pressure cut out, safety switch

5. **Psychrometry** (07 hrs)
 - 5.1 Various terms: Dry and wet bulb temperatures, saturation, dew point, adiabatic saturation, temperature, relative humidity, absolute humidity, humidity ratio
 - 5.2 Psychrometric processes: sensible heating and sensible cooling, humidification and dehumidification, cooling and dehumidification, heating and humidification, and their representation of psychrometric chart (concept only)

6. **Air Conditioning** (07 hrs)

- 6.1 Introduction
- 6.2 Metabolism in human body
- 6.3 Human comfort
- 6.4 Applications of air-conditioning

7. **Air conditioning System** (12 hrs)

- 7.1 Principles of automobile air conditioning.
- 7.2 Air distribution systems, concept of filter, damper, fan, blower, air register and diffuser, case/duct system, engine cooling and heater circuit.
- 7.3 Auto air conditioning systems : operating conditions, car air conditioning, bus air conditioning, truck air conditioning, performance, rating, typical installations.
- 7.4 Causes of failure of auto air conditioners.
- 7.5 Trouble shooting

RECOMMENDED BOOKS

- 1. Automobile air conditioning by Boyce H Dwiggin, Delman Thomson Publishers.
- 2. Automobile air conditioning by Crouse and Mghin, McGraw Hill Book Company.
- 3. Thermal Engineering by A.A. Sara, Satya Prakashan New Delhi.
- 4. Air Conditioning and Refrigeration by R.K. Rajput, Luxmi Publications, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	12	20
2	13	20
3	07	10
4	06	10
5	07	10
6	07	10
7	12	20
Total	64	100

6.2 AUTOMOBILE RECONDITIONING

L T P

4 - -

RATIONALE

A diploma holder is supposed to encounter vehicle breakdown and maintenance problems during his duties. He should be able to check up the performance of the vehicle and take correct measure to make up for power losses and other such defects occurring due to wear and tear in operation. It is rather highly uneconomical to out rightly reject and replace the whole unit observed to be faulty if it is possible to recondition the some of the parts like cylinder, piston, crankshaft etc. at a lesser cost. It is with this consideration that reconditioning should be undertaken. This subject is designed to give foundational knowledge and skill regarding reconditioning and maintenance.

DETAILED CONTENTS

1. **Servicing and Maintenance** (10 hrs)
 - Servicing and its necessity. Types of servicing
 - Engine decarbonizing and its various methods, precautions to minimize carbon deposits in the combustion chamber
 - Road services, road test and test report
 - Exterior and interior inspection motor vehicle, inspecting the engine compartment inspecting the trunk bottom
 - Concept of maintenance, Preventive, Seasonal, Break down maintenance
 - Maintenance schedules
 - Maintenance chart

2. **General Components** (9 hrs)
 - Method of engine decarburizing and its need
 - Method and necessity of engine sump flushing, cleaning of oil filter and air cleaner
 - Necessity and method of adjustment of dynamo/alternator belt tension, valve clearance, spark plug gap
 - Valve seat cutting and grinding, valve re-facing
 - Systematical approach to disconnect engine parts and accessories from chassis, removal of engine assembly, use of engine dismantling tools, cleaning of engine components
 - Storage of tyre and tubes
 - Factors determining retreading of tyre
 - Salient features of hot and cold retreading plants

3. **Overhauling** (10 hrs)
 - Explanation of overhauling, necessity of overhauling, period of overhauling, Delaying of overhauling period, Precautions taken during overhauling
 - Overhauling procedure (Dismantling and assembling) of engine, clutch, gear box, differential, axles, brake assemblies, suspension system, steering system

4. **Reconditioning of Cylinders** (7 hrs)
 - Necessity of cylinder head re-facing and operation of cylinder head re-facing machine
 - Cylinder wear, ovality and taper in cylinder and their measurement and permissible limit
 - Cylinder ridge removing, removing and fitting cylinder liners
 - Necessity of cylinder re-boring

- Dimensions for re-boring and number of re-bores in light and heavy motor vehicle engines e.g. Maruti, Tata
- Reconditioning of cylinder by boring, boring machines operation
- Operation of cylinder honing machine and honing amount

5. Piston and Piston Rings (5 hrs)

- Measurement of piston ring side clearance and worn gudgeon pin holes
- Procedure of replacement of pistons and piston Rings
- Piston grooves cleaning. Over size of piston and rings of light and heavy engines

