



COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MTIE111	DES	Ergonomic and Industrial Safety	2	1	0	3	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

### Course Educational Objectives (CEOs):

To (A) Explain the psychology of human behavior as it relates to workplace safety, (B) Identify ergonomic hazards, (C) Recommend appropriate controls, and relate the human and workplace factors which contribute to ergonomic hazards.

### Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Explain the psychology of human behavior as it relates to workplace safety.
2. Identify ergonomic hazards; recommend appropriate controls.
3. Relate the human and workplace factors which contribute to ergonomic hazards.

## Syllabus

### UNIT 1

Ergonomics: Definition, Application, Brief History, Effectiveness and Cost-Effectiveness of Ergonomics Human Factors and Ergonomics, Systems of the Human Body, Anatomy of Spine and Pelvis Related to Posture Biomechanics, Muscular System, Ergonomics and the Musculoskeletal System, Costs of Back Injuries.

### UNIT-2

Muscular Work and Nervous Control of Movements, Types of Muscular Work, Muscular Fatigue, Types of Muscle Contractions, Measurement of Muscular Strength, Anthropometry: Definition, Terminology, Myth of the Average Human, Principles of Universal Design, Anthropometric Measurements

### UNIT 3

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Design of Workplaces and Hand Tools, Work Design Analysis, Designing for Hand Use, Types of Injuries and Disorders. Work-Related Musculoskeletal Disorders, Types of Work-Related MSD's, Task-related Factors, Personal Risk Factors, Impact on Industry, Ergonomic Program for WMSD's.

#### **UNIT 4**

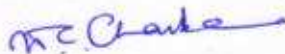
Heavy Work and Evaluating Physical Workloads and Lifting, Heavy Work, Manual Material Handling & Lifting, Classification and Risks, NIOSH Lifting Guidelines, Job Demands and Workplace Stress, Mental Fatigue/Shift-work Fatigue.

#### **UNIT 5**

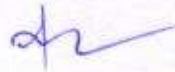
Information Ergonomics: Controls, and Displays, Mental Workload Measurement, Primary and Secondary Task Performance, Controls and Displays (Types), Control Layout and Design, How to Implement An Ergonomic Program, Management and Employee Involvement, Setting Up the Ergonomics Program, Problem Identification, Hazard Prevention and Control, Training.

#### **Text Books**

1. Introduction to Ergonomics by Robert Bridger
2. Global Ergonomics by Scott, P.A.; Charteris, J.; Bridger, R.S.
3. Industrial Safety and Health Management by Rieske, David W., Asfahl, C. Ray
4. Principles of Industrial Safety by Joel M. Haight; Jeffery C. Camplin; Christopher A. Janicak; Anjan K. Majumder; Linda S. Rowley; Kathy
5. Practical Guide to Industrial Safety by Nicholas P. Chermisinoff



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**M Tech in Industrial Engineering  
Elective I**

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MTIE121	DES	Human Resource Development	2	1	0	3	60	20	20	0	0

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 20 marks.

**Course Educational Objectives (CEOs)**

The objective of the course is to make student aware of the concepts, techniques and practices of human resource development. This course is intended to make students capable of applying the principles and techniques as professionals for developing human resources in an organization.

**Course Outcomes (COs)**

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Collaborative project experiences involving both written and oral presentations.
- Courses with significant experiential learning components.
- Experiences with identifying, accessing, evaluating, and interpreting information and data in support of assignments, projects, or research.
- Course experiences with large-scale datasets.

**Syllabus**

**UNIT-1**

Introduction to Human Resource Development: Concept; Relationship between human resource management and human resource development; HRD mechanisms, processes and outcomes; HRD matrix; HRD interventions; Roles and competencies of HRD professionals; Challenges in HRD.

**UNIT-2**

HRD Process: Assessing need for HRD; Designing and developing effective HRD programs;

  
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**M Tech in Industrial Engineering  
Elective I**

Implementing HRD programs; Evaluating effectiveness of HRD Programs; HRD audit; HRD culture and climate.

