6.1 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, Customer Relationship Management (CRM), Legal Aspects of Business, Total Quality Management (TQM), Intellectual Property Rights (IPR) etc. have been included in the subject to provide elementary knowledge about these management areas.

DETAILED CONTENTS

1. Principles of Management (06 hrs)

   1.1. Introduction, definition and importance of management.

   1.2. Functions of Management
   Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling.

   1.3. Concept and Structure of an organization

   Types of industrial organization
   a) Line organization
   b) Functional organization
   c) Line and Functional organization

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

   1.5. Departmentalization
   Introduction and its advantages.

2. Work Culture (06 hrs)

   2.1. Introduction and importance of Healthy Work Culture in organization
   2.2. Components of Culture
   2.3. Importance of attitude, values and behaviour
   Behavioural Science – Individual and group behaviour
   2.4. Professional ethics – Concept and need of Professional Ethics

3. Leadership and Motivation (06 hrs)

3.1. Leadership
   a) Definition and Need of Leadership
   b) Qualities of a good leader
   c) Manager vs. leader

3.2. Motivation
   a) Definition and characteristics of motivation
   b) Factors affecting motivation
   c) Maslow's Need Hierarchy Theory of Motivation

3.3. Job Satisfaction

4. Legal Aspects of Business: Introduction and need (06 hrs)

4.1. Labour Welfare Schemes
   a) Wage payment : Definition and types
   b) Incentives: Definition, need and types

4.2. Factory Act 1948

4.3. Minimum Wages Act 1948

5. Management Scope in different Areas (12 hrs)

5.1. Human Resource Development

   a) Introduction and objective
   b) Manpower Planning, recruitment and selection
   c) Performance appraisal methods

5.2. Material and Store Management

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

5.3. Marketing and Sales

a) Introduction, importance and its functions
b) Difference between marketing and selling
c) Advertisement- print media and electronic media
d) Market-Survey and Sales promotion.

5.4. Financial Management – Introduction

a) Concept of NPV, IRR, Cost-benefit analysis

b) Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund

5.5 Maintenance Management

a) Concept

b) Preventive Maintenance

6. Miscellaneous topics (12 hrs)

6.1. Customer Relationship Management (CRM)

a) Definition and Need

b) Types of CRM

c) Customer satisfaction

6.2. Total Quality Management (TQM)

a) Inspection and Quality Control

b) Concept of Quality Assurance

c) TQM

6.3. Intellectual Property Rights (IPR)

a) Introduction, definition and its importance

b) Infringements related to patents, copyright, trade mark

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. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
9. Intellectual Property Rights and the Law by Dr. GB Reddy.
10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	06	15
2.	06	10
3.	06	15
4.	06	10
5.	12	25
6.	12	25
Total	**48**	**100**

6.2 AUTO REPAIR, MAINTENANCE AND DRIVING PRACTICE - II

L	T	P
-	-	8

RATIONALE

A diploma holder in Automobile Engineering, should have reasonable practice on fault diagnosis with the help of latest machines like engine analyzer etc. Stress has also to be laid on the use of exhaust gas analyzer and other machines for the maintenance of automobiles. Student should also be proficient in driving and maintenance of vehicle. Hence this subject.

LIST OF PRACTICALS

1 -6 Trouble shooting of engine: Diagnosing and rectifying the following troubles- Engine overheating, high oil consumption, engine noises and knock, high fuel consumption, starter turns the engine but engine doesn't start, engine fires but dies out, engine misfires, lack of power, poor acceleration, engine produces black and white smoke; use of computerized engine analyzer, exhaust gas analyzer. Bringing exhaust gas contents within emission norms.

7. Engine testing and finding out all parameters using computerized engine analyzer

8. Emission test using exhaust gas analyzer

9. Decarbonising of engine - removing carbon deposits from engine combustion chamber, piston crown, valve parts.

10. Valve servicing:

    Refacing, seat reconditioning, lapping , testing, replacing worn out parts and tappet adjustment.

11. Reconditioning of engine - Measuring of bore for wear and ovality, servicing the cylinder bore, replacing of piston and piston rings.

