5.1 BASICS OF MANAGEMENT

L	T	P
3	-	-

RATIONALE

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Topics like Structure of Organization, Leadership, Motivation, Ethics and Values, Marketing management, Financial management, Customer Relationship Management (CRM) & Total Quality Management (TQM), etc. have been included in the subject to provide elementary knowledge about these management areas.. This course explores cyber-security measures and the different forms of cybercrime and emergent forms of cyber-warfare.

LEARNING OUTCOME

After undergoing the subject, the student will be able to:

- 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 organization .
- Maintain books of accounts and take financial decisions.
- Undertake store management.
- Use modern concepts like TQM, TPM and CRM.
- Distinguish and classify the forms of cybercriminal activity and the technological and 'social engineering' methods used to undertake such crimes.
- Analyse and assess the impact of cybercrime on government, businesses, individuals and society.

DETAILED CONTENTS

1. Principles of Management (06 hrs)

1.1. Introduction, importance and general functions of management.
1.2. Concept and Types of an organization - Sole trading ,partnership, companies, corporation, PSU's and cooperative societies.
1.3. Structure of an organisation -
   a) Line organization
   b) Staff organisation
   c) Functional organization
   d) Line and staff organization

1.4. Hierarchical Management Structure
- Top, middle and lower level management

1.5. Departmentalization
- Introduction and its advantages.

2. **Leadership and Motivation** (06 hrs)

2.1 Leadership
- 3.1.1. Definition and Need of Leadership
- 3.1.2. Qualities of a good leader
- 3.1.3. Manager vs. leader
- 3.1.4. Theories of leadership –trait theory and Behaviour theory.

2.2 Motivation
- 3.1.5. Definition and characteristics of motivation
- 3.1.6. Factors affecting motivation
- 3.1.7. Maslow's Need Hierarchy Theory of Motivation and X&Y need Hierarchy theory of motivation.

3. **Work Culture** (06 hrs)

3.1. Introduction and importance of Healthy Work Culture in organization
3.2. Components of Culture
3.3. Importance of attitude, values and behaviour
Behavioural Science – Individual and group behavior.
3.4. Professional ethics – Concept and need of Professional Ethics and human values.

4. **HRM and its functions** (04 hrs)

4.1 Human Resource Management
- Manpower Planning, recruitment and selection
- Training and development of work force at the shop-floor.
- Performance appraisal
- Wages, salary and incentive schemes

5. **Marketing and sales** (06 hrs)

5.1 Marketing
- Introduction, importance and its functions
- Marketing mix for industries and service sector
- Basic Marketing strategies

5.2 Sales
- Difference between marketing and selling
- Advertisement- print media and electronic media
- Market-Survey and Sales promotion.

6. **Basic of Accounting and Finance** (06 hrs)

6.1 Basic of Accounting:
- Meaning and definition of accounting
- Double entry system of book keeping
- Trading account, PLA account and balance sheet of a company

6.2 Objectives of Financial Management
- Profit Maximization v/s Wealth Maximization

7. **Material and Stores Management** (04hrs)

- Introduction, functions and objectives of material management
- Purchasing: definition and procedure
- Just in time (JIT)

8. **TQM , TPM** (02 hrs)

Total Quality Management (TQM) and Total Preventive Maintenance (TPM) - Concepts and importance

9. **Customer Relationship management (CRM)** (02 hrs)

Customer Relationship management - Concepts and importance

10. **Cyber Security** (06 hrs)

-Introduction to Cyberspace and Cyber Law, Pros and Cons of social media.
-Different Components of cyber Laws; Cyber Law and Netizens
- Categories of Cyber Crime: Personal, Business, Financial, Office Security
-Cyber Crime – Complete transparency, hacking/cracking, denial of service, IP piracy, phrasing, hetaerism etc. Cyber Attack – cyber attackers.
-Introduction to IPR, copyright & patent

INSTRUCTIONAL STRATEGY

It is observed that the diploma holders generally take up middle level managerial positions, therefore, their exposure to basic management principles is very essential. Accordingly students may be given conceptual understanding of different functions related to management. Some of the topics may be taught using question answer, assignment or seminar method. The teacher will discuss success stories and case studies with students, which in turn, will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organizations. Appropriate extracted reading material and handouts may be provided.

RECOMMENDED BOOKS

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
4. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
5. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
6. Intellectual Property Rights and the Law by Dr. GB Reddy.
7. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
8. Nandan Kamath, A Guide to Cyber Laws & IT Act 2000 with Rules & Notification
9. Keith Merill & Deepti Chopra (IK Inter.), Cyber Cops, Cyber Criminals & Internet

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	06	12
2.	06	12
3.	06	12
4.	04	9
5.	06	12
6.	06	12
7.	04	9
8.	02	05
9.	02	05
10.	06	12
Total	**48**	**100**

5.2 AUTO ENGINE - II

L	T	P
3	-	2

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.

