

APPLIED PROBABILITY & STATISTICS

Sub Code	16MEM 21	IA Marks	20
No. of Lecture Hrs/week	04	Exam Hours	03
Total Lecture Hrs	50	Exam Marks	80

Module-1

Introduction to statistics: Statistical Thinking, Collecting data, Statistical Modeling Frame work, measure of central tendency and variance, Importance of Data summary and Display, Tabular and Graphical display. **10 hours**

Module-2

Discrete Random Variables and Probability distribution: Discrete Random variables, Probability distributions and Probability mass functions, Cumulative distribution functions, Mean and Variance of a discrete random variable, discrete uniform distribution, Binominal distribution, Hyper Geometric distribution, Poisson distribution, Applications. **10 hours**

Module-3

Continuous Random Variables and Probability Distributions: Continuous random variables, Probability distributions and probability density functions, cumulative distribution functions, Mean and Variance of a continuous random variable, uniform distribution, Normal distribution, Normal approximation to Binominal and Poisson distribution, Exponential distribution. **10 hours**

Module-4

Testing of Hypothesis: Estimation theory, Hypothesis testing, Inference on the mean of a population (variance known and unknown), Inference on the variance of a normal population, Inference on a population proportion, Testing for Goodness of Fit, Inference for a difference in Means, Variances known, Inference for a difference in means of two normal distributions, Variances unknown, Inference on the Variances of two normal populations, Inference on two population proportions. **10 hours**

Module-5

Simple Linear Regressions and Correlation: Simple Linear Regression, Properties of Least square Estimators and Estimation of variances, Transformations to a straight line, Correlation. Multiple linear regressions model, least square estimation of parameters, Matrix approach to multiple linear regression, properties of least square estimators and estimation of variance. **10 hours**

Reference books:

1. **Applied statistics and Probability for Engineers** – Douglas C Montgomery, George C Runger - John Wiley and Sons - 2ndEdn, ISBN-0-471-17027-5.
2. **Statistics for Management** - Richard I Levin, David S Rubin - Prentice Hall India – 6thEdn, ISBN-81-203-0893-X.
3. **Probability and Statistics in Engineering** - William W Hines, Douglas C Montgomery - John Wiley and Sons - 2ndEdn.
4. **Business Statistics for Management and Economics**- Daniel, Terrell - Houghton Mifflin Company -6thEdn, , ISBN-0-395-62835-0.
5. **Probability and Statistics** - Walpole & Meyers

ORGANIZATIONAL BEHAVIOUR

Sub Code	16MEM 22	IA Marks	20
No. of Lecture Hrs/week	04	Exam Hours	03
Total Lecture Hrs	50	Exam Marks	80

Module-1

The Foundations of Organizational Behavior: Historical Background, Research Methodology, Theoretical, Frameworks. OB in global context, Role of Information Technology, TQM, Learning Organizations. **10 hours**

Module-2

Individual Behavior: Biographical Characteristics, Ability, Personality, Learning, Implications for Performance and Satisfaction. Perception and Individual Decision –Making Values, Attitudes and Job Satisfaction. **10 hours**

Module-3

Basic Motivation Concepts: Work Motivation Approaches – Content and Process Theories of Work Motivation – Contemporary Theories of Work Motivation – Motivation through Job Design, Quality of Work Life, Goal Setting. **10 hours**

Module-4

Foundations of Group Behavior: Communication and Group Decision Making – Leadership Styles and Skills – Power and Politics – Conflict and Inter – group behavior. **10 hours**

Module-5

Organization Culture: Organizational Change – Organizational Development Organizational Climate – Work Stress. **10 hours**

Reference books:

1. **Organizational Behavior** – Fred Luthans – McGraw Hill – 1997.
2. **Human Behavior at work**– Keith Davis – Prentice Hall India – 2007.
3. **Organizational Behavior** – Stephen. P. Robbins – Prentice Hall, India. - 9th edition 2001.
4. **Organizational Psychology** – Robin, Kolb, etc – 1996

TOTAL QUALITY MANAGEMENT

Sub Code	16MEM 23	IA Marks	20
No. of Lecture Hrs/week	04	Exam Hours	03
Total Lecture Hrs	50	Exam Marks	80

Module-1

Introduction: BUSINESS EVOLUTION

The Evolution of the Customer Satisfaction Concept: Evolution of Customer Satisfaction Methods, Evolution of Company Integration, Continuing Evolution

