

**COURSE STRUCTURE & SYLLABUS
FOR
M.Tech. (INDUSTRIAL ENGINEERING & MANAGEMENT)**

(Effective from Academic Session 2010 – 2011)



**Department of Management Studies,
Indian School of Mines,
Dhanbad – 826 004.**

M.Tech. (Industrial Engineering & Management)

Course No.	Name of the Course Semester 1 (15 Weeks)	L T P	Total Credit Hours
MSC 51101	Management and Organizational Behaviour	3 1 0	7
MSC 51102	Research Methodology & Statistics	3 1 0	7
MSC 51103	Personnel Management & Industrial Relations	3 1 0	7
MSC 51104	Accounting for Managers	3 1 0	7
MSC 51105	Operations Research – I	3 1 0	7
MSC 51106	Productivity Management	3 1 0	7
MSC 51201	Productivity Management (Practical).	0 0 3	3
MSC 51202	Personality Development Lab.	0 0 3	3
	Total Credit Hours		48
	Semester – II (15 Weeks)		
MSC 52101	Corporate Finance	3 1 0	7
MSC 52102	Production and Materials Management	3 1 0	7
MSC 52103	Supply Chain Management & Logistics	3 1 0	7
MSC 52104	Project Management	3 1 0	7
MSC 52105	Operations Research - II	3 1 0	7
	Elective (Any One) :	3 1 0	7
MSE 52101	a) Globalization in Operations Management		
MSE 52102	b) Advanced Manufacturing Systems		
MSE 52103	c) Technology Management		
MSE 52104	d) Statistical Process Control		
MSE 52105	e) Forecasting & Economic Modeling		
MSE 52106	f) Marketing Research		
MSE 52107	g) Financial Markets & Corporate Restructuring		
MSE 52108	h) Marketing Management		
MSE 52109	i) Industrial Marketing		
MSE 52110	j) System Dynamics		
MSE 52111	k) Enterprise Resource Planning		
MSE 52112	l) E-Commerce		
MSE 52113	m) Software Engg. and Management		
MSC 52201	Software Laboratory	0 0 2	2
MSE 52401	Term Paper & Seminar	0 0 0	4
	Total Credit Hours		48
	Semester – III (15 Weeks)		
MSC 53901	Industrial Training/Minor Project	0 0 0	4
MSC 53401	Seminar & Viva-voce on Industrial Training	0 0 0	2
MSC 53501	Comprehensive Viva-voce	0 0 0	4
MSC 53801	Dissertation (Interim)	0 0 0	15
MSC 53402	Seminar & Viva-voce on Dissertation	0 0 0	10
MSC 53001	Teaching Assignment, Evaluation/Laboratory Development Work etc.	0 0 0	5
	Total Credit Hours		40
	Semester – IV (15 Weeks)		
MSC 54801	Dissertation	0 0 0	20
MSC 54401	Seminar on Dissertation	0 0 0	5
MSC 54001	Viva-voce on Dissertation	0 0 0	10
MSC 54002	Evaluation of Teaching Assignment /Laboratory Development work etc.	0 0 0	5
	Total Credit Hours		40

First Semester

MSC 51101: Management and Organizational Behaviour

Management: Definition, The Evolution of Management Thought, Recent Contributors to Management Thought; Task & Responsibilities of a Professional Manager; Functions of a Manager; Management Style; Managerial Decision Making; Corporate Social Responsibility; Introduction to corporate governance; Ethics in Management. Organizational Theory: Definition; Dimensions of Organizational Structure; Types; Determinants; Organisational Behaviour – significance and scope, individual and group processes, managing emotions at work place.

MSC 51102: Research Methodology & Statistics

Module 1: Research Methodology:

Research Process; Types of Research; Problem identification & Hypotheses formulation; Research Design; Sampling Design; Measurement and Scaling; Methods of Data Collection; Reliability & Validity; Data Presentation and Report Preparation; Introduction to Qualitative Research Methods.

