GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Automobile Engineering

Subject Code: DI04002051

Subject Name: Automobile Industry Management

w. e. f. Academic Year:	2025-26
Semester:	4th
Category of the Course:	Professional Elective - I

Prerequisite:	The student should have fundamental knowledge of automobile engineering basics, workshop practices, engineering drawing, mathematics, statistics, and computer applications, along with awareness of safety and environmental aspects to understand and apply concepts of automobile industry management effectively.
Rationale:	Automobile Industry Management helps diploma engineers integrate technical knowledge with essential management skills. The subject emphasizes planning, organizing, directing, and controlling industrial activities while ensuring quality, productivity, safety, and compliance with legislative acts. It enables students to understand supervisory responsibilities, workforce coordination, resource utilization, and shop-floor management. By linking engineering practices with industrial management concepts, the course prepares students to perform effectively in supervisory and managerial roles within the automobile sector, thereby enhancing employability and professional competence.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Apply the concepts, principles, and functions of management in planning, organizing, and supervising industrial activities in the automobile sector.	R & U
02	Demonstrate directing and controlling skills at supervisory level for effective task execution, team coordination, and performance monitoring.	R & U
03	Follow industrial safety norms, apply ergonomics, and interpret legislative acts to ensure worker welfare, accident prevention, and legal compliance.	R & U & A
04	Use quantitative tools of Industrial Engineering for work study, production planning, and productivity measurement to improve shop-floor efficiency.	R & U & A
05	Apply quality management principles, TQM practices, and quality control tools to enhance product quality, reduce cost, and improve customer satisfaction.	R & U

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE(E)	PA(M)	PA(I)	ESE(V)	
3	1	0	4	70	30	00	00	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**1. Management Concepts, Planning and Organizing Skills** 1.1 Introduction to Management • Definition, role and importance of management • Characteristics and principles of management • Management vs. Administration vs. Organization; their relationship • Levels of management and their functions 1.2 Functions of Management • Planning, organizing, leading/directing, staffing and controlling • Functional areas of management 1.3 Managerial Skills • Technical, human, and conceptual skills • Relevance of managerial skills in automobile engineering 1.4 Planning Concepts and Process • Types of planning and steps in planning • Nature of planning and planning activities • Planning by supervisors: importance and procedures • Prescribing standard forms for planning activities 1.5 Organizing Concepts and Process • Types of organization and steps in organizing • Organizing at supervisory level: shop-floor organization of physical resources (with block diagrams) • Budgeting for materials and manpower • Matching human needs with job requirements (motivation, ergonomics) • Allotment of tasks to individuals and establishing group relationships	9	20

2.	**2. Directing and controlling at Industrial Engineer level** 2.1 Needs for Directions and Instructions • Importance of clear and complete instructions. • Feasibility of instructions for effective task completion. 2.2 Personal Counselling & Mistake Prediction • Role of supervisors in counselling subordinates. • Anticipating and preventing possible mistakes during work. 2.3 Decision-Making & Discipline • Elaboration of decisions at supervisory level. • Setting and maintaining disciplinary standards in the workplace. 2.4 Managerial Control • Meaning and importance of control. • Team understanding and coordination. • Linking various departments with process and quality standards. • Steps in the control process. 2.5 Methods of Control • Monitoring performance in terms of quality, quantity, time, and cost. • Measuring performance and comparing it with standards**.**	8	18
3.	**3. Industrial Safety, Ergonomics and Legislative Acts** 3.1 Industrial Safety and Ergonomics • Need and importance of safety management measures • General safety norms in an industrial unit • Preventive measures for industrial activities 3.2 Industrial Accidents • Definition and types of accidents • Causes of accidents in manufacturing plants and workshops • Safe procedures to prevent accidents • Work permits – need, preparation, and use in maintenance activities 3.3 Fire Safety • Fire hazards in industries • Fire drills and emergency preparedness • Types and specifications of firefighting equipment 3.4 Ergonomics • Concept, principles, importance, and applications in workplace safety	8	18

	3.5 Legislative Acts • Necessity and importance of acts in industrial environment • Important definitions and main provisions		
4.	**4. Quantitative tools of IE & Productivity measurements** 4.1 Introduction to Industrial Engineering Tools • Need and importance of quantitative tools in the automobile industry. • Role of Industrial Engineering (IE) in improving productivity, quality, and cost efficiency. 4.2 Work Study • Definition and objectives of work study • Method Study: Procedure, flow process charts, flow diagrams, string diagram • Work Measurement: Stop watch time study, work sampling, predetermined motion time system (PMTS) • Application in automobile assembly and service workshops 4.3 Production Planning and Control (PPC) Tools • Forecasting techniques (qualitative & quantitative methods) • Inventory control • Scheduling and sequencing methods • Line balancing in automobile production 4.4 Productivity Concepts • Definition and importance of productivity in automobile industry • Factors affecting productivity (internal & external) • Methods of improving productivity (technological, managerial, human factors) 4.5 Productivity Measurements • Measurement at different levels: • Partial Productivity: Labour, Machine, Material, Capital • Multifactor productivity • Total Productivity 4.7 Cost and Productivity Relationship • Cost reduction vs. cost control • Effect of quality and waste reduction on productivity • Value engineering and value analysis in automobile design	10	22
5.	**5. Industrial Quality management** 5.1 Introduction to Quality • Definition and concept of quality.	10	22