Survival in a Rapidly Changing World: Practice Systematic Development of Skill, Treat Management as a Coherent System, Focus on People and Their Purposes, Integrate Best Practices, Financial Benefit

Developing a Unique Organizational Capability: Four Practical Revolutions in Management, Evolution of Our Understanding, Four Levels of Practice. **10 hours**

Module-2

The First Revolution: CUSTOMER FOCUS

Change in the Work Concept: Market-in, Customers, Philosophy-in and Philosophy-out

Evolution of Customer Focus and Its Challenges: Three Stages of Customer Focus, Customer Concerns, Integration of Concerns, Individualizing Customers. **10 hours**

Module-3

The Second Revolution: CONTINUOUS IMPROVEMENT

Improvement as a Problem-Solving Process: Management by Process, WV Model of Continuous Improvement, Continuous Improvement of Processes for All Types of Work, Continuous Improvement and the Scientific Method

Managing Existing Processes

Process Discovery and Management: Thinking In Terms of Process, Process Discovery

Process Control and Variation: A Typical Example of (Mishandling) Variation, Making the Most of Variation, Process Control and Process Improvement

Reactive Improvement and the 7 Steps Method; Identifying the Problem, Standard Steps and Tools, The 7 Steps: A Case Study, The 7 QC Tools

Management Diagnosis of the 7 Steps of Reactive Improvement: General Guidelines for Managers Diagnosing a QI Story, Step-by-Step Guidelines for Managers Diagnosing a QI Story.

Process Management Mobilization Case Study, Planning Projects or Tasks: The 9 Steps Compared with the 7 Steps, the 9 Steps Mobilization at Teradyne, A Teradyne Illustration of the 9 Steps Use, Relationship of the 9 Steps to Other Methods

Proactive Improvement: Collecting Data for Proactive Improvement, Language Data and Use of Semantics, Toward Standard Tools and Steps for Proactive Improvement, Customer Visitation as a Method of Collecting Proactive Improvement Data, Applying Proactive Improvement to Develop New Products.

10 hours

Module-4

The Third Revolution: TOTAL PARTICIPATION

Engagement and Alignment of Organization Members: Engaged Employees for a Rapidly Changing World, Explicit Joining of Improvement and Routine Work, Processes and People Coordinating Behavior: Societal Networking Case Study of the CQM Study Group on Conversation, Expansion of the Principles of Semantics, Some Types and Models of Conversations

Leading Change: Technical Skill, Human Skill, Conceptual Skill

Self-Development, Team Skill Development, Initiation Strategies; CEO Involvement,

Infrastructure for Mobilization: Create Explicit Structures for Mobilization, A General Model for

Mobilization: The 7 Infrastructures, Phase-In: Orientation Phase, Empowerment Phase,

Alignment Phase, Evolution of the Parallel Organization, Common Patterns of Phase-In

U.S. Focused Strategies for Phase-In: Benchmarking, Six Sigma, Cycle-Time Reduction

Hoshin Management: Hoshin Management and Its Parts, Management by Objectives and Conventional Business Planning, Hoshin Management at Analog Devices

Leading Process Improvement: Modeling Personal Improvement, Employee Development at NIMS , Company Strategies ,Individual Practice of CAPD by Managers.

10 hours

Module-5

The Fourth Revolution: SOCIETAL NETWORKING

Networking and Societal Diffusion: Regional and National Networking the Japanese Model, Taking a Lesson from Japan—CQM, Comparison of National Methods, Use of Indirect Influence

Ongoing Integration of Methods: Applying Idealized Design to Hoshin Management, Structural Process Improvement Case Study, SerVend Case Study.

10 hours

Text Book:

- 1 **“Four Practical Revolutions in Management systems for creating unique organizational capability”** -Shoji Shiba and David Walden,— Productivity Press & Center for Quality Management, (USA) , 2001, ISBN-9781563273889/9781563272172/9781563272318

Reference Books

- 1 **“Management for Total Quality”** -N Logothetis- Prentice Hall of India, New Delhi, 2003, ISBN-81-203-1137-X
- 2 **“Total Quality Management”**- *Besterfield*, Pearson Education, 2011. ISBN, 817758410X, 9788177584107.