Module 2: Statistics:

Concepts, Purpose; Frequency Distribution; Presentation of Data; Measures of Central Tendency and Dispersion; Correlation and Regression; Probability Distributions – Binomial, Poisson, Normal; Sampling and Estimation; Hypotheses testing – t test, z test; Chi-square test; Analysis of Variance;

MSC 51103: Personnel Management & Industrial Relations

Module 1: Personnel Management

Personnel Management: Nature & Evolution, Personnel Function: Personnel as a Specialist Function, Qualities of a Personnel Manager, Policies, Future of Personnel Management, Discipline & Grievance Procedure: Definition, Disciplinary Procedure Model, Other Procedures, Grievance Procedure & Interview Termination of Employment: Retirement, Resignation & Termination of Contract, Layoff & Exit Interview, Dealing with Human Aspects of Termination, Cases in Indian & International Context

Module 2: Industrial Relations

Industrial Relations: Definition, Approaches to IR, Parties to IR, Industrial Worker in India: Profile of Indian Workers in India, Problems of Industrial Workers: Absenteeism, Commitment, Work Ethics, Industrial Dispute: Causes, Types, Settlement of Disputes, Collective Bargaining: Prerequisites, Process, Growth of Collective Bargaining in India, Workers Participation in Management: Concept, Purpose, Workers Participation Scheme in India Trade Unions: Origin, Growth, Structure, Problems in India Labour Welfare: Concept, Purpose, Statutory & Non-Statutory Provisions: Contract Labour Act 1970, Laws related to Remuneration: Payment of Wages Act 1936, Minimum Wages Act 1948, Payment of Bonus Act 1965, Equal Remuneration Act 1976, Laws related to Industrial Relations: Industrial Disputes Act 1946, Industrial Employment (Standing Orders) Act 1946, Trade Union Act 1926, Laws related to Social Security: Workmen Compensation Act 1926, Employee State Insurance Act 1948, Employee Provident Funds & Miscellaneous Provisions Act 1952, Maternity Benefit Act 1961, Payment of Gratuity Act 1972, Current Developments & Amendments in various Laws

MSC 51104: Accounting for Managers

Introduction to Accounting; Accounting equation; Analysis of Financial Statements; Comparative Statements; Common Size Statements; Ratio Analysis, Du-Pont Analysis; Introduction to Cost and Management Accounting; Cost concepts: Absorption & Marginal Costing, Behaviour of Costs, CVP Analysis, Standard Costing and Variance analysis; Introduction to Activity Based Costing and Balanced Scorecard; Recent Developments in Cost and Management Accounting; Target Costing; Life Cycle Costing; Strategic Cost Management;

MSC 51105: Operations Research - I

Application of Operations Research Models in Management Decision problems; Linear Programming Model and its applications; Solution methods, Duality theory and applications, Post-Optimality Analysis; Transportation and Assignment Problems-solutions Methods; Non-Linear programming models and applications, Classification of solution methodologies for non-linear programming; Concepts and principles of Network Analysis; Basic concepts of Game Theory; Replacement Analysis; Management Decision making process; Classification of Decision making situations: Pay-off matrix, Opportunity Cost Matrix, Decision Making under risk and uncertainty;

MSC 51106: Productivity Management

Module-I Productivity Management

Concept of Productivity – Partial and Total Productivity, Models for Productivity measurement. Productivity management cycle; Application of conventional Industrial Engineering techniques for productivity improvement; Incentive Plans; Job Evaluation; Quality Management – Evolution, Contributions of Juran, Deming, and Crosby; Quality control tools and techniques, Six Sigma, TQM, ISO Certification.

Module-II Ergonomics

Concept and scope of Ergonomics. Assessment of human capabilities and limitations. Human physiological work capacity, Energy cost of Job, recommended energy expenditure levels – case discussion; Environmental Ergonomics: Work environmental stressors; Human error and accidents.

MSC 51201: Productivity Management (Practical).

The practical classes will be held in the following areas of Work Study and Human Factor Engineering:

- a) Method Study
- b) Application of Principles of Motion Economy
- c) Work Measurement
- d) Anthropometry and Isometric Strength Data Base
- e) Assessment of human capabilities and limitation
- f) Assessment of physical work capacity/aerobic power
- g) Assessment of work environmental stress and its impact/effect

MSC 51202: Personality Development Lab.

Concept of Personality, Understanding Personality: nature and Nurture Debate, Personality and human behavior, approaches Personality Development, normal vs. abnormal personality, measuring personality: projective and subjective tests, psychometric techniques, behavioral modification techniques for Personality Development: anxiety, stress and cognitive appraisal, communication, inter-personal skills and emotional intelligence, Personality Development and Managerial Effectiveness.

Second Semester

MSC 52101: Corporate Finance

Introduction to Financial Management; Time Value of Money; Risk and Return, The Cost of Capital, CAPM; Basics of Capital Budgeting, Preparation of Budget and Budgetary control; Management of Working Capital; Cash Management and Receivables Management; Leverage. Cash flow estimation and Risk Analysis; Capital Structure; Sources of Finance, Dividend Decision; Leasing and Hire Purchase; Mergers and Takeovers.