6. Crank shaft, Cam shaft and Engine Bearing (9 hrs)

- Necessity and method of crank shaft and cam shaft grinding, Effect on the performance of engine
- Bearing clearance of camshaft, crankshaft and connecting rod
- Operation of crank shaft and cam shaft grinding machine size of crank shaft and cam shaft grinding amount
- Building up worn journals
- Over sizes of crank and cam shaft bearings
- Alignment of connecting rod
- Changing of connecting rod bush
- Replacement of small and big end bearing and its over sizes

7. Welding (9 hrs)

- Introduction to welding
- Types of welding
- Principles and uses of gas welding • high pressure and low pressure.
- Description of gas welding equipment, different types of flames and their applications.
- Fluxes and fillers
- Welding techniques and safety precautions
- Principles of arc welding
- Description of AC and DC welding equipment and their applications.
- Electrodes and their specifications
- Principle of Resistance welding, spot and seam welding
- Welding defects
- Modern techniques of welding
- Metal spraying

8. Painting (5 hrs)

- Preparation of surfaces for painting
- Undercoating, its necessity
- Detailed painting process of a vehicle
- Spray and oven painting
- Paint sprayers

RECOMMENDED BOOKS

1. Automobile Engineering, Vol I and II by Kirpal Singh
2. Practical Mechanic by Srivastava
3. Automobile Engineering by GBS Narang

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	10	15
2	9	15
3	10	15
4	07	10
5	05	05
6	09	15
7	09	15
8	05	10
Total	64	100

6.3 PRODUCTION PLANNING AND COSTING

L T P

4 - -

RATIONALE

A diploma holder in Automobile Engineering is supposed to look after the planning scheduling and production control activities in the industry. Also he is required to manage the materials function. He is also required to estimate the cost of new components as well as that of repairs and reconditioning components. Therefore, it is essential to teach him concepts, principles, applications and practices covering production planning and control, material and process planning and cost estimation of components manufactured by different processes. Hence this subject has been included in this course. It is expected that efforts will be made by the teacher to provide enough learning experiences to the students for developing necessary competencies related to this subject area.

DETAILED CONTENTS

A. Production Planning

1. Introduction

(6 hrs)

- Necessity of Planning and control
- Functions of production, planning and control Department
- Factors determining control procedure
- Advantages of PPC
- Types of production

2. Planning

(8 hrs)

- Material planning and allocation
- Allocation for optimum utilization
- Make or buy decision
- Break even analysis
- Process planning
- Procedure for process planning
- Process planning sheet
- Calculation of man and machine hours

3. Production Control

(4 hrs)

- Objectives
- Routing
- Loading and scheduling
- Dispatching
- Follow up

4. Plant Layout & Material Handling

(6 hrs)

- Concept of plant layout
- Method of Plant Layout
- Work Station Design
- Introduction and function of material handling
- Material handling equipments
- Safety Precaution in their use

5. Inspection and Quality Control

(7 hrs)

- Inspection : Need and Planning for Inspection
- Types of Inspection
- Role of Operator and Inspector in Inspection
- Quality Control and Quality Assurance : Meaning and Need.

- Statistical Quality Control
- Acceptance Sampling
- Control Charts for variables and Attributes
- Concept of TQM

6. Standards and Codes (3 hrs)

- National and International Codes
- ISO-9000 • Concept, its evaluation and implications

7. Inventory Control (7 hrs)

- Importance
- Store room operation
- Inventory control techniques
- Just in Time (JIT) Concept

B. Costing

8. Introduction (5 hrs)

Definition, and importance of estimating and costing. Difference between estimating and costing. Importance of preparing realistic estimates® Estimating procedures.

9. Elements of Cost (12 hrs)

- Direct materials : components.
- Direct Labour
- Indirect materials such as lubricants, Cotton waste
- Indirect Labour
- Other direct expenses such as of hired equipments.
- Overhead expenses : rent of building, office expenses.
- Depreciation and other costs like service charges.
- Profits : concepts and requirements.
- Terms used in costing.
- Prime cost
- Fabrication/service cost/factory cost
- Production cost
- Ultimate cost
- Selling price
- Fixed costs
- Variable costs.
- Estimation of costs.
- Perception of job/work order.
- Different units of work (Bifurcation as per type, Section etc.)
- Analysis of time
- Handling time
- Preparation time
- Work time
- Inspection and dispatch time

10. Sales and Purchase (6 hrs)

- Market Trends and Survey
- Advertising and sales techniques
- After sales service
- Warrantee and its claim procedures
- Purchasing • various procedures