**UNIT-3**

HRD Activities: Employee development activities- Approaches to employee development, leadership development, action learning, assessment and development centers; Intellectual capital and HRD; HRD mechanisms for workers; Role of trade unions; Industrial relations and HRD; Influence of motivation on development activities.

**UNIT-4**

HRD Applications and Trends: Coaching and mentoring; Career management and development; Employee counseling; Competency mapping; PCMM, Balanced Score Card, Appreciative inquiry; Integrating HRD with technology, Employer branding and other emerging trends.

**UNIT-5**

HRD in Organizations: Selected cases covering HRD practices in government organizations, manufacturing and service industries and MNCs; International experiences of human resource development..

**BOOKS RECOMMENDED:**

- [1] Werner J. M., DeSimone, R.L., Human resource development, South Western.
- [2] Nadler, L., Corporate human resources development, Van Nostrand Reinhold.
- [3] Mankin, D., Human resource development, Oxford University Press India
- [4] Halder, U. K., Human resource development, Oxford University Press India
- [5] Rao, T.V., Future of HRD, Macmillan Publishers India

**Reference Books**

- [1]- Rao, T.V., HRD Score Card 2500: Based on HRD audit, Response Books, SAGE Publications.
- [2]- Rao, T.V., Hurconomics for talent management: Making the HRD missionary business-driven, Pearson Education.
- [3]- Curtis, B., Hefley, W. E., Miller, S. A., The people capability maturity model: Guidelines for improving workforce, Pearson Education.



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**M.Tech in Industrial Engineering**

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MTIE131	DES	Materials and Inventory Management	2	1	0	3	60	20	20	0	0

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

**Course Educational Objectives (CEOs)**

Describe various theories of organizations, their characteristics, strengths, and weaknesses. (A) Identify what differentiates various types of organizations. (B) Analyze how organizations come to be the way they are, including the factors, pressures, and historical influences that shape them. (C) Describe the basic language and concepts of the modern organization.

**Course Outcomes (COs)**

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

1. Collaborative project experiences involving both written and oral presentations.
2. Courses with significant experiential learning components.
3. Experiences with identifying, accessing, evaluating, and interpreting information and data in support of assignments, projects, or research.
4. Course experiences with large-scale datasets.


**Syllabus**

**Unit-I**

**Introduction:** Field and scope of Material Management. General Analysis of Material Quality. Material Requirement Planning, JIT production planning, Strategic materials planning, Material control: Acceptance Sampling, Inspection, Make or buy decision, Economic analysis, Break even analysis.

**Unit-II**

**Purchase Management:** Importance of good purchasing system, Organization of purchasing functions, Purchase policy and procedures, Responsibility and limitations, Purchasing decisions, Role of purchase in new product development, Role of purchasing in cost reduction.

  
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### M.Tech in Industrial Engineering

Negotiations and purchase, Purchasing research: Identification of right sources of supply, Vendor rating, Standardization, Vendor certification plans, Vendor and supply reliability, Developing new source of supply.

#### Unit-III

**Stores Management:** Design of Stores for manufacturing organization and retail stores, Centralization v/s Decentralization, Types of stores, Waste Reduction, and waste disposal system planning. Stores Organization. Methods of storing, Record - keeping and checking. Issue Methods.

#### Unit-IV

**Inventory Management:** Inventory v/s Stores, Types of inventory, Inventory control, EOQ model, various inventory models, Inventory models with quantity discount, Exchange curve concept, Coverage analysis, Optimal stocking and issuing policies, Inventory management of perishable commodities.

**Selective Inventory Control** (ABC, VED analysis, FSN, HML, XYZ, GOLF, Music 3D), Design of inventory distribution systems, Information system for inventory management.

#### Unit-V

**Value Engineering:** Introduction, Cost Vs Price. Value of performance. Value of services. Functions and costs. Job plan, Scientific Approach to Value Analysis. Organizing of Value Engineering program.

#### References

1. A.K. Chitale, R.C. Gupta, *Materials management*, PHI
2. A. K. Dutta, *Materials management*, PHI
3. P. Gopalkrishnan, & M. Sundersen, *Material management- An integrated approach*, PHI
4. L.C. Jhamb, *Inventory Management*, EPH
5. Arnold, Chapman: *Introduction to Materials Management*: Pearson
6. Dobler & Lee, *Purchasing and Materials Management*, McGraw-Hill Education.