12. Inspection of crank shaft – bearing replacement and setting of journal bearing. Crank pin bearings and crank shaft bearings, measuring bearing clearances by gauges. Inspection of bearing with plastic gauge.

13. Servicing of valves and valve mechanism – Replacement of valves, valve seats. valve guides, checking and replacement of defective springs, refacing of valves, tappet and rocker arm and adjusting valve tappets. Placement of shims in overhead valves.

14. Surfacing of cylinder head, cylinder block and manifolds with cylinder head refacing machine.

15. Practice in piston ring removal.

16. Practice in honing cylinder block, keeping allowance of clearances.

17 Engine diagnosis using engine control module (ECM)

18	Testing of sensors using Laptop/Replacement if needed
19	Servicing of Hydraulic systems in tractors
20	Servicing of components of tractors and heavy earth machines
21	Onboard diagnosis of car
22.	Practice in fitting cylinder liners – sleeving and desleeving.
23	Practice in nozzle grinding and lapping, setting of injection pressure and nature of spray.
24	Practice in bending and nipple forming of fuel pipes.
25	Overhauling of wheel and axles.
26.	Overhauling of power brakes. Bleeding of brakes.
27.	Practice in brake drum turning, measuring ovality, skimming the brake drum.
28.	Tyre retreading. (The students may be taken to a service industry).
29.	Practice in wheel balancing
30.	Practice in wheel alignment
31.	Practice in automatic tyre changers
32.	Service of injectors (petrol)
33.	Crank shaft regrinding
34	Practice in preparing preventive maintenance schedule
35-40	Driving Practice on the road to gain proficiency in driving. 50% of the time of the subject should be given to driving.

Note: Visit to an automobile or tractor industry/workshop at least for two days. is essential.

RECOMMENDED BOOKS

1. Automobile Engineering by Dr. Kirpal Singh; Standard Publisher, Delhi.
2. Automobile Engineering by R.B. Gupta; Satya Prakashan, New Delhi.
3. Maintenance and Repair of Motor Vehicle by H.O. Geneva; , R-686, New Rajinder Nagar, New Delhi.

6.3 MOTOR VEHICLE ACT AND TRANSPORT MANAGEMENT

L	T	P
4	-	-

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.

DETAILED CONTENTS

1. Motor Vehicle Act (12 hrs)

   1.1 .Motor Vehicle Act - Main Provisions
   1.2. 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 (06 hrs)

   2.1. Fitness of vehicle -meaning and purpose, provisions in the act,
   2.2. Detailed procedure and requirements for vehicle inspection

3. Insurance of Vehicles (06 hrs)

   3.1. Meaning of Insurance and its necessity
   3.2. Different types - comprehensive and third party insurance
   3.3. Procedure to get Accidental claim and compensation
   3.4. Surveyor duties
   3.5 Relation between company and surveyor
   3.6 Duties of driver in case of accident and injury to a person

4. Vehicle Finance (04 hrs)
   4.1. Sources and types of finance
   4.2. Rate of interest, incentives

4.3. Net borrowing rate, documents required.

5. Driving (08 hrs)

5.1. Principle of driving
5.2. Driving procedure
5.3. Driving precautions
5.4. Driving in abnormal conditions, like hilly area, night, fog, heavy traffic and rain
5.5. Emergency Driving situations
5.6. Driving License - purpose, importance and requirements
5.7. Different types of driving license
5.8 Procedure to get driving license

6. Road Safety (06 hrs)

6.1. Road Signs/signals
6.2. Traffic rules
6.3. Imposition of Penalties for violation of rules
6.4. Duties of Driver, Conductor and Helper towards safety of vehicles/ passengers/ goods and self

7. Pollution Control (06 hrs)

7.1. Different contents of exhaust from vehciles
7.2. Prescribed standards for pollution
7.3. Status and Schedule for Enforcement of emission norms
7.4 Measurement of emission levels remote sensing of emission

8. Transport Management (16 hrs)

8.1. History of transport with special reference to road transport in India
8.2. Modes of Road transport
8.3. 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
8.4. Structure of fleet organization
8.5. State transport - optimum utilization of fleet.
8.6. Roadworthiness requirement,
8.7. Maintenance of logbook, History sheet, Causes, and prevention of Road Accident, Analysis of Accident, Economy of replacement, Assessment of used vehicles for sale and purchase, Training of Drivers and Mechanics.
8.8. Central Motor Vehicle Rules – Main features
8.9. Vehicle safety standards and regulations

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.