RECOMMENDED BOOKS

1. Production Estimating and Costing by M. Adithan and B.S. Pabla
2. Industrial Engineering and Management by T.R. Banga, M.K. Agarwal and S.C. Sharma

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	6	10
2	8	12
3	4	06
4	6	10
5	7	12
6	3	05
7	7	10
8	5	05
9	12	20
10	6	10
Total	64	100

6.4 MOTOR VEHICLE ACT AND TRANSPORT MANAGEMENT

L T P
4 - -

RATIONALE

A diploma holder is supposed to perform following types of functions:

- *Significance of vehicle accident*
- *Accidental vehicle claim study*
- *Compensation from Insurance Company*
- *Thorough study of Motor Vehicle Act*
- *Driving Practices of 2/4 wheelers (private and commercial vehicles)*

Therefore, it is essential to teach them motor basic principles, essentials and appropriateness practices covering Motor Vehicle Act and driving of different vehicles. Hence this subject has been included in this course. It is expected that efforts will be made by the teacher to provide learning experiences to students for developing necessary competencies related to this subject area.

DETAILED CONTENTS

- 1. Motor Vehicle Act (10 hrs)**
Definition and provisions (Salient features of M.V. Act 1988)
Requisites and formalities for following:
 - Different forms, application for various Uses
 - Registration of old and new vehicles
 - Private and commercial vehicle
 - Transfer of vehicle : Local and State to State
- 2. Inspection and Fitness of Vehicle (6 hrs)**
 - Fitness of vehicle
 - Private and Commercial
 - Different types of permits
 - Permit consideration for transport and public service and tourist permit
- 3. Insurance (10 hrs)**
 - Different types of insurance and policies
 - Procedure to get Accidental claim and compensation
 - Surveyor duties, Relations between company and surveyor
 - MACT (Motor accident claims tribunal)
- 4. Driving (9 hrs)**
 - Driving License
 - Different types of driving licenses
 - Procedure to get license
 - Private, commercial, invalid, international license
 - Principle of Driving
 - Driving precautions
 - Driving in abnormal conditions: Like Hilly, night, fog, typhoon, heavy traffic, rainy
- 5. Road Safety (8 hrs)**
 - Road Signs
 - Imposition of Penalties for violation
 - Act and Articles
 - Duties of Driver

- Duties of conductor

6. Pollution Control

(9 hrs)

- Different contents of exhaust gas
- Prescribed standards for vehicles: bharat stage norms
- Method of Control of pollution for SI and CI engines
- Fuel efficiency

7. Transport Management

(12 hrs)

- Structure of fleet organization
- State transport, optimum utilization of fleet, source of traffic, survey of route, factors affecting frequency, preparation of vehicle schedule and duty roaster
- Road worthiness requirement
- Maintenance of log book
- History sheet, causes and prevention of: Road Accident
Analysis of Accident
- Economy of replacement
- Test Drive
- Assessment of used vehicles for sale and purchase
- Automotive Associations in India.

RECOMMENDED BOOKS

1. Journal of Transport Management by C.I.R.T. Pune
2. Motor Vehicle Act of India (with Latest Amendment)
3. Motor Vehicle Act with Rules by B.S. Kohli
4. Automobile Engineering Vol I by Dr. Kirpal Singh

SUGGESTED DISTRIBUTION OF MARK

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	10	15
2	06	10
3	10	10
4	09	15
5	08	15
6	09	15
7	12	20
Total	64	100

6.5.1 TRACTOR AND FARM EQUIPMENT

L T P
4 - -

RATIONALE

Diploma holder in Automobile Engineering have to deal with repair and maintenance of heavy duty vehicles such as tractors and farm equipments. The subject provides basic understanding of such vehicles and equipments. Hence this subject.

DETAILED CONTENTS

- 1. Tractor (9 Hrs)**
Classification of tractors, main tractor assemblies, functions on farm tractors, types of engine used, Horse power requirement, human factor in tractor design. Prominent Indian makes tractors, specifications, selection, maintenance and operation of tractors.
- 2. Tractor Theory (7 Hrs)**
Basics trends in tractor design, forces acting on a tractor on move, parallel pull and rolling resistance, tractor stability and weight distribution.
- 3. Hydraulic System (9 Hrs)**
Functions of hydraulic system, hydraulic components, and methods of attaching implements classification of hydraulic controls for hitches, integral hitch system, three point hitches, and draft control system.
- 4. Tractor Chassis (7 Hrs)**
Salient features of engine, clutch, power transmission, final drive, brakes and steering of Indian tractors.
- 5. Supplementary System (7 Hrs)**
Power take off shaft, draw bar working, belt pulley, tractor control unit.
- 6. Tractor Wheels and Tyres (7 Hrs)**
Salient features of wheels and tyres, specifications of wheels and tyres, dual versus tandem tyres, tread design, effect of tyre inflation.
- 7. Agricultural Equipment (13 Hrs)**
Types of agriculture equipment, trailer and mounted types, description and working principles of ploughs, single plough, disc plough, tiller, cultivator, reaper, winnowers, binder, thrasher , pumps, sprayers and attachments.
- 8. Repair and Maintenance (5 Hrs)**
Faults and their rectification in tractor and farm equipment and their maintenance.