PROJECT MANAGEMENT

Sub Code	16MEM 24	IA Marks	20
No. of Lecture Hrs/week	04	Exam Hours	03
Total Lecture Hrs	50	Exam Marks	80

Module-1

Introduction: Projects, types of projects- public and private projects, project organization, structure and processes. Identification of Investment Opportunities, Market and Demand Analysis – Technical Analysis – Investment Outlay. **10 Hours**

Module-2

Means of Financing: Profitability and Breakeven Analysis – Cash Flows of Projects – Tax factor in investment Analysis – Interest – Compounding and Discounting. **10 Hours**

Module-3

Appraisal Criteria and Selection of Investment: Cost of Capital – Analysis of Risk – Financial Projection, Social Cost Benefit Analysis.

10 Hours

Module-4

Manpower Management in Projects: Functional Approach to Manpower Management – The Element of decision Process – Project Team Concepts – Field Autonomy – Policies Governing Projects. **10 Hours**

Module-5

Networks Technique in Project Management: PERT/CPM Analysis – Administrative aspects of Capital Investment.

10 Hours

Reference books:

1. **Projects** – Appraisal, preparation, budgeting and implementation Prasanna chandra – Tata McGraw Hill.
2. **Hand book of Project Management**– Dennis Lock.
3. **Project Management** – Dennis lock.

SIMULATION MODELING AND ANALYSIS

Sub Code	16 MEM 251	IA Marks	20
No. of Lecture Hrs/week	03	Exam Hours	03
Total Lecture Hrs	40	Exam Marks	80

Module-1

Introduction to Simulation: Appropriateness of simulation tool, Advantages, Disadvantages and Application areas of simulation, System and System Environment, Components of a system, Discrete and continuous systems, Model of a system, Types of models, Steps in a simulation study.

8 Hours

Module-2

Discrete Event Simulation: Concepts in discrete-event simulation, Event-driven hand simulation – Examples on single channel queue, two server queue, and inventory systems.

Statistical Models in Simulation: Terminology and concepts, Useful statistical models, discrete distributions, Continuous distributions.

8 Hours

Module-3

Random Number Generation: Properties of random numbers, Techniques for generating random numbers- Linear congruential method –Combined linear congruential method; Tests for random numbers -The Kolmogorov-Smirnov test, the Chi-square test.

8 Hours

Module-4

Random Variate Generation: Inverse Transforms technique-Exponential distribution, Uniform distribution, Weibull distribution, Triangular distribution, Empirical continuous distributions, Continuous distribution without a closed-form inverse, Discrete distribution, Generating approximate normal variate - Erlang distribution.

Empirical Discrete Distribution: Acceptance -Rejection technique - Poisson distribution, Gamma distribution.

8 Hours

Module-5

Design and Evaluation of Simulation Experiments: Variance reduction techniques -antithetic variables, Verification and validation of simulation models.

Simulation Software: Need for simulation software, Selection of simulation software, Simulation packages (a brief note of software packages such as ARENA, AutoMod, Extend, Flexsim, WITNESS, ProMODEL, etc.).

8 Hours

REFERENCE BOOKS:

1. **Discrete-Event Simulation** – Jerry Banks, John S Carson, Barry S. Nelson, David M. Nicol, P Shahabudeen, Pearson, Latest Edition.
2. **Handbook of Simulation** – Jerry Banks, Ed. John Wiley & Sons, Latest Edition.
3. **Simulation with Arena** – David Kelton, Sadowski, and Sturrock , McGraw Hill, Latest Edition

PRODUCT LIFE CYCLE MANAGEMENT

Sub Code	16MEM 252	IA Marks	20
No. of Lecture Hrs/week	03	Exam Hours	03
Total Lecture Hrs	40	Exam Marks	80

Module-1

Product life cycle management – Need for PLM, Components of PLM, Product Data and Product workflow, Drivers for Change, The PLM Strategy, Developing a PLM Strategy, a Five-step Process.

08 Hours

Module-2

Strategy Identification and Selection, Strategy Elements, Implications of Strategy Elements, Policies, Strategy Analysis, Communicating the Strategy.

08 Hours

Module-3

Change Management for PLM, Configuration management, and cost of design changes, schemes for concurrent engineering, Design for manufacturing and assembly, robust design. **08 Hours**

Module-4

Modeling, Current concepts, part design, sketching, use of datum's construction features, free ovalation, patterning, copying, and modifying features, reference standards for datum specification, Standards for Engineering data exchange.