RECOMMENDED BOOKS

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

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

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

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.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	12	18
2	06	10
3	06	10
4	04	06
5	08	12
6	06	10
7	06	10
8	16	24
Total	**64**	**100**

6.4. AUTO SENSORS AND MECHATRONICS

L	T	P
4	-	2

RATIONALE

A diploma holder in Automobile Engineering must have knowledge of microprocessors, microcontrollers and other electronic systems which are used in automobiles. Hence this subject.

DETAILED CONTENTS

1. Basic electronics (06 hrs)

   Introduction, electronic devices and circuits, circuits, amplifiers, converters and digital electronics..

2. Microprocessors (10 hrs)

   Block diagram of microcomputer, Architecture of intel 8085, importance of data, Address and control buses. Instruction formats, Addressing modes and types of instructions in Intel 8085. Instruction set of 8085. Memory devices.

3. Micro Controllers (08 hrs)

   Comparison of microprocessor and microcontrollers. Survey of 4,8,16 and 32 bit microcontrollers, Architecture of 8051

   DC motor and stepper motor controls.

4. Electronic fuel control system (08 hrs)

   Introduction, components, open loop and closed loop control system. Intake manifold pressures, mass air flow rate, sensor, throttle body injection and multiport or point fuel injection. Fuel injection system control.

5. Digital engine control system (08 hrs)

   Concept, parameters, variables, engine mapping, control strategy, enrichment, Deceleration, leaning and idle speed control. EGR control, variable valve timing control, electronic ignition control, electronic spark timing control.

6. Transmission Control System (08 hrs)

   Electronic transmission management, layout, electronic control of automatic transmission, valve actuating control system, two wheel drive control, four wheel drive control.

7 Chassis Control System (08 hrs)

Electronic management of chassis system. Cruise control systems, electronic suspension system, antilock braking control system, traction control system and vehicle stability control system. Electronic steering control.

8 Body Control and security (08 Hrs)

Body control system, remote control locking, keyless entry, automatic air conditioning system, security systems – immobilizer and warning system, GPS system, Electronic control diagnosis , usage of multimeter. Immobilizer and oscilloscope and their uses. Coding.

LIST OF PRACTICALS

1. Study of 8085 microprocessor kit.
2. Write a program to add and subtract two 8-bit numbers using 8085.
3 Study of 8051/8031 microcontroller kits.
4 Write a program for multiplication of two numbers using 8051.
5 Write a program to control the speed of DC motor.
6 Programming of PLC based system to control speed of DC motor.

INSTRUCTIONAL STRATEGY

Efforts should be made to relate the actual application of various mechanical drives, devices and switches in modern manufacturing. Students should be taken to industrial units for clear conception.

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. Fundamentals of Electrical Engineering and Electronics by BL Thareja; S. Chand and Company, New Delhi.

4. Basic Electronics by Gupta, NN Bhargava, Kulshreshtha, TTTI, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

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

6.5.1 AUTO BODY
(ELECTIVE)

L	T	P
4	-	-

RATIONALE

A diploma holder in Automobile Engineering must have complete knowledge of automobile body construction, material used, safety aspects and other features. Hence this subject.

DETAILED CONTENTS

1. Introduction (10 hrs)

Classification of automobiles on different basis. Types of vehicles, Car body details, Types , Salerris, convertibles, limousine, eastern van, racing and sports cars. Car body construction types-frame and unitary (manocoque) . Various body panels and their constructional details. Methods of improving space in cars.

2. Commercial Vehicle Details (06 hrs)

Types of commercial vehicles, Commercial vehicle body details –flat flatform, drop side, fixed side, tipper body, tanker body, tractor trailer.