RECOMMENDED BOOKS

1. Farm machines and equipment by C.P. Nakra, Dhanpat Rai and Sons
2. Manual of Tractors by Joachian Konard, Asia Publishing house
3. Tractors and Agriculture Equipment by Jain and Roy

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1	9	16
2	7	12
3	9	15
4	7	10
5	7	10
6	7	10
7	13	20
8	5	07
Total	64	100

6.5.2 AUTOMOTIVE BODY

L T P
4 - -

RATIONALE

Automobile body is very important aspect of management/operation of vehicles. Basic knowledge to diploma students of automobile engineering is significant as they have to deal with the manufacture and up keep of auto body especially accident repair. Hence the subject is added in the syllabus.

DETAILED CONTENTS

1. **Auto Body** (9 hrs)
 - Introduction
 - Main features and functions of body
 - Body requirements
 - Types, shapes : Car, Jeep, Medium and Heavy truck Half body, Articulated
 - Design principles
 - Frame construction : tubular, interrelated, channel section, Car Frame, Truck frame, Ladder.

2. **Body Structures** (13 hrs)
 - Frame less construction
 - Integral construction
 - Semi Unitary or Endo : Skeleton
 - Unitary with sub-frame
 - Car body paneling
 - Special purpose bodies
 - Passenger and luggage requirements, all metal bodies, Coach built bodies.
 - Auto floors, cowl assembly, front end assembly, roof assembly, doors and door fittings.

3. **Body Materials** (10 hrs)
 - Requirements of body materials
 - Types of materials and their specifications
 - Timber : ply wood, fiber, boards
 - Steel, M.S. : Angle, Channel, Strips
 - Aluminum alloys : Sheets, Strips, Channels etc.
 - Rivets/Screws
 - Glass : Coloured glass
 - Toughened
 - Fiber reinforced
 - General parts like door handles, hinges, latches locks • Plastics, fiber glass

4. **Seating's and Upholstery** (13 hrs)
 - Importance/need of seats
 - Types of seats
 - Seat designs/cont-ours
 - Rigidity and comfort
 - Adjusting mechanisms

- Seat making
- Seat materials : Rubber/Foam/Jute, mats/Springs Sutri
- Seating clothes : Cotton, Rexins, Leather
- Seats covers and colours, Correct Upholstry, curtain, and curtain materials
- Maintenance/cleanliness of seat and item of upholstery
- Interior Fitting-covers/mats, decoration, electrical fittings.

5. Safety Standards (08 hrs)

- Safety standards regarding
- Anchorage
- Instruments/controls
- Windshields, glass, wipers
- Doors, Windows, Roofs
- Head rests
- Safety belts

6. Body Maintenance and Accident repairs (11 hrs)

- Periodic maintenance for nuts/bolts/latches and moveable parts.
- General body repairs, replacement of panels and damaged portions, denting systematic, preparatory work, ironing of dents, finishing and patching welding, soldering. General and special tools and equipments for repair work.

RECOMMENDED BOOKS

1. Automotive Body by Anil Chhikara; SK Kataria Publication
2. Automobile Engineering by G.B. Narang
3. Automobile Engineering by K.M. Gupta
4. Automobile Engineering by Dr. Kirpal Singh

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	09	15
2	13	20
3	10	15
4	13	20
5	08	12
6	11	18
Total	64	100

6.5.3 HEAVY EARTH MOVING MACHINERY

L T P
4 - -

RATIONALE

A diploma holder in Automobile Engineering has to deal with repair and maintenance of heavy duty vehicles. The subject provides basic understanding of such special vehicles.