MSC 52102: Production and Materials Management

Introduction to Operations Management; Operations Strategy; Product Design; Process Design; Facility Layout; Facility Location; Forecasting Models; Production Planning and Control – Aggregate Planning, Job Shop Scheduling;

Materials Management – Functions & Objectives; Purchasing policy and sourcing strategies; Supplier Rating, Selection and Development; Stores Management Principles and Practices; Inventory management and techniques – EOQ Models; Learning Curve; MRP I, MRP II & ERP; JIT systems;

MSC 52103: Supply Chain Management & Logistics

Supply Chain Management – genesis, definitions and basic structure; Value Chain concept; Relevant issues in supply chain; Strategy formulation; Product type- Supply Chain Matrix; Strategic sourcing and management of supply, Suppliers evaluation and development, Outsourcing strategy.

Logistic Management – functions and basic issues, Indian Scenario; Areas of logistical decision making, Design of transportation network; Warehousing; Introduction to e-commerce; Performance measurement of Supply Chain Management.

MSC 52104: Project Management

Project Management – an Overview; Project Life Cycle, Feasibility Study; Market and Demand Analysis; Technical Analysis; Financial Analysis; Social Cost-Benefit Analysis; Detailed Project Report.

Project Planning and Scheduling: Planning Time Scales, Project Planning using Network techniques, Scheduling of Project with Limited Resources, Implementation and Control; Project Organization, Project Management Information Systems, Basics of Software Project Management.

MSC 52105: Operations Research – II

Integer Programming and its application in Decision Making, Solution Methodologies, Zero-one programming; Dynamic Programming: Principle of Optimality, Concepts of State and Stage, Solution of Discrete and Continuous Dynamic Programming Problems; Introduction to Markov Process; Queuing Theory: Definitions & Classification, Applications; Discrete-event Simulation and its applications; Concept of Multi Criteria Decision Making; Stochastic Decision Making Models: Decision Tree, Introduction to Stochastic Programming Model; Soft Optimization Methods: Genetic Algorithm, Simulated Annealing, Neural Network and Heuristic Programming Methods.

MSC 52201: Software Lab.

- Spreadsheet (EXCEL) based applications using built-in functions and Analysis tools
- Application of Statistical Tools and Techniques.
- Financial models involving Time value of money – basis functions like NPV, IRR, MIRR, YTM, Annuity functions, Mortgage, Pension, Financial statements, Models of Valuation
- Operations Research Models, Sensitivity Analysis, Monte Carlo Simulation.
- RDBMS based applications
- Use of Application packages like **SPSS, MINITAB, LINDO** and **LINGO**.
- ERP packages like SAP.
- Project Management Software like MS Project, Primavera.

Elective (any one) :**a) MSE 52101: Globalization in Operations Management**

Globalization in Operations Management – meaning and background; Key driving forces for globalization; Strategies for meeting international challenges; Modes of entry into international markets – equity and non-equity-based modes; Globalized Operations Strategies – prime issues and concerns for effective decision making; Performance dimensions in Globalized Operations Management, coordination and structural issues; Facility Location Decision in globalized environment; Quality Management issues in managing globalized operations – TQM and quality assurance certifications , meeting the demand for environment-friendly operations; Relevant inventory management and suppliers management issues.

b) MSE 52102: Advanced Manufacturing Systems

Cellular Manufacturing, Concept of Group Technology; Optiz Classification; Different algorithms related to Cell formation; Fundamental of Automation in Manufacturing, Functions and Components of CIMS; Automated Materials Handling; Robots, Conveyors, AGVs; Automated Quality and Inspection; Flexible Manufacturing Systems-Planning and Scheduling; Introduction to and overview of Expert Systems, Introduction to Artificial Intelligence; Applications along with case studies.

c) MSE 52103: Technology Management

Technology Management – Basic Concepts, Aspects and Issues; Implications of Change; Technology Environment – Science and Technology in India; Policies and Linkages; Technology Forecasting; Technology Support Systems – Financing, Information Systems; Organizing for Technology at Enterprises; Generation and Development; Technology Transfer; R & D Management.

d) MSE 52104: Statistical Process Control

Process variations and causes; Statistical concepts in quality control; Rational sub-grouping; Quality characteristics variables and attributes; SPC Tools and Techniques; Control charts for variables and attributes; Process capability analysis; Fundamentals of Experimental Designs, Factorial Experiments, 2^k factorial design; Acceptance Sampling;

e) MSE 52105: Forecasting & Economic Modeling

Forecasting Techniques – Time Series Analysis, Causal Models; Econometric model – Uses of Econometric modeling – Concept and Applications, Multiple Regression; Demand Function – Demand Estimation model for Established Products and New Products, Production Function model, Investment Function Model. Estimation and hypothesis-testing techniques for the linear regression model.