	• Importance of quality in automobile industry. • Dimensions of product quality (performance, reliability, durability) and service quality (responsiveness, assurance, customer satisfaction). • Relationship between quality, productivity, and cost. 5.2 Quality Control and Quality Assurance • Differences between Quality Control (QC) and Quality Assurance (QA). • Objectives and functions of QC in automobile manufacturing. • Role of inspection and testing in ensuring product quality. • Basics of Statistical Quality Control (SQC) – control charts, sampling, process capability. 5.3 Quality Management Systems (QMS) • Principles of quality management. • ISO 9000 series standards – overview and applications. • IATF 16949 – automotive quality management standard. • Documentation and standard operating procedures in QMS. 5.4 Total Quality Management (TQM) • Concept and philosophy of TQM. • Elements of TQM – customer focus, continuous improvement, employee involvement. • Benefits of TQM in automobile industries. • Kaizen, 5S, and Poka-Yoke techniques for workplace improvement. 5.5 Quality Tools and Techniques • Seven basic quality tools – • Check sheet • Histogram • Pareto chart • Cause and Effect diagram • Control charts • Scatter diagram • Flow chart • Six Sigma concept and DMAIC cycle – introduction. • Lean Manufacturing and Just-in-Time (JIT) in quality improvement. • Failure Modes and Effects Analysis (FMEA). 5.6 Inspection and Testing Methods • Types of inspection – incoming, in-process, and final inspection.		

	• Non-destructive testing (NDT) methods and Coordinate measuring machine (CMM) method in automobile industry. • Measuring instruments and gauges used in quality control. 5.7 Quality Cost and Productivity • Cost of quality – prevention, appraisal, internal failure, and external failure costs. • Relationship between quality and productivity. • Waste reduction and defect minimization practices.		
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
40	**40**	**20**			

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

Sr. No.	Title of Book	Author(s)	Publication (Place, Year) & ISBN
1	*Fundamentals of Quality Control and Improvement*	Amitava Mitra	Wiley, New Jersey, 4th Ed., 2016, ISBN: 9781118705146
2	*Juran's Quality Handbook: The Complete Guide to Performance Excellence*	Joseph M. Juran, A. B. Godfrey	McGraw-Hill, New York, 7th Ed., 2016, ISBN: 9780071840538
3	*Total Quality Control*	Armand V. Feigenbaum	McGraw-Hill, New York, 4th Ed., 1991, ISBN: 9780070203532
4	*Automotive Quality Systems Handbook*	David Hoyle	Butterworth-Heinemann (Elsevier), Oxford, 2nd Ed., 2005, ISBN: 9780750666633
5	*Automotive Quality Management – A Complete Guide*	Gerardus Blokdyk	5STARCooks, Brisbane, 2020, ISBN: 9781867437015
6	*Total Quality Management*	Dale H. Besterfield et al.	Pearson, New Delhi, 3rd Ed., 2011, ISBN: 9788131761063

7	*Kaizen: The Key to Japan's Competitive Success*	Masaaki Imai	McGraw-Hill, New York, 1986, ISBN: 9780075543329
8	*Gemba Kaizen: A Commonsense, Low-Cost Approach to Management*	Masaaki Imai	McGraw-Hill, New York, 2nd Ed., 2012, ISBN: 9780071790369
9	*Lean Thinking: Banish Waste and Create Wealth in Your Corporation*	James P. Womack, Daniel T. Jones	Simon & Schuster, New York, 2003, ISBN: 9780743249270
10	*Six Sigma: The Breakthrough Management Strategy*	Mikel Harry, Richard Schroeder	Doubleday, New York, 2000, ISBN: 9780385494380
11	*Practical Reliability Engineering*	Patrick O'Connor, Andre Kleyner	Wiley, Chichester, 5th Ed., 2012, ISBN: 9780470979822
12	*Maintainability and Maintenance Management*	Joseph D. Patton	Industrial Press, New York, 2nd Ed., 1988, ISBN: 9780831111746
13	*Engineering Metrology and Measurements*	R.K. Jain	Khanna Publishers, New Delhi, 2013, ISBN: 9788174091536
14	*Non-Destructive Testing Handbook* (Vol. 1–10)	ASNT (American Society for Nondestructive Testing)	ASNT, Columbus OH, Latest Ed., ISBN: 9781939039022
15	*Quality Planning and Analysis: For Enterprise Quality*	J.M. Juran, F.M. Gryna	McGraw-Hill, New York, 5th Ed., 2010, ISBN: 9780073521503
16	*The Machine That Changed the World*	James P. Womack, Daniel T. Jones, Daniel Roos	Harper Perennial, New York, 1991, ISBN: 9780060974176

