6.1 INDUSTRIAL MANAGEMENT

L	T	P
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RATIONALE

The knowledge of this subject is required of all diploma holders who wish to choose industry/field as this career. This course is designed to develop understanding of various functions of management, role of workers and engineers and providing knowledge about safety and labour, industrial laws and management in different areas.

DETAILED CONTENTS

1. Principles of Management (2 hrs)

   - Management, different functions of management: Planning, organizing, coordination and control.
   - Structure of an industrial organization.
   - Functions of different departments. Relationship between individual departments.

2. Human and Industrial Relations (4 hrs)

   - Human relations and performance in organization.
   - Understand self and others for effective behaviour.
   - Behaviour modification techniques.
   - Industrial relations and disputes.
   - Relations with subordinates, peers and superiors.
   - Characteristics of group behaviour and trade unionism.
   - Mob psychology
   - Grievance, handling of grievances.
   - Agitations, strikes, lockouts, picketting and gherao
   - Labour welfare.
   - Workers' participation in management.

3. Professional Ethics (4 hrs)

   - Concept of ethics.
   - Concept of professionalism.
   - Need for professional ethics.
   - Code of professional ethics.
   - Typical problems of professional engineers.
   - Professional bodies and their role.

4. Motivation (4 hrs)

   - Factors determining motivation

- Characteristics of motivation.
- Methods for improving motivation.
- Incentives, pay, promotion, rewards.
- Job satisfaction and job enrichment.

5. Leadership (4 hrs)

- Need for leadership.
- Functions of a leader.
- Factors for accomplishing effective leadership.
- Manager as a leader.

6. Human Resource Development (4 hrs)

- Introduction.
- Staff development and career development.
- Training strategies and methods

7. Wage Payment (4 hrs)

- Introduction
- Classification of wage payment scheme.

8. Labour, Industrial and Tax Laws (4 hrs)

- Importance and necessity of industrial legislation.
- Types of labour laws and disputes.
- Brief description of the following Acts: The Factory Act 1948; Payment of Wages Act 1936; Workmen Compensation Act 1923; Industrial Dispute Act 1947; Employee' State Insurance Act, 1948; Provident Fund Act.
- Various types of Taxes-Production Tax, Local Tax, Sales Tax, Excise Duty, Income Tax.
- Labour Welfare schemes.

9. Accidents and Safety (4 hrs)

- Classification of accidents; according to nature of injuries i.e. fatal, temporary; according to event and according to place.
- Causes of accidents-psychological, physiological and other industrial hazards.
- Effects of accidents.
- Accidents-prone workers.
- Action to be taken in case of accident with machines, electric shock, road accident, fires and erection and construction accidents.
- Safety consciousness & publicity.
- Safety procedures.
- Safety measures-Do's and don'ts & good housekeeping (5S).
- Safety measures during executions of Electrical Engineering works.

10. Environmental Management (4 hrs)

Basics of environmental pollution, various management techniques for control of environmental pollution, various control acts for air, water, solid waste and noise.

11. Materials Management (4 hrs)

Material in industry, inventory control model, ABC Analysis, Safety stock, Re-order, level, Economic ordering quantity, Stores equipment, Stores records, purchasing procedures, purchase records, Bin card, Cardex, Material handling, Manual lifting, Hoist, Cranes, conveyors, trucks, fork trucks.

12. Financial Management (3 hrs)

Important, ledger, Journal, Profit and Loss Account, Balance Sheet, Interpretation of Statements, Ration Analysis, Project financing, Project appraisal, return on investments.

13. Marketing and Sales (3 hrs)

Sellers and Buyers markets, Marketing, Sales, Market conditions, monopoly, oligraphy, perfect competition, Cost Elements of Cost, Contribution, Break even analysis, Budgets, Pricing Policies.