DETAILED CONTENTS

- 1. Earth Moving Equipment (27 hrs)**
Function, classification and constructional features of the following: Excavators, scrappers, rippers, draglines, graders, shovels, trailers, loader. Dozers : Types, Poclain Difference in each type of engine used, features of clutch, power transmission, track chains, sprockets, springs and blades.
- 2. Hoisting Equipment (14 hrs)**
Brief introduction and description of hoist winch, part lines, hoisting chains, slings, fork lift truck, cranes. Factors affecting the selection of hoisting equipment.
- 3. Rollers (08 hrs)**
Types of rollers, type of engines used for rollers. Chassis, power transmission, steering, braking and other features.
- 4. Pneumatic Equipment (9 hrs)**
Function and salient features of pneumatic tools : rock drills, hammers, chippers. Air operated grease gun and spray gun.
- 5. Calculations of hire charges for various types of earth moving equipments. (6 hrs)**

RECOMMENDED BOOKS

1. Construction Equipment by Mahesh Verma.
2. On and with the Earth by Jagman Singh.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	27	40
2	14	20
3	08	15
4	9	15
5	6	10
Total	64	100

6.6 AUTO RECONDITIONING WORKSHOP

L T P
- - 6

RATIONALE

A diploma holder in Automobile Engineering should have a reasonable practice in overhauling, reconditioning, pump calibration and maintenance of automotives. This subject in actual practice of shop floor had been added to impart competency to handle above work areas.

DETAILED CONTENTS

1. Decarbonising of Engines : removing carbon deposits from engine combustion chamber, piston crown, and valve parts manually and by using engine de-carbonizing machine.
2. Overhauling of Diesel engine.
3. Surfacing of cylinder heads, cylinder blocks and manifolds with cylinder head re- facing machine.
4. Practice in cylinder boring machine, measuring ovality and taperness of cylinder bore, using cylinder dial gauge, inside micrometer, telescopic gauge, use of direct reading micrometer.
5. Practice in honing cylinder blocks, keeping allowance of cylinder clearances.
6. Inspection and practice of crankshaft, crankpin, journal grinding, main journal grinding on crankshaft grinding machine.
7. Practice of cam shaft journals on line boring machine.
8. Servicing of valve and valve mechanism, replacement of valves, valve seats, valve guide, checking and replacement of defective springs, facing of valve, tappet and rocker arm and seat reconditioning, lapping, adjusting of valve tappets.
9. Testing of fuel injector in fuel injection tester.
10. Calibrations of fuel injection pump on fuel calibration machine.
11. Operation and use of engine analyzer, analysis of diesel engine performance.
12. Practice on brake drum lathe, measuring ovality, skimming the brake drum.
13. Practice in nozzle grinding and lapping, setting of injection pressure and nature of spray.
14. Practice in bending and nipple forming of fuel pipes.
15. Alignment of connecting rod.

RECOMMENDED BOOKS

1. Automobile Engineering by Kirpal Singh, Standard Publishers Distributors Limited, Delhi
2. Automotive Electrical Equipment by P.L. Kohli
3. Automotive Electrical Equipment by William H. Crouse
4. Automobile Engineering by R.B. Gupta, Satya Prakashan.

6.7 MAJOR PROJECT

L T P
- - 10

RATIONALE

The practical training cum project work is intended to place students for project oriented practical training in actual work situations for the stipulated period with a view to:

- i) 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.
- ii) Develop understanding of subject based knowledge given in the class room in the context of its application at work places.
- iii) 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 in the world of work.
- iv) Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

This practical training cum project work should not be considered as merely conventional industrial training in which students are sent at work places with minimal supervision. This experience is required to be planned and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnic may establish close linkage with 8-10 relevant organization for providing such an experience. 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 which are of curricular interest to students and of professional value to industrial/field organizations. Each teacher is expected to supervise and guide 5-6 students.

Effort should be made to identify actual field problems as project work for the students. Project selected should not be too complex which is beyond the level of the students. The placement of the students for such a practical cum project work should match with the competency profile of students and the project work assigned to them. Students may be assessed both by industry and Polytechnic faculty. The suggested performance criteria is given below:

1. Punctuality and regularity
2. Initiative in learning/working at site
3. Level/proficiency of practical skills acquired
4. Ability of solve live practical problems
5. Sense of responsibility
6. Self-expression/communication skills
7. Interpersonal skills/Human Relation
8. Report Writing Skills
9. Viva Voce

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

1. Projects connected with repair and maintenance of machine
2. Claim Settlement of Accidental Vehicle
3. Body Fabrication

4. Projects related to quality control
5. Projects relating to erection, installation, calibration and testing
6. Setting up of a Garage
7. Overhauling and testing of Engine (using engine scanner)
8. Vehicle testing
9. Project work related to making small working models related to recent trends in automobile industry