3. Body Materials (08 hrs)

Steel sheet, timber, FRP, Plastic, GRP, Corrosion and anti corrosion methods, scalation of paint and painting process, body trim items and body mechanisms

4 Safety (10 hrs)

Safety aspects in vehicle bodies, Safety equipments in cars- anti roll bars, roll over bar, collapsible steering, multistage bumper, seat belts, collision crumble zones..

5 Special Purpose Vehicles (08 hrs)

Various types, Needs & constructional details – Fire station vehicle, tankers, ladder vehicle, concrete mixer, transport vehicles-Ambulance..

6. Vehicle Aerodynamics (14 hrs)

Objectives, vehicle drag and types of force and moments – Effect of forces and moments. Side wind effects on forces and moments. Various body optimization techniques for reducing drag. Tunnel testing, Flow visualization techniques. Scale model testing.

7 Ergonomics (08 hrs)

Man machine system. Anthropometry data and considerations in design of seat, controls and displays, gear lever, steering wheel, foot controls etc. Dimensions of driver's seat in relation to control, visibility. Methods of improving visibility. Effect of noise, vibration and heat on human body and their control. Driver cab design.

INSTRUCTIONAL STRATEGIES

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.

LIST OF RECOMMENDED BOOKS

1. Body Engineering by Sydney F. Page; Chapman Hill Co., London
2. Automobile Engineering by Kirpal Singh, Katson Publications.
3. Aerodynamics of Road vehicles by Hucho W.H.; Butterworths .
4. Automobile Engineering by Anil Chikara

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	10	16
2	06	10
3	08	12
4	10	16
5	08	12
6	14	22
7	08	12
Total	**64**	**100**

6.5.2 TRACTORS AND HEAVY EARTH MOVING MACHINERY (ELECTIVE)

L	T	P
4	-	-

RATIONALE

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

DETAILED CONTENTS

1. Tractor (12 hrs)

Classification of tractors, main tractor assemblies, functions of farm tractors, types of engine used, power requirement, 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, tractor stability and weight distribution

2 Hydraulic System (08 hrs)

Functions of hydraulic system, hydraulic components, method of attaching implements, classification of hydraulic controls for hitches, integral hitch system, draft control system. Position control and Mixed control

3 Tractor Chassis (08 hrs)

Salient features of engine, clutch, power transmission, final drive, brakes and steering of Indian tractors.

4. Supplementary System (06 hrs)

Power take off shaft, draw bar working, belt pull traction control unit, three point linkages

5. Tractor Wheels and Tyres (10 hrs)

Salient features of wheels, tyres and wheel base/wheel tracks. Specifications of wheels and tyres, dual versus tendum tyres, tread design, effect of tyre inflation. Prominent make of Indian – Tractors. Selection criteria, maintenance and operation of tractors, differential lock.

6 Earth Moving Machinery (12 hrs)

Description and working principle of:

- Bull Dozer
- Leveller
- Front end loader
- Cranes
- Scrapper

6. Repair and Maintenance (8 hrs)

Faults and their rectification in tractor and maintenance of tractor.

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.

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.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	12	20
2	08	12
3	08	12
4	06	10
5	10	16
5	12	18
6	08	12
Total	**64**	**100**

6.6 MAJOR PROJECT WORK

L	T	P
-	-	12

Project work aims at developing skills in the students whereby they apply the totality of knowledge and skills gained through the course in the solution of particular problem or undertaking a project. The students have various 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. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments. 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 for a group. The students should identify or given project assignment at least two to three months in advance. The project work identified in collaboration with industry may be preferred.

Each teacher is expected to guide the project work of 4-5 students.

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

Sr. No.	**Performance criteria**	**Max. marks**	**Rating Scale**				
			Excellent	**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

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	65-80	Very good
iii)	50-64	Good
iv)	41-49	Fair
v)	Less than 40	Poor

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance of undergoing 8 -10 weeks of project oriented professional training in the same industry and re-evaluated 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.

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 100 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 another criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations in such an exhibition. 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 industries are approached for instituting such awards.