08 Hours

Module-5

Tolerance mass property calculations, rapid prototyping and tooling, finite modeling and analysis, general procedure, analysis techniques, Finite element modeling. Applicability of FEM, Static analysis, dynamic analysis. **08 Hours**

Reference books:

1. **Product Lifecycle Management Paradigm for century Product Realization** - John Stark, Springer-Verlag, **21st**, London, 3rd printing -2006. 441 pp., ISBN: 1-85033-810-5.
2. **CAD/CAM Theory and Practice** -Zeid, McGraw Hill.- 1991.
3. **Computer Integrated Design and Manufacturing**, - Mark Henderson & Philip Wolfe, Bedworth McGraw hill inc.- 1991.
4. **Part modeling Users Guide**, Engineer - 1998.

SUPPLY CHAIN MANAGEMENT

Sub Code	16MEM 253	IA Marks	20
No. of Lecture Hrs/week	03	Exam Hours	03
Total Lecture Hrs	40	Exam Marks	80

Module-1

Building a Strategic Frame Work to Analyze Supply Chains: Supply chain stages and decision phases process view of a supply chain. Supply chain flows. Examples of supply chains, Competitive and supply chain strategies. Achieving strategic fit. Expanding strategic scope. Drivers of supply chain performance. Framework for structuring drivers – Inventory, Transportation, Facilities, Information. Obstacles to achieving fit.

Designing the Supply Chain Network: Distribution Networking – Role, Design. Supply Chain Network (SCN) – Role, Factors, Framework for Design Decisions. **08 Hours**

Module-2

Facility Location and Network Design: Models for facility location and capacity allocation. Impact of uncertainty on SCN .

Planning and Managing Inventories in a Supply Chain: Review of inventory concepts. Trade promotions, managing multi-echelon cycle inventory, safety inventory determination. Impact of supply uncertainty aggregation and replenishment policies on safety inventory. Optimum level of product availability; importance factors. Managerial levers to improve supply chain profitability. **08 Hours**

Module-3

Sourcing, Transportation and Pricing Products: Role of sourcing, supplier – scoring & assessment, selection and contracts. Design collaboration.

Sourcing, Transportation and Pricing Products: Role of transportation, Factors affecting transportation decisions. Modes of transportation and their performance characteristics. Designing transportation network. Trade - off in transportation design. Tailored transportation, Routing and scheduling in transportation. International transportation. Analytical problems. Role Revenue Management in the supply chain. **08 Hours**

Module-4

Coordination and Technology in the Supply Chain: Co-ordination in a supply chain: Bullwhip effect. Obstacles to coordination. Managerial levers to achieve co-ordination, Building strategic partnerships. **08 Hours**

Module-5

Coordination and Technology in the Supply Chain: The role of IT supply Chain, The Supply Chain IT framework, CRM, Internal SCM, SRM. The role of E-business in a supply chain, The E-business framework, E-business in practice.

Emerging Concepts: Reverse Logistics; Reasons, Activities, Role. RFID Systems; Components, applications, implementation. Lean supply chains, Implementation of Six Sigma in Supply Chains. **08 Hours**

Reference books:

1. **Supply Chain Management**– Strategy, Planning & Operation. Sunil Chopra & Peter Meindl; Pearson Education Asia, ISBN: 81-7808-272-1. – 2001
2. **Supply Chain Redesign** – Transforming Supply Chains into Integrated Value Systems -Robert B Handfield, Ernest L Nichols - Jr., 2002, Pearson Education Inc, ISBN: 81-297-0113-8
3. **Modeling the Supply Chain** -Jeremy F Shapiro, Duxbury -Thomson Learning -2002, ISBN 0-534-37363.
4. **Designing & Managing the Supply Chain** -David Simchi Levi, Philip Kaminsky& Edith Simchi Levi - McGraw Hill.
5. **Going Backwards Reverse Logistics Trends and Practices** -Dr. Dale S. Rogers,Dr. Ronald S. Tibben-Lembke, University of Nevada, Reno, Center for Logistics Management.

PRODUCT DATA MANAGEMENT

Sub Code	16MEM 254	IA Marks	20
No. of Lecture Hrs/week	03	Exam Hours	03
Total Lecture Hrs	40	Exam Marks	80

Module-1

Centralized systems: Client Server Systems, Parallel Systems, Distributed Systems, Network Types, Parallel Database, Distributed Database, Security and Integrity, Standardization views, Product Data Management, Product life cycle, Complexity in Product Development, General Description of PDM

08 Hours

Module-2

Basic functionality of PDM: Information architecture, PDM System architecture, Applications used in PDM systems. Trends in PDM

08 Hours

Module-3

Document Management Systems: Document management and PDM, Document life cycle, Content Management, Document management and related technologies, Document management resources on the Internet

08 Hours

Module-4

Workflow Management in PDM: Structure Management, Engineering Change Management, Release Management, Version Management, Configuration Management

Creating Product Structures: Part centric approach, CAD centric approach, Product Structure configuration.