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**MTech. in Industrial Engineering**

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MTIE141	DES	Project Management	2	1	0	3	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

**Course Educational Objectives (CEOs):**

- Understand the characteristics of a project.
- Identify skills necessary to manage a project.
- Evaluate the impact costs have on completion of a project
- Evaluate how time impacts the completion of a project
- Describe how cost and time influence a project's product's performance.
- Explain the different methods of team management that can be used to guide a project to completion.
- Collaborate with other project managers through completing case study discussions, blogging about project management, and a collaborative project.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

- Understand the philosophy and basic concepts of quality improvement.
- Describe the DMAIC process (define, measure, analyze, improve, and control).
- Demonstrate the ability to use the TQM and ISO 9000
- Demonstrate the ability to use the methods of statistical process control.
- Demonstrate the ability to design, use, and interpret control charts for variables.
- Demonstrate the ability to design, use, and interpret control charts for attributes.
- Perform analysis of process capability and measurement system capability.
- Understand the project risk management.

**Syllabus**

  
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## MTech. in Industrial Engineering

### Unit – I

**Introduction:** Basics of Project Management: Introduction, Need for Project Management, Project Management Knowledge Areas and Processes, The Project Life Cycle, The Project Manager (PM), Phases of Project Management Life Cycle, Project Management Processes, Impact of Delays in Project Completions, Essentials of Project Management Philosophy, Project Management Principles.

### Unit – II

**Project Identification and Selection:** Introduction, Project Identification Process, Project Initiation, Pre-Feasibility Study, Feasibility Studies, Project Break-even point.

**Project Planning:** Introduction, Project Planning, Need of Project Planning, Project Life Cycle, Roles, Responsibility and Team Work, Project Planning Process, Work Breakdown Structure (WBS)

**Organisational Structure and Organisational Issues:** Introduction, Concept of Organisational Structure, Roles and Responsibilities of Project Leader, Relationship between Project Manager and Line Manager, Leadership Styles for Project Managers, Conflict Resolution, Team Management and Diversity Management, Change management.

### Unit – III

**Resources Considerations in Projects:** Introduction, Resource Allocation, Scheduling, Project Cost Estimate and Budgets, Cost Forecasts.

**Purchasing and Contracting for Projects:** Introduction, Purchase Cycle, Contract Management, Procurement Process.

**Project Management Information System:** Introduction, Project Management Information System (PMIS), Planning of PMIS, Design of PMIS

### Unit – IV

**Project Risk Management:** Introduction, Risk, Risk Management, Role of Risk Management in Overall Project Management, Steps in Risk Management, Risk Identification, Risk Analysis, Reducing Risks

**Project Quality Management and Value Engineering:** Introduction, Quality, Quality Concepts, Value Engineering.

### Unit-V

**Project Performance Measurement and Evaluation:** Introduction, Performance Measurement, Productivity, Project Performance Evaluation, Benefits and Challenges of Performance Measurement and Evaluation, Controlling the Projects.

**Project Execution and Control:** Introduction, Project Execution, Project Control Process, Purpose of Project Execution and Control.

**Project Close-out, Termination and Follow-up:** Introduction, Project Close-out, Steps for Closing the Project, Project Termination, Project Follow-up.

### References:

*K. C. Chandra*

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1. John M Nicholas, Project Management for Business and Technology: Principles and Practice, Prentice Hall of India, 2002.
2. N. J. Smith (Ed), Project Management, Blackwell Publishing, 2002.
3. Robert K. Wysocki, Robert Back Jr. and David B. Crane, Effective Project Management, John Wiley, 2002.
4. Jack R Meredith and Samuel J Mantel, Project Management: A Managerial Approach, John Wiley, 4th Edition, 2000.
5. Shtub, Bard and Globerson, Project Management: Engineering, Technology, and Implementation, PH Inc.
6. Lock, Gower, Project Management Handbook.
7. Cleland and King, VNR Project Management Handbook.
8. Horald Kerzner, Project Management: A Systemic Approach to Planning, Scheduling and Controlling, CBS Publishers, 2002.
9. S. Choudhury, Project Scheduling and Monitoring in Practice.
10. P. K. Joy, Total Project Management: The Indian Context, Macmillan India Ltd.