Learning Outcomes:

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

- Explain the phenomenon of combustion in I.C engine.
- Explain the working of fuel supply system in diesel engine
- Identify and select various components of fuel supply system is diesel engine.
- Interpret effect of various parameters on engine performance.
- Comprehend effect of automobile pollution on humans and methods to control pollution
- Explain the concept involved in specialized engine.

DETAILED CONTENTS

1. Combustion in I.C. Engines (12 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 (16 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).

LIST OF PRACTICALS

1. Sketching and working of fuel supply system with in line pump in diesel engine
2. Testing of fuel injector (diesel) on test rig.
3. Phasing of fuel injection pump (Jerk type).
4. Calibration of fuel injection pump (Jerk type).
5. Servicing of turbocharger.

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis in making the students conversant with the principles and practices related to various types of engines. Audio visual aids should be used to show engine features and working. Demonstrations should be made in automobile shop to explain various engine components.

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	12	25
2	16	35
3	8	16
4	6	12
5	6	12
Total	**48**	**100**

5.3 CHASSIS, BODY AND TRANSMISSION-II

L	T	P
3	-	2

RATIONALE

Chassis, body and transmission form the core of automobile engineering. The subject aims at imparting knowledge and skills regarding chassis and body viz, clutch system, transmission system, drive system, steering mechanism, suspension system, braking system and safety of vehicles

Learning Outcomes :

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

- Explain functions and constructional features of various types of automotive suspension system
- Diagnose and rectify faults in automobile suspension system
- Explain the constructional detail and nomenclature of various types of tyres.
- Take appropriate measures for optimizing tyre life.
- Explain the functions, constructional features and working of various types of brakes
- Diagnose and rectify the faults in disc and drum brakes
- Comprehend the function of various automotive safety system.

DETAILED CONTENTS

1. Suspension System (12 hrs)

Function, types- independent, rigid axle. Springs – functions, construction materials and types (coil spring, leaf spring and torsion bar) sprung and unsprung weight, characteristics of springs, spring eye, bushes, variable rate spring, helper leafs, leaf sections, camber grading and nippling spring seats, rubber pads, pressure blocks, spring cover, interleaf inserters. Function and construction of hydraulic dampers (shock absorbers). Pneumatic suspension system – lay out and working. Function and Construction of hydraulic damper (shock absorber). Diagnosis of common faults and their rectifications

2. Wheel and Tyres (10 hrs)

Wheels – types, constructional detail, Tyres – classification of tyres. Construction of pneumatic tyres, composition of covers, tread breaker, bead and casing, comparison of cross-ply and radial-ply tyres. Causes of excessive tyre wear. Tyre care and maintenance. Static and dynamic balance. Tubeless tyres, Run flat tyres, retreading of tyers.

3. Braking System (12hrs)

Purpose of brakes, layout of braking system, components, Types of brakes- mechanical, hydraulic, power. Principle of hydraulic brakes, braking action, master cylinder, wheel cylinder, leading and trailing shoes, self adjusting brakes, self applying and self releasing action, anti-skid devices, pedal travel, brake enclosures, heat generation and opening temperature, Drum brakes-Construction & Working, Disc. Brakes-Construction and Working. Power Brakes - Air, air-hydraulic, hydro-vac brakes-their construction components and working details. Brake fluid and its characteristics, brake liner, hand brake, Antilock brake systems. Brake test, common faults and their rectification. Common faults and their rectification.

4. Automotive Safety System (6 hrs)

Preventive design, designing for minimum injury in accident, seat belts, air bags, electronic vehicle stability and occupant protection systems, pedestrian protection.

5. Miscellaneous (8 hrs)

History, leading manufacturers of automobiles, their market share, recent developments in automobile industry and automotive components industry in India. Specifications of a 2-wheeler and a 4-wheeler, milestones in the development of automobiles

LIST OF PRACTICALS

1. Demonstration and Sketching of suspension system - coil spring, leaf spring, torsion bar.
2. Servicing of shock absorber.
3. Servicing/Overhauling of mechanical & hydraulic brakes, adjustment and bleeding of brakes.
4. Demonstration and Sketching of Power brakes.
5. Wheel Balancing- Static and Dynamic.

INSTRUCTIONAL STRATEGY

Teacher should make use of audio visual aids to show features of chassis, body and transmission. Demonstration should be made in the automobile shop to explain various aspects of chassis, body and transmission.