08 Hours

Module-5

PDM Tools: Matrix One, Team Center, Windchill. Enovia, PDM resources on the Internet

PDM Implementation Case Studies: Sun Microsystems, Inc., Mentor Graphics Corporation, Ericsson Radio Systems AB, Ericsson Mobile Communications AB, ABB Automation Technology Products.

08 Hours

Reference books:

1. **Implementing and Integrating Product Data Management and Software Configuration Management** - IvicaCmkovic Ulf Asklund, AnnitaPersson Dahlqvist - Archtech House Publishers
2. **Product Data Management** - Rodger Burden - Resource Publishing, ISBN-10: 0970035025, ISBN-13: 978-0970035026
3. Windchill User Manual
4. **The AutoCAD Database Book – Accessing and Managing CAD Drawing Information** -Galgotia Publications -3rd Edition.

ADVANCED MANUFACTURING PRACTICES

Sub Code	16MEM 255	IA Marks	20
No. of Lecture Hrs/week	03	Exam Hours	03
Total Lecture Hrs	40	Exam Marks	80

Module-1

JIT – Introduction – The spread of JIT Movement, some definitions of JIT, core Japanese practices of JIT, Creating continuous Flow Manufacture, Enabling JIT to occur, Basic elements of JIT, Benefits of JIT.

Module-2

Just in Time Production – Primary purpose, profit through cost reduction, Elimination of over production, Quality control, Quality Assurance, Respect for Humanity, Flexible work Force, JIT Production Adapting to changing production Quantities, process layout for shortened lead Times, Standardization of operation, Automation.

Module-3

Sequence and scheduling used by suppliers: Monthly and daily Information. Sequenced withdrawal system by sequenced schedule table, problems and counter measures in applying the Kanban system to sub-contractors.

Toyota Production System-The philosophy of TPS, Basic Frame work of TPS, Kanban, Determining the Number of Kanban in Toyota Production System.

- Kanban Number under Constant Quantity Withdrawal System.
- Constant Cycle, Non-constant Quantity Withdrawal System. Supplier Kanban and the Sequence
- Schedule for Use by Suppliers.
- Later Replenishment System by Kanban.
- Sequenced Withdrawal System.
- Circulation of the Supplier Kanban within Toyota.

Production Smoothing in TPS, Production Planning, Production Smoothing

Adaptability to Demand Fluctuations, Sequencing Method for the Mixed Model Assembly Line to Realize Smoothed Production of Goal.

Module-4

Just-in-Time Production with Total Quality Control just in time concept, cutting lot sizes, cutting set-up times, cutting purchase order costs, the JIT cause-Effect chain, Scrap/Quality Improvements, Motivational effects, Responsibility effects, small Group improvement Activities, withdrawal of Buffer Inventory, the total Quality Control Concept.

Module-5

Total Quality Control-Introduction-Total Quality Control concepts, responsibility, learning from the west, TQC concepts categorized, Goals, Habit of improvement, perfection, Basics, process control, Easy to see Quality control as facilitator, small lot sizes, Housekeeping, Less than full capacity scheduling, Daily machine checking, Techniques and Aids, Exposure of problems, Fool proof Devices, Tools of Analysis, QC Circles, TQC in Japanese-owned US Electronics plant, TQC in Japanese-owned Automotive plants.

REFERENCE BOOKS:

- **Japanese manufacturing techniques** – Richard Schonberger.
- **Toyota Production system– An integrated approach to just in time** – Yasuhiro Monden
- **Lean Thinking** – By James Womack.
- **The machine that changed the World – The story of Lean production** – James P. Womack, Daniel T
- **Jones, and Daniel Roos** – Harper Perennial edition published 1991.
- **Just in time manufacturing** – Kargoanker
- **Wind-chill reference manual.**

LAB COMPONENT

Sub Code	16MEM 26	IA Marks	20
No. of Lecture Hrs/week	03	Exam Hours	03
Total Lecture Hrs	42	Exam Marks	80

- 1 Generating bill of materials for various engineering design.
 - a. Creation of Item masters for various engineering design
 - b. Creation of purchase order for items
2. Inventory and cost transactions
3. Accounts payable/receivable
4. Creation of dispatch instruction for items.
5. Generating various reports for confirmed orders and Exception Reporting.

Suggested Software packages:

Sixth sense/ Ofbiz / other ERP packages