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## M.Tech. in Industrial Engineering

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
MTIE102	DCS	INDUSTRIAL ENGINEERING SYSTEMS	60	20	20	30	20	2	0	2	3

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components; Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

### Course Objectives (COs):-

1. The primary objective of the course is to describe the Industrial Engineering System concepts.
2. This course Provides comprehensive Knowledge of Production Planning, Inventory, Artificial Intelligence & Six Sigma.

### Course Outcomes (CEOs):-

1. Student will be able to understand the various Production Planning concepts & how to control the inventory in Industry.
2. Students would be able to understand plant Layout & Material handling equipment's.
3. Students would be able to understand which type artificial intelligence work in industry.
4. On completion of this course the students will be able to acquire knowledge of six sigma & lean manufacturing.

## Syllabus

### Unit-I

**Production Planning and Control:** Definition and importance, types of production -job, batch and mass forecasting, routing, scheduling, dispatching and follow up. Break even analysis and Gantt chart Project scheduling, application of CPM and PERT techniques Analysis and control of project cost in CPM and PERT, numerical problems.

### Unit-II

**Inventory Control:** Definition, types of inventory - Codification and standardization ABC analysis. Economic ordering quantity Procurement cost, carrying charges, lead-time, re-order point, simple problems. Definitions, types of inspection and procedure Statistical quality control - Basic theory of quality control,

### Unit-III

**Plant Location and Layout:** Definition, factors affecting the site selection of plant Factor affecting plant layout Types of layout - process, product, combination and fixed position layout Techniques in

  
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making layout-Flow diagram, templates, distance volume matrix, travel chart Line balancing, workstation

**Material Handling:** Principles of economic material handling Hoisting equipment - forklift truck, Cranes- mobile motor cranes, overhead cranes, travelling bridges crane. Derrick crane. Whiler crane Conveying equipment - Package conveyors, gravity roller conveyors, screw conveyors, flight or scraper conveyors, bucket conveyors, bucket elevators, belt conveyors, and pneumatic conveyors.

### Unit-IV

**Artificial Intelligence In Manufacturing:** Introduction to artificial intelligence. Application of artificial intelligence (AI) techniques: Metaheuristics such as simulated annealing, tabu search, genetic algorithms, particle swarm intelligence; Artificial Neural Networks (ANN); Fuzzy Logic Systems (FLS); Knowledge Based Systems (KBS); and Petri nets in manufacturing systems planning and control. Distributed AI and Multi Agent Systems (MAS).

### Unit-V

**Six Sigma & Lean Manufacturing:** Introduction, Lean - Evolution & Steps, Introduction to Lean Manufacturing, Lean - Specify Value - Quality at Source, 5S Concepts, 5S Implementation, Identify Value Stream - Process Mapping, Why is Inventory bad, Process Layouts, Lean - Make It Flow - Setup Time Reduction, Hejunka, Total Productive Maintenance.

**Six Sigma :** Overview, Six Sigma (basics and history of the approach, methodology and focus), the application of Six Sigma in production and in service industries, Relationship of Six Sigma and Lean Management, linking Six Sigma project goals with organizational strategy.

### Reference Books:

1. "Motion & Time study: Design and Measurement of Work", by Barnes Ralph M., Wiley
2. "Production Planning and Control: Text and Casesby" by Mukhopadhyay S.K, PHI
3. "Production Planning and Control" by Dr. R.K. Singal , Katson Books
4. "Production Planning and Inventory Control" by Narasimhan & Seetharama L, PHI
5. "Plant Layout & Material Handling" by GK Agarwal
6. "Plant Layout & Material Handling", by SIA Experts (Author), SIA Publishers & Distributors Pvt Ltd .
7. "Becoming Lean - Inside Stories of U.S. Manufacturers ", by Jeffrey K. Liker, Productivity Press, Portland, Oregon
8. "The Six Sigma Handbook", by Third Edition, Thomas Pyzdek & Paul Keller, McGrawHill