f) MSE 52106: Marketing Research

Basic Concepts; Marketing Research Process; Sources of Information; Experiment and Survey Design; Multivariate Techniques for Marketing Research – Multiple Regression; Multiple Discriminant Analysis; Factor Analysis; Cluster Analysis; Conjoint Analysis; Multiple Dimensional Scaling.

g) MSE 52107: Financial Markets and Corporate Restructuring

Investment scenario; Financial Markets: Capital and Money Market, Primary and Secondary Market; Financial Institutions; Theory of Firm; Introduction to Mergers, Acquisitions, Amalgamations, Spin Offs and demergers; Determination of Swap Ratios; Cross Border M&A; Legal Procedures; Joint Ventures; LBOs and MBOs; Takeover Defenses; Corporate Control; Financial Distress – Prediction and Prevention.

h) MSE 52108: Marketing Management

Marketing Concepts – Approaches to Marketing/ Marketing Mix – Functions of Marketing- Marketing Environment– The changing marketing environment – Analyzing needs and trends in Macro Environment and Micro Environment - The Marketing Process - Market Segmentation , Market Targeting and positioning strategies, B2B and B2 C marketing, New Product Development, Packaging – Purpose, Types and New Trends in packaging, Product Life Cycle, Physical Distribution – Importance and role of distribution in marketing, Introduction to the various channels of distribution –Promotion Tools – Sales Promotion, Advertising, Personal Selling, Direct Marketing and Online Marketing, Pricing Integrated Marketing Communication, Branding and Packaging, Recent Trends in Marketing

i) MSE 52109 Industrial Marketing

Basics of Industrial Marketing, Industrial Markets and Environment, Industrial buyer behaviour, STP framework in industrial market, Product strategy and new product development, industrial distribution channels, Communications for Industrial market, Industrial pricing strategies and policies, International industrial marketing

j) MSE 52110 System Dynamics

Systems Concept and System Dynamics, Evolution of System Dynamics as a System Enquiry Methodology.

Physical and information flows; causality and its interpretation; Causal loop diagramming. Flow diagramming; Level and rate configurations; Principles of modeling; Behavioural characteristics of low order systems; Smoothing of information, Exponential delays, Response characteristics of smoothing and delay functions.

Model formulation, Simulation of system dynamics models, Software packages for System Dynamics Simulation, Model validation, Policy design.

Some applications of system dynamics methodology to policy design problems in industrial, economic, social, environmental, and technological systems, etc.

k) MSE 52111 Enterprise Resource Planning

Introduction to ERP, Objectives, Benefits and Challenges; Strategic issues and Applications of ERP; Architecture of Integrated Information System (ARIS); Business processes, Workflows, Process models and modeling languages; Business process management through applications of IT; Supply Chain Management (SCM) and other enterprise-wide systems applications- SRM, CRM, PDM; E-Business and ERP; ERP Implementation; Business Process Reengineering (BPR); Understanding ERP functioning through a standard ERP package e.g. SAP. Overview of SAP and working of its various modules like FI, CO, MM, SD etc; Pre and Post implementation;

l) MSE 52112 E-Commerce

Introduction to e-commerce and e-business, e-environment and e-commerce fundamentals; status of e-commerce, strategies for e-business, e marketing basics, e retailing, CRM; Electronic data Interchange (EDI), Electronic Payment system, Security issues in e-commerce, Knowledge Management, Future of e-commerce

m) MSE 52113 Software Engineering and Management

History and evolution of software engineering; Software development life cycles: waterfall, prototyping, incremental, spiral, concurrent, reuse, and formal models;
Requirement analysis – problems in information elicitation, methods of eliciting user requirements, functional and non-functional requirements, tools for requirement analysis, document flow charts, decision tables, data flow diagrams, data dictionaries, Use case diagrams, system sequence diagrams, CRC card, software requirement specification;
Software design – the design process, function-oriented design, data base oriented design, object oriented design, data base design, user interface design, output design;
Coding – Code documentation, data declaration, statement construction, guidelines for input/output, efficiency with regard to code, memory and input/output.;
Testing – Unit testing, black box and white box testing, program flow graphs, test cases, integration testing, top-down and bottom-up testing, validation testing, alpha and beta testing, system testing, security testing, performance testing;
Software reliability, availability, and maintainability, Reliability models;