(b) Open-source software and website:

Sr. No.	Software / Website	Type	Relevant Content / Application
1	**R Project (CRAN) →** https://cran.r-project.org	Open-source Statistical Software	Statistical Quality Control (SQC), Control Charts, Regression, Six Sigma analysis
2	**PSPP (GNU Project) →** https://www.gnu.org/software/pspp/	Free Alternative to SPSS	Data analysis, quality metrics, hypothesis testing for QC & QA
3	**Orange Data Mining →** https://orangedatamining.com/	Open-source Data Analytics Tool	Visual analytics, productivity measurements, defect trend analysis

4	**OpenReliability →** http://www.openreliability.org/	Reliability Engineering Software	Reliability, Maintainability, FMEA, Fault Tree Analysis (FTA)
5	**Relyence FMEA Free Trial / Open-source FMEA tools →** https://relyence.com	Reliability & Risk Analysis	Failure Modes and Effects Analysis (FMEA) for automobile design
6	**QCC (R Package – Quality Control Charts)**	R Add-on	Construct control charts (p, np, c, u, X-bar, R charts) for SQC
7	**SciPy & NumPy (Python) →** https://scipy.org	Open-source Python Libraries	Operations Research (OR), Linear Programming, Queuing theory, Optimization
8	**OpenLCA →** https://www.openlca.org	Open-source Life Cycle Assessment Tool	Environmental impact, sustainability, waste reduction analysis
9	**MIT OpenCourseWare (OCW) →** https://ocw.mit.edu	Free Courses	Quality Management, Operations Research, Lean Manufacturing
10	**NPTEL (India) →** https://nptel.ac.in	Free Online Lectures	TQM, Six Sigma, Industrial Engineering, Reliability Engineering
11	**ASQ (American Society for Quality) →** https://asq.org	Professional Website	Standards, best practices, quality case studies
12	**Kaizen Institute →** https://in.kaizen.com	Knowledge Resource	Lean, 5S, Kaizen, Continuous Improvement techniques
13	**Lean Enterprise Institute (LEI) →** https://www.lean.org	Educational Resource	Lean, JIT, Waste reduction in automobile industry
14	**Coursera / edX Free Courses →** https://www.coursera.org	Online Learning	Six Sigma, Lean, Quality Tools, ISO standards
15	**OpenTextbooks – Quality Management →** https://open.umn.edu/opentextbooks	Free eBooks	Free textbooks on TQM, QC, QA, Productivity improvement

Suggested Activities for Students:

The suggested activities will help students bridge the gap between theory and practice by applying management concepts, safety norms, productivity tools, and quality techniques in real or simulated situations. These exercises encourage teamwork, problem-solving, and analytical thinking, thereby preparing diploma automobile engineers with practical managerial skills, industry readiness, and a strong foundation for future careers in the automobile sector.

1. Case Studies – Study real-life management practices from automobile companies (e.g., Toyota, Maruti Suzuki, Tata Motors) and present findings.
2. Role Play / Simulation – Practice supervisory roles (planning, organizing, directing, and controlling) in simulated shop-floor situations.
3. Industrial Visit / Virtual Tour – Observe safety practices, quality systems, and productivity tools used in automobile industries.
4. Work Study Exercise – Conduct a simple time study or method study in the workshop/lab to improve a process.
5. Preparation of Budgets – Develop a materials and manpower budget for a small production/maintenance activity.
6. Accident Analysis Report – Identify possible accident causes in a workshop and suggest preventive measures.
7. Legislative Acts Assignment – Prepare summaries of Indian Factories Act, Workmen's Compensation Act, and Minimum Wages Act with practical examples.
8. Quality Tools Practice – Use Pareto chart, cause-effect diagram, or check sheet on a small dataset (like workshop defects).
9. Mini Project – Apply productivity measurement techniques (labour, machine, material productivity) to a simple case and suggest improvements.
10. Group Discussion / Seminar – Present on topics such as Kaizen, 5S, TQM, ergonomics, or cost-productivity relationship.

* * * * * * *