  
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M. Tech. in Industrial Engineering

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MTIE103	DC	Work study and productivity management	2	0	2	3	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To provide basic understanding to the students about the concept and significance of work study and productivity management.
2. To impart thorough knowledge to the students about various techniques of work-study for improving the productivity of an organisation.
3. To impart through knowledge and skills to students with respect to allowances, rating, calculation of basic and standard time for manual operations in an organisation.
4. To provide the knowledge to the students about various wages and incentives schemes.

Course Outcomes:


1. Students will be able to calculate the basic work content of a specific job for employees of an organization. Thereby they will be able to calculate the production capacity of man power of an organization.
2. Students will be able to analyze and calculate the level of risk in a job causing stress, fatigue and musculoskeletal disorders and design appropriate work systems.
3. Students will be able to analyze the existing methods of working for a particular job and develop an improved method through questioning technique.
4. Students will be able to devise appropriate wage and incentive plan for the employees of an organization

UNIT-I

**Productivity Management** : Concept of Productivity, Factors affecting Productivity, Total productivity model. Short term and Long term Productivity Planning Models. Productivity improvement Techniques: Technology based, Material based, Employee based, Product and Time based P.I. Techniques.

UNIT-II

**Work Study**: Definition, objectives and areas of application of work study in industries, Historical review. Interrelation between method study and work measurement; Human aspects of work-study. Role of work-study in productivity improvement.

  
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**Method Study** : Definition and objectives; Engineering approach to methods analysis and improvement. Data collection and recording techniques; critical examination and development, creative thinking, tools of creativity. Installation and maintenance of the new improved methods.

### UNIT-III

**Motion Economy and Analysis** : Principles of motion economy, motion analysis; Micro motion and memo motion study; Therbligs and Simo charts.

**Work Measurement** : Definition and objectives; work measurement techniques, Stop watch time study, Principles and procedures. Systems of performance rating; calculation of basic time, allowances and standard time. predetermined motion time and other standard systems, MOST , Work Sampling : principles and techniques, application of work sampling studies.

### UNIT-IV

**Introduction to Ergonomics** : Ergonomics as a multi-disciplinary field, components. Importance of ergonomics in equipment and work design. Concept of man-machine system; Types and characteristics of Man-machine systems. Rest Pause design based on physiological consideration, Anthropometry and Work place design

### UNIT-V

**Wage Incentives and Job Evaluation** :. Various types of wage Incentive schemes and their impact on productivity. Comparison of different incentive plans, design of incentive plans, Group system of Wage payment. Supervisory incentive plans. Job Evaluation : Purpose, Various types of jobs evaluation system and their application of classification. Wage Cure. Designing salary structure and Grade. Merit Rating. Performance Appraisal.

### Text Books:

1. Sumanth D.J., Productivity Management, TMH.
2. I.L.O., Introduction of Work Study
3. Maynard H.B., Industrial Engineering Hand Book
4. Jhamb L.C., Workstudy and Ergonomics
5. Sumanth D.J., Productivity Management. TMH.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
MTIE104	DCS	MARKETING MANAGEMENT	60	20	20	0	0	3	0	0	3

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

### Course Objectives (COs):-

1. The primary objective of the course is to describe the Marketing Management concepts.
2. This course Provides comprehensive Knowledge of Marketing research, Product Planning, Promotion Decisions & Distribution.

### Course Outcomes (CEOs):-

1. Student will be able to understand the Tasks and Philosophies of Marketing Management
2. Students would be able to understand, Planning and formulating Marketing Research Projects, Methods of collecting data.
3. Students would be able to understand Concept of a product.

## Syllabus

### Unit-I

**Introduction:** Tasks and Philosophies of Marketing Management. The marketing system and environment. Systems approach to marketing.

**Marketing Organization:** Organization of marketing department, Responsibilities and Functions of Marketing managers, Interaction of Marketing with other functions.

**Sales Function:** Recruitment, Selection, Training, Motivation and compensation of sales force, Controlling and evaluating.

### Unit-II

**Marketing research:** Scope and objective, Planning and formulating Marketing Research Projects, Methods of collecting data. Analysis and evaluation of data. Consumer behaviour analysis, Vendor analysis.

### Unit-III

**Product Planning:** Concept of a product, Classification of products, Major product decisions, Product line and product mix; Branding; Packaging and labelling Product Policy decision, Product Life Cycle, Innovation, and Product failure. Introducing new products, New Product development Product Mix strategies. Sales Promotion and evaluation of advertising program.

  
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### Unit-IV

**Promotion Decisions:** Communication Process; Promotion mix – advertising, personal selling, sales promotion, publicity and public relations; Determining advertising budget; Copy designing and testing; Media selection; Advertising effectiveness; Sales promotion – tools and techniques.

### Unit-V

**Distribution:** Nature, functions, and types of distribution channels, Distribution channel intermediaries; Channel management decisions; Importance of middlemen, Design decisions, Problem in channel determination and uses, Retailing and wholesaling.

### Reference Books:

1. "Marketing Management: Analysis, Planning Implementation and Control", by Philip Kotler, PHI.
2. "Marketing Management", by Stanton, Mc Graw Hill.
3. "Principles of Marketing", by Philip Kotler, PHI.
4. "Marketing Management: Text and Cases", by Rajagopal Vikas Publishing House.
5. "Marketing a managerial Introduction" by Gandhi TMH.

  
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**B. Tech. in Mechanical Engineering**

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MTIE105	DC	Statistical Quality Control and TQM	3	0	0	3	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

**Course Educational Objectives (CEOs):**

To introduction with (A) Modern quality control techniques to include the design of statistical process control systems, (B) Acceptance sampling and process improvement, (C) Quality Principles, Tools and Techniques.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student would be able to understand the need of Quality, and its concepts and need.
2. Student would be able to understand various available statistical tools of quality monitoring.
3. Student would be able to analyses basics of Quality Management and able to understand various management tools and techniques.
4. Students would be able to understand the statistical and economical design issues associated with the monitoring tools.
5. Students will be able to understand the basics of Quality Function Deployment and its tools and techniques.

**Syllabus**

**Unit I**

**Introduction of Statistical quality Control & TQM**

Quality: Definition, need, evolution ,The Meaning of Quality and Quality Improvement; Brief History of Quality Methodology; Statistical Methods for Quality Control and Improvement; Total Quality Management : quality philosophy(Contributions of Deming, Juran and Crosby, links between quality and productivity, quality costs legal aspects of quality implementing quality improvement).

**Unit II**

  
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## B. Tech. in Mechanical Engineering

### Methods and Philosophy of Statistical Process Control

Chance and assignable causes, Statistical Basis of the Control Charts (basic principles, choices of control limits, sample size and sampling frequency, rational subgroups, analysis of pattern on control charts, warning limits, ARL, sensitizing rules for control charts); Deming's Magnificent Seven Implementing SPC; An Application of SPC; Nonmanufacturing application of SPC.

### Unit III

#### Control Charts for Variables

Control Charts for  $\bar{X}$  and R (statistical basis, development and use, estimating process capability; interpretation, the effect of non normality on the chart, the OC function, average run length); Control Charts for  $\bar{X}$  and S; Control Chart for Individual Measurements; Applications of Variables Control Charts.

### Unit IV

#### Inferences about Process Quality

Sampling distributions, estimation and confidence interval for process parameter(s), hypothesis testing on process parameter(s) and power analysis, Process Capability Ratios, Process Capability Analysis, Exponentially Weighted Moving Average Control Chart, Moving Average Control Chart.

### Unit V

#### TQM Tools & Techniques I & II

Seven traditional tools of quality, new management tools, Six-sigma: Concepts, methodology, application to manufacturing, service sector including IT, Bench marking; reason, process. FMEA, Just-In-Time, Kanban system MRP vs JIT system, Waste elimination, workers involvement through JIT. QFD, Taguchi quality loss function, Inspection: acceptance sampling, OC curve, producer and consumer risk, theoretical invalidation of AS, kp rule for stable and chaotic processes.

### References

- 1) "Statistical Quality Control" by E.L. Grant and R.S. Leavenworth, 6th edition, McGraw-Hill publisher.
- 2) "Principles of Quality Control", by Jerry Banks, Wiley publisher.
- 3) "Total Quality Management" by D. H. Besterfield ; Pearson Education Asia, Third Edition, Indian Reprint, 2006.
- 4) "The Management and Control of Quality" by J. R. Evans and W. M. Lindsay; South-Western (Thomson Learning), Sixth Edition, 2005.
- 5) "Total Quality Management" by Naidu, Babu and Rajendran; New age International pub; First Edition Reprint, 2013

  
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**M. Tech. in Industrial Engineering**

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MTIE107	DC	<b>Intellectual property rights</b>	0	0	4	2	0	0	0	30	20

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

**Course Educational Objectives (CEOs):**

To introduction with (A) Overview of Intellectual Property, (B) Patents, copyright, Trademarks, (C) Enforcement of Intellectual Property Rights and Intellectual Property.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

1. Student would be able to understand the fundamental aspect of intellectual property rights.
2. Student would be able to understand the patent system of India.
3. Students will be able to understand the basics of copyright and protect copyright.
4. Student would be able to demonstrate the related rights.
5. Students would be able to demonstrate various case studies based on patent, copyrights and related rights.

**Syllabus**

**Unit - I**

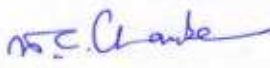
**Overview of Intellectual Property:**

Introduction and the need for intellectual property right (IPR) IPR in India - Genesis and Development IPR in abroad some important examples of IPR

**Unit - II**

**Patents:**

Macro economic impact of the patent system Patent and kind of inventions protected by a patent Patent document How to protect your inventions? Granting of patent Rights of a patent How extensive is patent protection? Why protect inventions by patents? Searching a patent Drafting of a patent Filing of a patent The different layers of the international patent system.

  
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## M. Tech. in Industrial Engineering

### Copyright

What is copyright? What is covered by copyright? How long does copyright last? Why protect copyright?

### Related rights

What are related rights? Distinction between related rights and copyright? Rights covered by copyright?

### Unit - III

#### Trademarks

What is a trademark? Rights of trademark? What kind of signs can be used as trademarks? types of trademark function does a trademark perform How is a trademark protected? How is a trademark registered? How long is a registered trademark protected for? How extensive is trademark protection? What are well-known marks and how are they protected? Domain name and how does it relate to trademarks?

#### Geographical indications

What is a geographical indication? How is a geographical indication protected? Why protect geographical indications?

### Unit - IV

#### Industrial designs:

What is an industrial design? How can industrial designs be protected? What kind of protection is provided by industrial designs? How long does the protection last? Why protect industrial designs?

#### New plant varieties

Why protect new varieties of plants? How can new plants be protected? What protection does the breeder get? How long do the breeder's rights last? How extensive is plant variety protection?

#### Unfair competition

What is unfair competition? relationship between unfair competition and intellectual property laws?

### Unit-V

#### Enforcement of Intellectual Property Rights:

Infringement of intellectual property rights Enforcement Measures

#### Intellectual Property

Overview of Biotechnology and Intellectual Property Biotechnology Research and Intellectual Property Rights Management Licensing and Enforcing Intellectual Property Commercializing Biotechnology Invention.



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### References Books:

1. "Biotechnology Applications and Research", P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Technomic Publishing Co., Inc. USA, 1985
2. "Concepts in Biotechnology", D. Balasubramaniam, C.F.A. Bryce, K. Dharmalingam, J. Green and K. Jayaraman, University Press (Orient Longman Ltd.), 2002
3. "Biotechnology: Demystifying the Concepts", Bourgagaize, Jewell and Buiser, Wesley Longman, USA, 2000.
4. Indian Patents Law Legal & Business, Ajit Parulekar and Sarita D' Souza, Implications; Macmillan India Ltd, 2006

*R.C. Chande*

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*[Signature]*

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