RECOMMENDED BOOKS

1. Automobile Engineering, Vol. I – II by Dr. Kirpal Singh, Standard Publishers, Delhi
2. Automobile Engineering by GBS Narang, Khanna Publishers, Delhi
3. Chassis, Body and Transmission by Vijay Singh & Raj Kumar, Ishan Publications, Jalandhar.
4. Chassis, Body and Transmission-II by G.S.Aulakh, Eagle Prakashan, Jalandhar.
5. Automobile Engineering by R.B. Gupta, Satya Prakashan, New Delhi.
6. Chassis, Body and Transmission by Ishan's Publications, Jalandhar.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	12	22
2	10	20
3	12	22
4	6	18
5	8	18
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, lighting system and various other electrical accessories used in Automobile Engineering. Hence the subject of automotive electric equipment is very essential for these technicians.

Learning Outcomes :

After undergoing this course, the students will be able to

- Identify various auto-electrical faults/troubles and their causes.
- Analyse and rectify various auto-electrical troubles with the help of troubleshooting charts
- Use suitable instruments and tools for diagnosis and testing of automotive electrical system
- Able to explain censoring system, ECM etc.
- Explain different type of accessories use in automobile
- Explain charging and starting system

DETAILED CONTENTS

1. Introduction (03 hrs)

   Various Electrical and Electronics equipment components/systems in Automobile. Their functions and demands, earth return system, types of earthing, 6V, 12V system.

2. Batteries (14 hrs)

   2.1. Lead Acid Batteries: 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.

   2.2. Battery Testing: Electrolyte testing by hydrometer, voltage test, high discharge and cadmium test. (voltage)

   2.3. Battery Charging: Constant potential and constant current, initial charging, normal charging, trickle charging, intermittent charging, boost charging.

   2.4. Battery Defects: Stipulation, plates decay, working, erosion, cracking, sedimentation, separator defects, short circuits, overcharging

2.5. Basic description of Alkaline Batteries:

2.6 Lithium ion battery: Construction and working

3. Charging System (10 hrs)

3.1. Circuits, function and various components, dynamo and alternator, types, construction, working, advantages and disadvantages of dynamo and alternators, drives, cut out relay.

3.2. Regulation: Functions of various components of two unit, three unit and heavy duty Regulators, Regulators for alternators.

4. Starting System (10 hrs)

- Function of various components, torque terms, principle and constructional details of starter motor, switches, types, starter to engine drive and their types, integrated started motor.

5. Lighting System (08 hrs)

5.1. Various lighting circuits, head lamp, type and constructional details, sealed beam, double filaments, asymmetric and dual units, vertical and side control of lamps, fog light, side light, brake light, instrument light, indicator lights, reversing light, lamp mounting.

5.2. Wiring: HT and LT, their specifications, cable colour codes, wiring Harness, Cable connections, Wiring diagrams of cars and two wheeler, Fuses, faults and rectification.

6. Electrical Accessories (08 hrs)

- Fuel gauges - bimetallic and balancing coil type, Air pressure gauges, temperature gauges, Ammeter, warning light, speedometer, wind screen wipers, horns, horn relay, electric fuel pump, Faults and rectification.

7. Miscellaneous Electrical Equipment (04 hrs)

- Impulse Speedometer, tachometer, heaters, defrosters, Air conditioner, and Electric door locks, window actuation, Seat adjusters.

8. Electronic Devices and Application in Automobile Engineering (07 hrs)

Familiarisation with automobile electronic devices, Sensoring units.
Integrated circuits, Rectifiers, Logic gates, Analog and digital devices, converters, signal conditioners, communication chips, multiplexed wiring, working of ECU, microprocessor and microcontroller its applications.

LIST OF PRACTICALS

1. Testing of alternator rotor and stator winding for short circuit, ground and broken circuit.
2. Head light beam setting.
3. Testing and setting of horn and relay.
4. Testing and fault tracing of field winding, armature and magnetic switch for short circuit, grounding of a starter.
5. Testing dipper switch, flasher unit and indicator circuits and fault tracing.
6. Testing and fault tracing of different components of transistorized ignition system.
7. Identification of colour codes for continuity test in a wiring harness.
8. Study and sketching of complete wiring circuit of an Indian vehicle.

INSTRUCTIONAL STATREGY

Teachers should lay emphasis on concepts and principles while imparting instructions. As far possible, subject teaching should be supplemented by demonstrations in the laboratory. During practical work, individual students should be given opportunities to perform practicals independently.