RECOMMENDED BOOKS

1. Industrial Engineering and Management by TR Banga.
2. Industrial Engineering and Management by OP Khanna, Dhanpat Rai Publications, Delhi.
3. Industrial Management by VK Sharma, OP Harkut.
4. Sharma BR, Environmental and Pollution Awareness: Satya Prakashan, New Delhi.
5. Thakur Kailash, Environment Protection Law & Policy in India: Deep & Deep Publication, New Delhi.
6. Handbook of Small Scale Industry by P.M. Bhandari.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Principles of Management by Philip Kotler, TEE Publication.
9. Industrial Organisation and Management by Tara Chand, Nem Chand and Brothers, Roorkee

6.2 TRACTORS AND EARTH MOVING MACHINERY

L	T	P
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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 (8 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 (8 hrs)

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

4. Supplementary System (6 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 principles of:
   - Bull Dozer
   - Leveller
   - Front end loader
   - Cranes
   - Scrapper

7. Repair and Maintenance (8 hrs)

Faults and their rectification in tractor and maintenance of tractor.

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.

6.3 MOTOR VEHICLE ACT AND TRANSPORT MANAGEMENT

L	T	P
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RATIONALE

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

DETAILED CONTENTS

1. Motor Vehicle Act (12 hrs)

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

   - Licensing of drivers and conductors of motor vehicles Registration of old and new vehicles
   - Private and commercial vehicle 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 (6 hrs)

   Fitness of vehicle -meaning and purpose, provisions in the act, applications Permit consideration for transport and public service

3. Insurance of Vehicles (6 hrs)

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

4. Driving (8 hrs)

   - Principle of Driving
   - Driving procedure
   - Driving precautions
   - Driving in abnormal conditions, like hilly area, night, fog, heavy traffic and rain
   - Driving License - purpose, importance and requirements
   - Different types of driving licenses

- Procedure to get driving license

5. Road Safety (8 hrs)

- Road Signs/signals
- Traffic rules
- Imposition of Penalties for violation of rules
- Act and Articles, Duties of Drivers, Duties of conductor, Duties of Helper towards safety of vehicles/passengers/goods and self

6. Pollution Control (8 hrs)

- Different contents of exhaust gas
- Prescribed standards for pollution
- Control of pollution
- Fuel efficiency

7. Transport Management (16 hrs)

History of transport with special reference to road transport in India
Modes of Road transport
Organization- Service station and its functions, General layout of modern service station, Spare parts section and dealership service section, Accounts and books, Different types of cards and their use in maintaining service station records

Structure of fleet organization, management of fleet
State transport - optimum utilization of fleet, theory of fares/freight
Roadworthiness requirement,
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.
Taxation – Structure and formalities relating to calculating and paying the relevant taxes.

RECOMMENDED BOOKS

1. Transport Management Vol. III' and IV by Central Institute of Road Transport Pune.
2. Motor Vehicle Act of India (with Latest Amendment).
3. Motor Vehicle Act with Rules by B.S. Kohli.
4. Motor Transportation: Principles and Practices Constantin, Ronald Press Company, New York by WJ Hudson and James'.
5. Transport in Modern'India by KP Bhatnagar, Satish Bahadur, DN Aggarwal and SC Gupta.
6. State Motor Vehicle Rules.

6.4 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

L	T	P
3	-	-

RATIONALE

Entrepreneurship Development and Management is one of the core competencies of technical human resource. Creating awareness regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects can be helpful in motivating technical/ vocational stream students to start their own small scale business/enterprise. Based on the broad competencies listed above, following detailed contents are arrived to develop the stated competencies.

DETAILED CONTENTS

(1) Entrepreneurship (4 hrs)

- 1.1 Concept/Meaning
- 1.2 Need
- 1.3 Competencies/qualities of an entrepreneur

(2) Entrepreneurial Support System (6 hrs)

- 2.1 District Industry Centres (DICs)
- 2.2 Commercial Banks
- 2.3 State Financial Corporations
- 2.4 Small Industries Service Institutes (SISIs), Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State level

(3) Market Survey and Opportunity Identification (Business Planning) (6 hrs)

- 3.1 How to start a small scale industry
- 3.2 Procedures for registration of small scale industry
- 3.3 List of items reserved for exclusive manufacture in small scale industry
- 3.4 Assessment of demand and supply in potential areas of growth
- 3.5 Understanding business opportunity
- 3.6 Considerations in product selection
- 3.7 Data collection for setting up small ventures

(4) Project Report Preparation (6 hrs)

- 4.1 Preliminary Project Report
- 4.2 Techno-Economic feasibility report
- 4.3 Project Viability

(5) Managerial Aspects of Small Business (8 hrs)

5.1 Principles of Management (Definition, functions of management viz planning, organisation, coordination and control
5.2 Operational Aspects of Production
5.3 Inventory Management
5.4 Basic principles of financial management
5.5 Marketing Techniques
5.6 Personnel Management
5.7 Importance of Communication in business

(6) Legal Aspects of Small Business (6 hrs)

6.1 Elementary knowledge of Income Tax, Sales Tax, Patent Rules, Excise Rules
6.2 Factory Act and Payment of Wages Act

(7) Environmental considerations (6 hrs)

7.1 Concept of ecology and environment
7.2 Factors contributing to Air, Water, Noise pollution
7.3 Air, water and noise pollution standards and control
7.4 Personal Protection Equipment (PPEs) for safety at work places

(8) Miscellaneous (6 hrs)

8.1 Human relations and performance in organization
8.2 Industrial Relations and Disputes
8.3 Relations with subordinates, peers and superiors
8.4 Motivation – Incentives, Rewards, Job Satisfaction
8.5 Leadership
8.6 Labour Welfare
8.7 Workers participation in management

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
3. Environmental Engineering and Management by Suresh K Dhamija, SK Kataria and Sons, New Delhi
4. Environmental and Pollution Awareness by Sharma BR, Satya Prakashan, New Delhi
5. Thakur Kailash, Environmental Protection Law and policy in India: Deep and Deep Publications, New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by Dr DD Sharma, Sultan Chand and Sons, New Delhi.
9. Principles of Management by Philip Kotler TEE Publication

6.5 FAULT DIAGNOSIS AND DRIVING PRACTICE

L	T	P
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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 automotive. Student should also be proficient in driving and in 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 knocks, high fuel consumption, starter turns the engine but engine doesn't start, engine fires but dies out, engine misfire, lack of power, poor acceleration, engine produces black and white smoke; use of engine analyzer.

7. Engine testing and find out fuel consumption.

8. Engine out put and efficiency.

9. Emission test using exhausts gas analyzer (Petrol).

10. Emission test using smoke meter (Diesel).

11. Decarbonising brushes and tools, decarbonising of engine - removing carbon deposits from engine combustion chamber, piston crown, valve parts.

12. Valve servicing:

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

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

14. Inspection of crank shaft – bearing replacement and setting of journal bearing. Big–end bearings and crank shaft bearings, measuring bearing clearances by gauges.

15. 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.

16. Overhauling of wheel and axles.

17. Overhauling of power brakes. Bleeding of brakes.

18. Surfacing of cylinder heads, cylinder blocks and manifolds on cylinder head refacing machine.

19. Practice for piston ring removal.
20. Practice on cylinder boring machine, measuring ovality and taper of cylinder bore, using cylinder dial gauge, inside micrometer, telescopic gauge, use of direct reading micrometer.
21. Practice on honing cylinder blocks, keeping allowance of clearances.
22. Demonstration of crankshaft metal sapraying and grinding, measuring of ovality and taperness of journals and crank pins.
23. Setting and grinding of camshaft journals.
24. Heat treatment of crankshaft, crack detection and demagnetising.
25. Aligning of connecting rod.
26. Practice in fitting cylinder liners – sleeving and desleeving.
27. Practice in nozzle grinding and lapping, setting of injection pressure and nature of spray.
28. Practice in bending and nipple forming of fuel pipes.
29. Practice in brake drum turning, measuring ovality, skimming the brake drum.
30. Tyre retreading. The students may be taken to a service industry.
31. Driving Practice on the road to gain proficiency in driving. 50% of the time should be given to driving.

Visit to tractor workshop is must at least for two days.

RECOMMENDED BOOKS

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

6.6 PROJECT WORK

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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 5-6 students.

- Projects related to repair and maintenance of automobiles
- Projects related to increasing productivity
- Projects related to quality assurance
- Projects related to estimation and economics of production
- Projects connected with repair and maintenance of plant and equipment
- Projects related to identification of raw material thereby reducing the wastage
- Any other related problems of interest of host industry

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)	79 <> 65	Very good
iii)	64 <> 50	Good
iv)	49 <> 40	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 organisations 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.