RECOMMENDED BOOKS

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	03	05
2	14	20
3	10	16
4	10	16
5	08	12
6	08	12
7	04	07
8	07	12
Total	**64**	**100**

5.5 ELEMENTS OF DESIGN

L	T	P
3	-	-

RATIONALE

Understanding of basic principles of design of various machine elements for diploma holders in Automobile Engineering.

Learning Outcomes:

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

- Identify different types of design procedures
- Apply limits, fits, tolerances on different machine elements
- Design various machine elements(flange coupling, clutches, flywheel, joints and pulleys, spur gear)

DETAILED CONTENTS

1. Introduction (12 hrs)

   - Design consideration, design procedure
   - Basic requirements, classification of design and principles of good economic design
   - Standardization, interchangeability of automobile parts among industry and at global level.
   - Limits, fits and tolerances
   - Material Properties: elasticity, plasticity, ductility, malleability, toughness, hardness, fatigue, creep.
   - Materials selection and ergonomics
   - Designing for strength

2. Design of **:** (24 hrs)

   - Flanged coupling(protected and unprotected),muff or sleeve coupling
   - Clutch.(single plate and multi plate clutch)
   - Flywheel
   - Joints(knuckle, universal) and pulleys
   - Gears(spur gear)

3. Design of **:** (12 hrs)

   a Design of shaft subjected to torsion only, determination of shaft diameter (hollow and solid shaft) on the basis of strength criteria, rigidity criterion

   b Types of key, Functions of key, Failure of key, Design of key (determination of key dimensions)

INSTRUCTIONAL STRATEGY

Teacher should lay emphasis on conceptual understanding and design aspects of various parts/components. Various models should be demonstrated in the class to explain mechanism

RECOMMENDED BOOKS

1. A Text Book of Machine Design by RS Khurmi & JKGupta, Eurasia Publishing House, Pvt. Ltd.., New Delhi
2. Introduction to Machine Design by VB Bhandari, TMH, Delhi
3. Theory of Machines by PL Ballaney, Khanna Publishers, New Delhi
4. Theory of Machines by DR Malhotra & HC Gupta, Satya Prakashan, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	12	25
2	24	50
3	12	25
Total	**48**	**100**

5.6 AUTO REPAIR, MAINTENANCE AND DRIVING PRACTICE – I

L	T	P
-	-	12

RATIONALE

Testing and trouble shooting of various systems and components of automotive vehicle is an area where a diploma holder must have proficiency. He should be fully aware of the procedures of overhauling of engine, gearbox, and differential. He should be trained in using various controls while driving. That is why, this subject has been introduced.

Learning Outcomes

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

- Diagnose and rectify electrical system faults
- Carryout servicing of vehicles.
- Overhaul petrol engine, gear box and differential
- Perform emission test on automobile

LIST OF PRACTICALS

1. Testing of battery with hydrometer, high rate discharge tester. Charging of batteries.
2. Testing and setting of ignition timing with timing light, cam angle tester, and dwell angle tester.
3. Testing and cleaning of spark plug.
4. Servicing of air cleaner
5. Colour codes and sketching of complete wiring circuits of an Indian automobile.
6. Inside and outside inspection/checking of vehicle, checking of engine oil, horn, starter, coolant before starting of engine, brake oil.
7. Adjusting Clutch free play. Cleaning clutch plate and assembly
8. Setting brake pedal free play and carry out bleeding.
9. Gear changing from low to high and high to low speed on the road.
10. Practice on general road safety, road and traffic signals and driving regulations.
11. Driving practice on road for steering control.
12. Starting of engine and warming up.
13. Check the performance of engine using compression gauge and vacuum gauge
14. Overhauling of gearbox.
15. Overhauling of differential.
16. Servicing of suspension system, leaf springs, independent suspension, coil spring, torsion bar, telescopic shock absorber.
17. Removal and fitting of wheels and tyres of a two wheeler and repairing of punctures

18. Cleaning, greasing, checking as per maintenance schedule of two wheelers
19 Cleaning, greasing, checking as per maintenance schedule for washing, wiping and polishing of jeep/car
20 Use of smoke meter to measure emission
21. Overhauling of petrol engine.

RECOMMENDED BOOKS

1. Automobile Engineering by Kirpal Singh, Standard Publishers, Delhi
2. Auto Workshop & Driving Practice by G.S. Aulakh, Eagle Prakashan, Jalandhar.
3. Automotive Electrical Equipment by P.L. Kohli., TMH, Delhi
4. Automobile Engineering by R.B. Gupta, Satya Parkashan, New Delhi

PERSONALITY DEVELOPMENT CAMP

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person interviews; telephonic interviews, panel interviews; group interviews and video conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene