UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY CHENNAI : : CHENNAI 600 025

REGULATIONS - 2009

CURRICULUM I TO IV SEMESTERS (FULL TIME)

M.E. QUALITY ENGINEERING AND MANAGEMENT

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MA9105	Probability and Statistical Methods	3	1	0	4
2	QE9111	Manufacturing Systems and Processes	3	0	0	3
3	QE9112	Total Quality Management	3	0	0	3
4	QE9113	Optimization Techniques	3	0	0	3
5	QE9114	Metrology and Inspection	3	0	0	3
6	E1	Elective I	3	0	0	3
		TOTAL	18	1	0	**19**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	QE9121	Total Quality Control	3	0	0	3
2	QE9122	Quality by Design	3	1	0	4
3	QE9123	Software Quality Engineering	3	0	0	3
4	E1	Elective II	3	0	0	3
5	E2	Elective III	3	0	0	3
6	E3	Elective IV	3	0	0	3
7	QE9124	Quality System Design Project	0	0	0	2
		TOTAL	18	1	0	**21**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	E5	Elective V	3	0	0	3
2	E6	Elective VI	3	0	0	3
3	E7	Elective VII	3	0	0	3
4	QE9131	Project-Phase I	0	0	8	6
		TOTAL	15	0	8	**15**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	PD9141	Project Work – Phase II	0	0	24	12
		TOTAL	0	0	24	12

Total number of credits to be earned for the award of the degree: 67

UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY CHENNAI : : CHENNAI 600 025

REGULATIONS - 2009

CURRICULUM I TO VI SEMESTERS (PART TIME)

M.E. QUALITY ENGINEERING & MANAGEMENT

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	MA9105	Probability and Statistical Methods	3	1	0	4
2	QE9111	Manufacturing Systems and Processes	3	0	0	3
3	QE9112	Total Quality Management	3	0	0	3
		TOTAL	9	0	0	**10**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	QE9121	Total Quality Control	3	0	0	3
2	QE9122	Quality by Design	3	1	0	4
3	QE9123	Software Quality Engineering	3	0	0	3
		TOTAL	9	1	0	**10**

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	QE9113	Optimization Techniques	3	0	0	3
2	QE9114	Metrology and Inspection	3	0	0	3
3	E1	Elective I	3	0	0	3
		TOTAL	9	0	0	**9**

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	E2	Elective II	3	0	0	3
2	E3	Elective III	3	0	0	3
3	E4	Elective IV	3	0	0	3
4	QE9124	Quality System Design Project	3	0	3	2
		TOTAL	12	0	3	**11**

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	E5	Elective V	3	0	0	3
2	E6	Elective VI	3	0	0	3
3	E7	Elective VII	3	0	0	3
4	QE9131	Project-Phase I	0	0	8	6
		TOTAL	9	0	8	**15**

SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
PRACTICAL						
1	QE9141	Project Work – Phase II	0	0	24	12
		TOTAL	0	0	24	12

Total number of credits to be earned for the award of the degree: 67

ELECTIVES for M.E. QUALITY ENGINEERING & MANAGEMENT

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	QE 9150	Maintenance Engineering and Management	3	0	0	3
2	QE 9151	System Simulation	3	0	0	3
3	IE 9159	Decision Support Systems	3	0	0	3
4	IE 9161	Applied Object Oriented Programming	3	0	0	3
5	QE 9152	Operations Scheduling	3	0	0	3
6	IE 9124	Supply Chain Management	3	0	0	3
7	QE 9153	Production and Inventory management	3	0	0	3
8	QE 9154	Materials Management Value Engineering	3	0	0	3
9	QE 9155	Product Innovation and Development	3	0	0	3
10	QE 9156	Lean Six Sigma	3	0	0	3
11	QE 9157	Reliability Engineering Models	3	0	0	3
12	IE 9164	Business Excellence Models	3	0	0	3
13	IE 9162	Management Accounting and Financial Management	3	0	0	3
14	IE 9169	Project Management	3	0	0	3
15	IE 9170	Service Operations Management	3	0	0	3
16	IE 9172	Multi Variate Data Analysis	3	0	0	3
17	IE 9175	Systems Analysis and design	3	0	0	3
18	QE 9159	Software Process Measurement and Analysis	3	0	0	3
19	IE 9174	Data Analysis	3	0	0	3
20	IE 9150	Facilities Planning and Design	3	0	0	3
21	IE 9154	Productivity Management and Re-Engineering	3	0	0	3
22	QE 9160	Engineering Economics	3	0	0	3
23	IE 9167	Industrial Safety and Hygiene	3	0	0	3
24	IE 9168	Logistics and Distribution Management	3	0	0	3
25	IE 9171	Industrial Psychology	3	0	0	3
26	IE 9173	Technology Management	3	0	0	3

MA 9105 PROBABILITY AND STATISTICAL METHODS L T P C
3 1 0 4

UNIT I ONE DIMENSIONAL RANDOM VARIABLES 9

Random variables-Probability function- moments- moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and normal distributions – Functions of a Random variable.

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions – Marginal and conditional distributions – Functions of two dimensional random variables – Regression Curve – Correlation.

UNIT III ESTIMATION THEORY 9

Unbiased Estimators – Method of moments – Maximum likelihood Estimation – Curve fitting by principle of least squares – Regression lines.

UNIT IV TESTING OF HYPOTHESIS 9

Sampling distributions- Type I and Type II errors – Tests based on normal, t, χ^2 and F distributions for testing of mean, variance and proportions – Tests for Independence of attributes and Goodness of fit.

UNIT V MULTIVARIATE ANALYSIS 9

Covariance matrix – Correlation Matrix – Multivariate Normal density function – Principal components – Sample variation by principal components – Principal components by graphing.

L+T: 45+15
TOTAL: 60 PERIODS

REFERENCES:

1. Richard Johnson, Miller & Freund's Probability and statistics for Engineers, 7th Edition, Prentice –Hall of India, Private Ltd., New Delhi (2007).
2. Richard A.Johnson and Dean W, Wichern, Applied Multivariate Statistical Analysis, 5th Edition, Pearson Education, Asia (2002).
3. Gupta, S.C and Kapoor, V.K. "Fundamentals of Mathematical Statistics, Sultan and Sons, New Delhi (2001).
4. Jay L.Devorer, Probability and Statistics for Engineering and the Sciences, Thomson and Duxbbury, Singapore (2002).
5. Dallas E Johnson et al., Applied multivariate methods for data analysis, Thomson and Duxbbury Press, Singapore (1998).

QE 9111 MANUFACTURING SYSTEMS AND PROCESSES L T P C

3 0 0 3

UNIT I MACHINE TOOLS 8

Lathe – types of lathes – shaper –shapers operations – planer – planer operations – Types of grinding machines

UNIT II MANUFACTURING PROCESS 10

Patterns – casting process – forging – rolling - extrusion process- welding technology.

UNIT III NON TRADITIONAL MACHINING TECHNIQUES 8

Electric discharge machining – wire EDM – chemical machining – elector chemical machining – ultra sonic machining – abrasive jet machining – water jet machining

UNIT IV MANUFACTURING SYSTEMS 9

Manufacturing systems – Functions – Types of production – Costs in manufacturing- Modern manufacturing systems & controls

UNIT V WORK SYSTEMS 10

Introduction to time study and method study.

TOTAL: 45 PERIODS

REFERENCES:

1. S.K.Hajara Choudhury,Elements of Workshop technology Volume I and II,Media promoters and publishers Pvt.Ltd,2002.
2. P.C.Sharma,A text book of production technology,S.Chand &Co.,Ltd.,1999.
3. Mikel, P.Groover, “Automation Production Systems and Computer integrated manufacturing” PHI, 1995.
4. Benjamin W. Niebel, Motion & Time Study, Richard D.Irwin Inc., 1982.

QE 9112 TOTAL QUALITY MANAGEMENT L T P C

3 0 0 3

UNITI INTRODUCTION 9

Need for TQM, evolution of quality, Definition of quality, TQM philosophy – CONTRIBUTIONS OF Deming Juran, Crosby and Ishikawa, TQM models.

UNIT II PLANNING 9

Vision, Mission, Quality policy and objective Planning and Organization for quality, Quality policy Deployment, Quality function deployment, introduction to BPR and analysis of Quality Costs.

UNIT III TQM PRINCIPLES 9

Customer focus, Leadership and Top management commitment, Employee involvement – Empowerment and Team work, Supplier Quality Management, Continuous process improvement, Training, performance Measurement and customer satisfaction.

UNIT IV TQM TOOLS AND TECHNIQUES 9

PDSA, The Seven Tools of Quality, New Seven management tools, Concept of six sigma, FMEA, Bench Marking, JIT, POKA YOKE, 5S, KAIZEN, Quality circles.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 Systems, clauses Documentation, Implementation, Introduction to ISO14000 and OSHAS18000, Implementation of TQM, Case Studies.

TOTAL: 45 PERIODS

TEXT BOOK:

Dale H.Besterfiled, “Total Quality Management”, Pearson Education Asia, (Indian reprint 2002)

REFERENCES:

1. Oakland.J.S. “Total Quality Management”, Butterworth–Hcinemann Ltd., Oxford, 1989.
2. Narayana V. and Sreenivasan, N.S., “Quality Management – Concepts and Tasks”, New Age International 1996.
3. Zeiri. “Total Quality Management for Engineers”, Wood Head Publishers, 1991.
4. Juran J.M and Frank M.Gryna Jr., “Quality Planning and Analysis”, TMH, India, 1982.
5. Brain Rethery, ISO 9000, Productivity and Quality Publishing Pvt.Ltd., 1993.
6. D.Mills, Quality Auditing, Chapman and Hall, 1993.

QE 9113 OPTIMIZATION TECHNIQUES **L T P C**
3 0 0 3

UNIT I LINEAR PROGRAMMING 15

The L.P.model, Assumptions, solving by Graphical and simplex method, Post optimality analysis, the transportation problem, the assignment problem.

UNIT II NET WORKS 8

PERT-CPM, the shortest path - Minimal spanning tree – Maximum flow problems.

UNIT III DECISION ANALYSIS 7

Decision making without and with experimentation Decision trees, Game theory.

UNIT IV MARKOV PROCESSES 8

Basic structure of queuing models, application of queuing theory, Markov chain.

UNIT V DYNAMIC PROGRAMMING 7

Characteristics of D.P.problems, Deterministic dynamic programming.

TOTAL: 45 PERIODS

REFERENCES:

1. Ravindran – Phillips and Solberg, “Operations Research Principles and Practice”, Wiley India, 2007.
2. Pannerselvam,R, “Operations Research”, Prentice Hall, 2008.
3. F.S.Hillier, G.L.Liberman, “Introduction to Operations Research” McGraw Hill, 1995.

QE 9114 METROLOGY AND INSPECTION **L T P C**

3 0 0 3

UNIT I LINEAR MEASUREMENT AND ANGULAR MEASUREMENT **12**

Accuracy, Precision, Readability, Sensitivity etc., Linear measuring instruments-vernier – micrometer-Gauge blocks- dial indicator-comparators – Angle standards – vernier bevel protrctor-sine bar – autocollimator.

UNIT II STANDARDS FOR LINEAR AND ANGULAR MEASUREMENTS **8**

Shop floor standards and their calibration, light interference, Method of coincidence, Slip gauge calibration, Measurement errors, Limits, fits, Tolerance, Gauges, Gauge design.

UNIT III MEASUREMENT APPLICATION **8**

Measurement of screw threads and gears – Radius measurement – surface finish measurement -Measurement of straightness-flatness-parallelism – squareness-roundness – circularity

UNIT IV MODERN CONCEPTS **8**

Image processing and its application in Metrology, Co-ordinate measuring machine, Types of CMM, Probes used, Application, Non-contact CMM using Electro-optical sensors for dimensional metrology.

UNIT V INTRODUCTION TO MEASUREMENT SYSTEMS **9**

System configuration, basic characteristics of measuring devices, Displacement, force and torque measurement, standards, Calibration, Sensors, Basic principles and concepts of temperature, Pressure and flow measurement,Destructive testing – Nondestructive testing.

TOTAL: 45 PERIODS

REFERENCES:

1. Galyer J.F. and Shotbolt C.R.”Metrology for Engineers” ELBS, 1992.
2. Hune, K.J.Engineering Metrology, Kalyani Publishers, India, 1980.
3. Robinson, S.L. and Miller R.K. Automated Inspection and Quality Assurance, Marcel Dekker Inc.1989.
4. Stout, K.”Quality Control in Automation, Prentice Hall, 1986.

QE 9121 TOTAL QUALITY CONTROL L T P C

3 0 0 3

UNIT I INTRODUCTION 7

Quality Dimensions – Quality definitions – Inspection - Quality control – Quality Assurance – Quality planning - Quality costs – Economics of quality – Quality loss function

UNIT II CONTROL CHARTS 12

Chance and assignable causes of process variation, statistical basis of the control chart, control charts for variables and attributes- Construction and application.

UNIT III SPECIAL CONTROL PROCEDURES 8

Warning and modified control limits, control chart for individual measurements, multi-vari chart, X-chart with a linear trend, chart for moving averages and ranges, cumulative-sum and exponentially weighted moving average control charts.

UNIT IV STATISTICAL PROCESS CONTROL 8

Process stability, process capability analysis using a Histogram or probability plots and control chart. Gauge capability studies, setting specification limits.

UNIT V ACCEPTANCE SAMPLING 10

The acceptance sampling fundamental, OC curve, sampling plans for attributes, simple, double, multiple and sequential, sampling plans for variables, MIL-STD-105D and MIL-STD-414E & IS2500 standards.

REFERENCES:

1. Grant E.L. and Leavensworth, Statistical Quality Control, TMH, 2000.
2. IS 2500 Standard.
3. Douglas C Montgomery, Introduction to Statistical Quality Control, John Wiley, 2001.

QE 9122 QUALITY BY DESIGN **L T P C**

3 1 0 4

UNIT I INTRODUCTION **5**

Perception of quality, Taguchi's definition of quality – quality loss function, tolerance using loss function, quality and process capability, Planning of experiments, design principles, terminology.

UNIT II FACTORIAL EXPERIMENTS **10**

Design and analysis of single factor and multi-factor experiments, tests on means, EMS rules.

UNIT III SPECIAL DESIGNS **10**

2^K Factorial designs, Fractional factorial designs, Nested designs, Blocking and Confounding.

UNIT IV ORTHOGONAL EXPERIMENTS **10**

Selection of orthogonal arrays (OA's) OA designs, conduct of OA experiments, data collection and analysis of simple experiments, Modification of orthogonal arrays.

UNIT V ROBUST DESIGN **10**

Variability due to noise factors, Product and process design, Principles of robust design, objective functions in robust design - S/N ratios , Inner and outer OA experiments, optimization using S/N ratios, fraction defective analysis, case studies.

TOTAL: 45 PERIODS

REFERENCES:

1. Nicolo Belavendram, "Quality by design" Taguchi techniques for Industrial experimentation, Prentice Hall, 1999.
2. D.C.Montgomery, "Design and analysis of experiments", John Wiley, 2006.
3. Tapan, P. Bagchi," Taguchi methods explained: Practical steps to Robust Design", PHI, 1993.
4. Robert H Lochner and Joseph E Matar, "Designing for Quality", Chapman & Hall, 1990.

QE 9123	SOFTWARE QUALITY ENGINEERING	L	T	P	C
		3	0	0	3

UNIT I SOFTWARE QUALITY **5**

Concepts & Costs of quality – Quality Control Vs Quality Assurance – Defect Prevention vs. Defect Prediction Product Life Cycle- Project Life Cycle Models.(Traditional and Agile)

UNIT II SOFTWARE ENGINEERING ACTIVITIES **10**

Estimation, Requirements, Analysis, Architecture, Design, development Testing and Maintenance

UNIT III SUPPORT ACTIVITIES **10**

Reviews- Auditing – Risk Management – Software Quality Assurance- Software Configuration Management

UNIT IV SOFTWARE QUALITY MANAGEMENT TOOLS **10**

Seven Basic Quality Tools- Checklist-Pareto Diagram-Cause and Effect Diagram-Run Chart- Histogram-Control Chart-Scatter Diagram – Poke Yoke – Statistical Process Control – Failure Mode and Effects Analysis (FMEA)- Quality Function Deployment- Continuous Improvement tools – case study.

UNIT V QUALITY ASSURANCE MODELS **10**

Software Quality standards,ISO 9000 series – CMMI– P-CMM – case study.

TOTAL: 45 PERIODS

TEXT BOOK

Software Engineering: A Practitioners Approach, 5th Edition Roger S. Pressman McGraw- Hill International Edition, 6th Edition, 2006

REFERENCES:

1. Norman E-Fenton and Share Lawrence Pflieger, Software Metrics, International Thomson Computer Press, 1997.
2 . Ramesh Gopalswamy, Managing Global Projects; Tata Mcgraw Hill, 2002.
3 .Gordon Schulmeyer.G. and James.L.McHanus, Total Quality Management for Software, International Thomson Computer Press, USA, 1990.
4 Dunn Robert M., Software Quality: Concepts and Plans, Englewood Clifts, Prentice Hall Inc., 1990.
5. Metrics and Models in Software Quality Engineering, Stephen, Stephen H. Ka,Pearson Education, 2006, Low Price Edition.

QE 9150 MAINTENANCE ENGINEERING AND MANAGEMENT **L T P C**
3 0 0 3

UNIT I INTRODUCTION **6**

Maintenance definition – Maintenance objectives – Maintenance management – Functions of maintenance department – Tero technology – Maintenance costs.

UNIT II MAINTENANCE MODELS **12**

Maintenance policies – Imperfect maintenance – PM versus b/d maintenance – Optimal PM schedule and product characteristics – Inspection decisions: Maximizing profit – Minimizing downtime – Replacement models.

UNIT III MAINTENANCE LOGISTICS **11**

Maintenance staffing – Human factors –Resource requirements: Optimal size of service facility – Optimal repair effort – Maintenance planning and scheduling – Spares planning – Capital spare.

UNIT IV MAINTENANCE QUALITY **8**

Five Zero concept –FMECA – Maintainability prediction– Design for maintainability – Maintainability allocation – Reliability Centered Maintenance.

UNIT IV TOTAL PRODUCTIVE MAINTENANCE **8**

TPM fundamentals – Chronic and sporadic losses – Six big losses – OEE as a measure – TPM pillars– Autonomous maintenance –TPM implementation.

TOTAL: 45 PERIODS

REFERENCES:

1. Andrew K.S.Jardine & Albert H.C.Tsang, “Maintenance, Replacement and Reliability”, Taylor and Francis, 2006.
2. Bikas Badhury & S.K.Basu, “Tero Technology: Reliability Engineering and Maintenance Management”, Asian Books, 2003.
3. Seichi Nakajima, “Total Productive Maintenance”, Productivity Press, 1993.

QE 9151 SYSTEM SIMULATION **L T P C**
3 0 0 3

UNIT I INTRODUCTION **3**

Systems, modeling, types of models- simulation definition, types of simulation.

UNIT II GENERATION OF RANDOM NUMBERS AND VARIATES **5**

Pseudo random number, methods of generating random variates, testing of random numbers and variates.

UNIT III DESIGN OF SIMULATION EXPERIMENTS **8**

Problem formulation, data collection and reduction, time flow mechanism, key variables, logic flow chart, starting condition, run size,

UNIT IV SIMULATION LANGUAGES **14**

Comparison and selection of simulation languages, study of any one simulation language.

UNIT V CASE STUDIES/MINI PROJECT **15**

Development of simulation models related to quality engineering & Management

TOTAL: 45 PERIODS

REFERENCES:

1. Jerry Banks and John S.Carson, Barry L Nelson, David M.Nicol, P.Shahabudeen,Discrete event system simulation, Pearson Education, 2007.
2. Law A.M, Simulation Modelling and Analysis, Tata Mc Graw Hill,2008
3. Thomas J.Schriber, Simulation using GPSS, John Wiley, 1991.
4. Kelton, W. David, Simulation with Arena ,McGraw-Hill,2006

IE 9159	DECISION SUPPORT SYSTEMS	L	T	P	C
		3	0	0	3

UNIT I DECISION MAKING 5

Managerial decision making, system modeling and support-preview of the modeling process-phases of decision making process.

UNIT II MODELING AND ANALYSIS 12

DSS components- Data warehousing, access, analysis, mining and visualization-modeling and analysis-DSS development.

UNIT III KNOWLEDGE MANAGEMENT 12

Group support systems- enterprise DSS- supply chain and DSS-knowledge management methods, technologies and tools.

UNIT IV INTELLIGENT SYSTEMS 12

Artificial intelligence and expert systems-concepts, structure, types-knowledge acquisition and validation, knowledge representation

UNIT V IMPLEMENTATION 4

Implementation, integration and impact of management support systems.

REFERENCES:

1. Efraim Turban and Jay E Aronson, Decision Support and Intelligent Systems, Pearson education Asia, Seventh edition, 2005.
2. Elain Rich and Kevin Knight, Artificial intelligence, TMH, 2006.

IE9161 APPLIED OBJECT ORIENTED PROGRAMMING L T P C

3 0 0 3

UNIT I UNDAMENTALS OF OBJECT ORIENTED PROGRAMMING 5

Elements of OOP, classes, subjects, messaging, inheritance, polymorphism, OOP paradigm versus procedural paradigm, object-oriented design.

UNIT II ++ Basics 15

Expression and statements, operators, precedence, type conversion, control statements, loops, Arrays structures, functions,argument passing, reference argument, overloaded function.

UNIT III C++ CLASS 5

Definition, class objects, member functions, , class argument, , operator overloading, user defined conversions.

UNIT IV CLASS DERIVATION 10

Derivation specification, public and private base classes, standard conversions under derivation, class scope, initialization and assignment under derivation.

UNIT V APPLICATION

10

OOP's applications in Industrial Engineering.

TOTAL: 45 PERIODS

REFERENCES

1. Robert Lafore, "Object oriented programming in C++", Sam Publishing, 2002.
2. E.Balagurusamy, Object oriented programming with C ++,Tata Mc Graw Hill,2003
3. Stanley B.Lippman, C++ Printer, Addison – Wesley Pub.Co., 2003.
4. Nabajyoti Barkakati,Object Oriented Programming in C++, Prentice Hall of India, 2001

QE 9152 OPERATIONS SCHEDULING L T P C
3 0 0 3

UNIT I SCHEDULING BASICS 8

Scheduling theory and function – Sequencing objectives – Performance measures– Dominant schedules – SPT, EDD, WSPT sequences – Sequencing Theorems.

UNIT II SINGLE **MACHINE MODEL 9**

Pure sequencing –Minimizing $\overline{T}$, $\overline{F}$ – Hodgson's algorithm – Smith's rule – WI algorithm – Dynamic programming – Branch and Bound – Non simultaneous arrivals –Dependent jobs – Sequence dependent set up times.

UNIT III PARALLEL MACHINE MODEL 8

Minimizing makespan: McNaughton's algorithm – Heuristic procedures – Minimizing $\overline{F_w}$: H_1 & H_m heuristics – Hu's algorithm – Muntz Coffman algorithm.

UNIT IV FLOW SHOP MODEL 9

Johnson's algorithm – Campbell Dudek Smith algorithm – Palmer's method – Mitten's algorithm – Ignall Schrage algorithm - Despatch index heuristic.

UNIT V JOB SHOP MODEL 9

Graphical representation – Jackson's algorithm – Semi-active schedule – Active schedule – Non delay schedule – Dispatching rules – Heuristic schedule generation.

TOTAL: 45 PERIODS

REFERENCES:

1. Kenneth R.Baker, "Introduction to sequencing and scheduling", John Wiley & Sons, New York, 2000.
2. Richard W. Conway, William L.Maxwell and Louis W. Miller, "Theory of Scheduling", Dover Publications, 2003.

IE 9124 SUPPLY CHAIN MANAGEMENT L T P C
3 0 0 3

UNIT I INTRODUCTION 6

Definition of Logistics and SCM: Evolution, Scope, Importance& Decision Phases – Drivers of SC Performance and Obstacles.

UNIT II LOGISTICS MANAGEMENT 10

Factors – Modes of Transportation - Design options for Transportation Networks- Routing and Scheduling – Inbound and outbound logistics- Reverse Logistics – 3PL- Integrated Logistics Concepts- Integrated Logistics Model – Activities - Measuring logistics cost and performance – Warehouse Management - Case Analysis

UNIT III SUPPLY CHAIN NETWORK DESIGN 10

Distribution in Supply Chain – Factors in Distribution network design –Design options-Network Design in Supply Chain – Framework for network Decisions - Managing cycle inventory and safety.

UNIT IV SOURCING, AND PRICING IN SUPPLY CHAIN 9

Supplier selection and Contracts - Design collaboration - Procurement process. Revenue management in supply chain

UNIT V COORDINATION AND TECHNOLOGY IN SUPPLY CHAIN 10

Supply chain coordination - Bullwhip effect – Effect of lack of co-ordination and obstacles – IT and SCM - supply chain IT frame work. E Business & SCM. Metrics for SC performance – Case Analysis

TOTAL: 45 PERIODS

REFERENCES:

1. Supply Chain Management, Strategy, Planning, and operation – Sunil Chopra and Peter Meindl- PHI, Second edition, 2007
2. Logistics, David J.Bloomberg, Stephen Lemay and Joe B.Hanna, PHI 2002
3. Logistics and Supply Chain Management –Strategies for Reducing Cost and Improving Service. Martin Christopher, Pearson Education Asia, Second Edition
4. Modeling the supply chain, Jeremy F.Shapiro, Thomson Duxbury, 2002
5. Handbook of Supply chain management, James B.Ayers, St.Lucle Press, 2000

QE 9153 PRODUCTION AND INVENTORY MANAGEMENT L T P C
3 0 0 3

UNIT I PROCESS MANAGEMENT 5

Operations strategy, types of processes, process management – outsourcing, make-buy decision, process re-engineering

UNIT II FORECASTING 10

Purpose and application of forecasts, types of forecasts, Delphi & Market surveys, Moving average and exponential smoothing methods, Linear Regression, monitoring of forecasts.

UNIT III PRODUCTION PLANNING 10

Aggregate planning problem, costs, strategies, graphical and tabular methods, transportation and linear programming methods, MRP, MRPII, CRP, ERP.

UNIT IV PRODUCTION CONTROL 10

Capacity planning and control, production activity control, JIT, flow shop & Job shop scheduling basic models.

UNIT V INVENTOTY MANAGEMENT 10

Inventory classification and analysis, Basic inventory systems, deterministic and probability models.

TOTAL: 45 PERIODS

REFERENCES:

1. Lee J.Krajewsky and Larry P.Ritzman , “Operations Management”, PHI, 2003.
2. R.Pannerselvam, “Production and Operations Management”, PHI, 2007.
3. Seetharama L., Narasimhan, Dennis W.McLeavy and Peter J.Brillington, “Production Planning and Inventory Control,” PHI, 1997.
4. Mahadevan, B. Operations- Theory & Practice, Pearson Education, 2007.

QE 9154 MATERIALS MANAGEMENT AND VALUE ENGINEERING L T P C
3 0 0 3

UNIT I MATERIALS PLANNING 10

Objectives of materials management, Materials control – Variety reduction, Codification, Storage and handling, Materials forecasting, Inventory control, MRP & MRP-II

UNIT II PURCHASING 10

Policies and procedures, Selection of sources of supply, Make or Buy, Vendor evaluation and rating, Vendor development, Buying of different materials – JIT in purchasing, Kanban.

UNIT III SPARE PARTS MANAGEMENT 10

Importance of spares management – Categorization, Reliability and Quality of spares, Procurement, Warehousing and Logistics, Obsolescence of spares – Spares information system

UNIT IV VALUE ENGINEERING CONCEPTS 10

Origin of Value Engineering, Meaning of value, Definition of Value Engineering and Value analysis, Type of Value, function – Basic and Secondary functions, concept of cost and wroth, creativity in Value Engineering.

UNIT V VALUE ENGINEERING PROCESS 10

Seven phases of job plan, FAST Diagram as Value Engineering Tool, Behavioural and organizational aspects of Value Engineering, Ten principles of Value analysis, Benefits of Value Engineering, Case study.

TOTAL: 45 PERIODS

REFERENCES:

1. P.Gopalakrishnan, “Purchasing and Materials Management”, Tata McGraw Hill, 1993.
2. L.Lee Jr. and D.M.Dobbler, “Purchasing and Materials Management” – Texts and cases, Tata McGraw Hill, 1993.
3. Value Engineering – Concepts, Techniques & Applications – Mukhapadhyaya Sage Publications 2003.
4. P.Gopalakrishnan A.K.Banerji, “Maintenance and spare parts Management”, PHI New Delhi, 1991.

QE 9155 PRODUCT INNOVATION AND DEVELOPMENT L T P C
3 0 0 3

UNIT I PRODUCT DEVELOPMENT AND CONCEPT SELECTION 10

Product development process – Product development organizations- Identifying the customer needs – Establishing the product specifications – concept generation – Concept selection.

UNIT II PRODUCT ARCHITECTURE 7

Product architecture – Implication of the architecture – Establishing the architecture – Related system level design issues.

UNIT III INDUSTRIAL AND MANUFACTURING DESIGN 10

Need for industrial design – Impact of industrial design – Industrial design process. Assessing the quality of industrial design- Human Engineering consideration - Estimate the manufacturing cost – Reduce the component cost – Reduce the assembly cost – Reduce the support cost – Impact of DFM decisions on other factors

UNIT IV PROTOTYPING AND ECONOMIC ANALYSIS 9

Principles of prototyping – Planning for prototypes - Elements of economic analysis – Base case financial model – Sensitivity analysis – Influence of the quantitative factors

UNIT V MANAGING PRODUCT DEVELOPMENT PROJECTS 9

Sequential, parallel and coupled tasks - Baseline project planning – Project Budget- Project execution – Project evaluation- patents- patent search-patent laws- International code for patents.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Karal .T. Ulrich, Steven D.Eppinger, Product Design and Development, McGRAW- HILL International Editions.2003.

REFERENCES:

1. S.Rosenthal, Effective product design and development, Irwin 1992.
2. Charles Gevirtz, Developing New products with TQM, McGraw – Hill International editions, 1994

QE 9156 LEAN SIX SIGMA L T P C
3 0 0 3

UNIT I EVOLUTION OF LEAN SIX SIGMA 5

Introduction to Lean Principles and Six Sigma Concepts-Similarities and differences – Synergy-Evolution of Lean Six Sigma

UNIT II LEAN SIX SIGMA APPROACH 8

Lean Six Sigma Methodology- Phases of Lean Six Sigma Method, Managing Lean Six sigma Project, Six sigma Methodologies (DMAIC, DMADV, DFSS)

UNIT III SIX SIGMA TOOLS AND TECHNIQUES 12

Advanced Statistical Tools - Statistical Process Control-Process Capability Analysis Sigma computation -Hypothesis Testing-ANOVA-Design of Experiments- chi-square test, Regression analysis –Case studies

UNIT IV LEAN TOOLS 10

Value Stream Mapping – Poka Yoke-5S-Cycle Time Analysis-Push-Pull Systems-Waste Elimination- Total Productive Maintenance- Failure Mode Effect Analysis-Standard Work Practices-Control Plans, SMED , Kanban , Visual control , Kaizen – Case studies

UNIT V LEAN SIX SIGMA IMPLEMENTATION 10

Identifying Lean Six Sigma Projects, Define Scope, Planning for Implementation, Selection of tools and techniques for each phase, measuring the Benefits

TOTAL: 45 PERIODS

REFERENCES:

1. Michael L. George, David Rowlands, Bill Kastle, What is Lean Six Sigma, McGraw-Hill, 2003
2. Thomas Pyzdek,The Six Sigma Handbook ,McGraw-Hill, 2000
3. James P. Womack , Daniel T. Jones ,Lean Thinking, Free press business, 2003.

4 Forrest W. Breyfogle III, Implementing Six Sigma: Smarter Solutions Using Statistical Methods ,1999.

5. Liker, Jeffrey; Meier, David, Toyota Talent, Tata Mcgraw Hills

QE 9157 RELIABILITY ENGINEERING MODELS L T P C
3 0 0 3

UNIT I RELIABILITY CONCEPT 9

Reliability definition – Quality and Reliability– Reliability mathematics – Reliability functions – Hazard rate – Measures of Reliability – Design life –A priori and posteriori probabilities – Mortality of a component –Bath tub curve – Useful life.

UNIT II FAILURE DATA ANALYSIS 11

Data collection –Empirical methods: Ungrouped/Grouped, Complete/Censored data – Time to failure distributions: Exponential, Weibull – Hazard plotting – Goodness of fit tests.

UNIT III RELIABILITY ASSESSMENT 10

Different configurations – Redundancy – m/n system – Complex systems: RBD – Baye's method – Cut and tie sets – Fault Tree Analysis – Standby system.

UNIT IV RELIABILITY MONITORING 8

Life testing methods: Failure terminated – Time terminated – Sequential Testing – Reliability growth monitoring – Reliability allocation – Software reliability.

UNIT V RELIABILITY IMPROVEMENT 7

Analysis of downtime – Repair time distribution – System MTTR – Maintainability prediction – Measures of maintainability – System Availability – Replacement theory.

TOTAL: 45 PERIODS

REFERENCES:

1. Charles E. Ebeling, "An introduction to Reliability and Maintainability engineering", TMH, 2000.
2. Roy Billington and Ronald N. Allan, "Reliability Evaluation of Engineering Systems", Springer, 2007.

IE 9164 BUSINESS EXCELLENCE MODELS L T P C
3 0 0 3

UNIT I BUSINESS EXCELLENCE MODELS 8

Business Excellence Concepts – Need for BE models – Pioneers in the model MBNQA, EFQM and DEMING award

UNIT II MBNQA 12

Criteria : : LEADERSHIP , Strategic planning , Customer and Market focus , Measurement analysis and Knowledge Management , Human resource focus, process management , business results

UNIT III BUSINESS EXCELLENCE AWARDS IN INDIA 7

Models in Business excellence: RBNQA CII EXIM Award, Tata BE Model etc

UNIT IV IMPLEMENTING BUSINESS EXCELLENCE MODEL 10

Basic concepts – Training -Report writing – Internal audit-Report submission – Initial assessment -Site visit – Scoring – Criteria for Award, Award finalization

UNIT V CASE STUDY 8

TEXT BOOK:

Mark Graham Brown, Baldrige Award Winning Quality, CRC press, 2008.

REFERENCES:

http://www.baldrige.nist.gov

http://www.baldrige21.com/

www.imc.org

http://www.quality.nist.gov/index.html

www.qimpro.com

www.imcrbnqa.com

www.efqm.org

www.juse.or.jp/e/deming/index.html

IE 9162 MANAGEMENT ACCOUNTING & FINANCIAL MANAGEMENT **L T P C**
3 0 0 3

UNIT I FINANCIAL ACCOUNTING 10

Salient features of Balance sheet and Profit & Loss Statement, Cash Flow and Fund Flow Analysis, Working Capital management, Inventory valuation, Financial Ratio analysis – Depreciation.

UNIT II COST ACCOUNTING 10

Cost accounting systems: Job costing, Process costing, Allocation of overheads, Activity based costing, differential cost and incremental cost, Variance analysis, Software costing.

UNIT III BUDGETING 10

Requirements for a sound budget, fixed budget-preparation of sales and production budget, flexible budgets, zero base budgeting and budgetary Control.

UNIT IV FINANCIAL MANAGEMENT 10

Investment decisions – Capital Investment process, types of investment proposals, investment appraisal techniques – pay back period method, Accounting rate of return, net present value method, internal rate of return and profitability index method.

UNIT V FINANCIAL DECISIONS 5

Cost of Capital – Capital structure – Dividend Policy – Leasing.

TOTAL: 45 PERIODS

REFERENCES:

1. Bhattacharya, S.K. and John Deardon, “Accounting for Management – Text and Cases”, Vikas Publishing House, New Delhi, 1996.
2. Charles, T.Horn Green – “Introduction to Management Accounting”, Prentice Hall, New Delhi, 1996.
3. James, C.Van Horne, “Fundamental of Financial Management”, Pearson Education, 12th Edition, 2002.
4. Pandey, I.M., “Financial Management”, Vikas Publishing House, New Delhi, 8th Edition, 2004.

IE 9169 PROJECT MANAGEMENT L T P C
3 0 0 3

UNIT I STRATEGIC MANAGEMENT AND PROJECT SELECTION 9

Project selection models, Project portfolio process, Analysis under uncertainty, Project organization**,** Matrix organization

UNIT II PROJECT PLANNING 9

Work breakdown structure, Systems integration, Interface coordination, Project life cycle, Conflict and negotiation,

UNIT III PROJECT IMPLEMENTATION 12

Estimating Project Budgets, Process of cost estimation, Scheduling: Network Techniques PERT and CPM, Risk analysis using simulation, CPM- crashing a project, Resource loading, leveling, and allocation

UNIT IV MONITORING AND INFORMATION SYSTEMS 9

Information needs and the reporting process, computerized PMIS, Earned value analysis, Planning-Monitoring-Controlling cycle**,** Project control**:** types of control processes, design of control systems, control of change and scope

UNIT V PROJECT AUDITING 6

Construction and use of audit report, Project audit life cycle, Essentials of audit and evaluation, Varieties of project termination, the termination process, The Final Report – A project history

REFERENCES:

1. Project Management – A Managerial Approach, by Jack R. Meredith, and Samuel J. Mantel Jr., John Wiley and Sons, 2006
2. Project Management – A Systems Approach to Planning, Scheduling and Controlling, by Harold Kerzner, John Wiley and Sons, 2006

IE 9170 SERVICES OPERATIONS MANAGEMENT **L T P C**
3 0 0 3

UNIT I INTRODUCTION TO SERVICES **6**

Manufacturing and Services, Definition of Service, Characteristic of Service, Nature of Services, Importance of Activity, Impact of technology

UNIT II GLOBALIZATION AND STRATEGY **7**

Types of Globalized Services, Outsourcing, issues in Globalization, Service strategies

UNIT III OPERATIONS ISSUES **12**

Forecasting, Inventory, capacity Planning, Scheduling

UNIT IV SERVICE QUALITY AND PRODUCTIVITY **10**

Importance of Quality, Models for Service Quality, GAPS model, issues in productivity measurement, Work measurement

UNIT V TOOLS FOR SERVICES **10**

Data Envelopment Analysis, Queuing models, Vehicle Routing models

TOTAL: 45 PERIODS

REFERENCES:

1. Fitzsimmons, J.A. and Fitzsimmons, M.J. Service Management, Tata Mc Graw Hill India, 2006.
2. Haksever C, Render B, Russell RA and Murdick RG ,Service Management and Operations, Prentice Hall International, USA, 2000

IE 9172 MULTI VARIATE DATA ANALYSIS **L T P C**
3 0 0 3

UNIT I REGRESSION **9**

Simple Regression, and Correlation – estimation using the regression line, correlation analysis, Multiple Regression and Correlation analysis – finding the multiple regression equation, modeling techniques, Making inferences about population parameters

UNIT II MULTIVARIATE METHODS **9**

An overview of multivariate methods, Multivariate normal distribution, Eigen values and Eigen vectors

UNIT III FACTOR ANALYSIS **9**

Principal components analysis – objectives, estimation of principal components, testing for independence of variables, Factor analysis model – factor analysis equations and solution

UNIT IV DISCRIMINANT ANALYSIS **9**

Discriminant analysis – discrimination for two multi variate normal populations

UNIT V CLUSTER ANALYSIS **9**

Cluster analysis – clustering methods, Multivariate analysis of variance

TOTAL: 45 PERIODS

REFERENCES

1. Dallas E Johnson, Applied multi variate methods for data analysis, Duxbury Press (1998)
2. Richard I Levin, Statistics for Management, PHI (2000)

IE 9175 SYSTEMS ANALYSIS AND DESIGN **L T P C**
3 0 0 3

UNIT I SYSTEMS ANALYSIS FUNDAMENTALS 9

Information systems analysis overview, Classification of information systems, Systems development life cycle, Role of systems analyst, and Role of case tools

UNIT II INFORMATION REQUIREMENT ANALYSIS 9

Sampling and investigating hard data, Interviewing, Using Questionnaires, Developing prototype, System requirements specification, Feasibility analysis

UNIT III THE ANALYSIS PROCESS 9

Data flow diagrams, Data dictionary, Process specifications, presenting the systems proposal

UNITIV THE ESSENTIALS OF DESIGN 9

Designing effective output, Designing the database, Designing the user interface, Designing data entry procedures

UNIT V SOFTWARE ENGINEERING AND IMPLEMENTATION 9

Quality assurance through software engineering, Implementation approaches, Implementing distributed systems, Object oriented systems analysis and design

REFERENCES:

1. Analysis and Design of Information systems, Arthur M. Langer, Springer 2001
2. Systems Analysis and Design, Kendall and Kendall, Prentice hall, 2004
3. Analysis and Design of Information systems, V. Rajaraman, PHI, 2006

QE 9159 SOFTWARE PROCESS MEASUREMENT AND ANALYSIS L T P C

3 0 0 3

UNIT I SOFTWARE MEASURES AND METRICS 10

Measurement theory- Categories of data (Nominal data, Ordinal data, Absolute data (Attribute), Interval data, Ratio data (Continuous Data) - Aspects of Data Quality (correctness, Accuracy, precision, Consistency, Completeness, repeatability)- Base Measures (Size, Cost, Effort, Schedule ,Defects, Resources, Changes) , Product & Process Metrics.

UNIT II METRICS FRAMEWORK 10

Goal Question Indicator Metric GQ (I) M Framework- Data Collection & Analysis Plan- Data Collection Systems, Data Validation, Management by Metrics- Key Metrics for each project type

UNIT III ANALYSIS AND IMPROVEMENTS 15

Arriving Organizational capability baselines , Arriving Organization Norms – COQ, Productivity, Effort distribution , Phase wise Defect distribution - Using the baselines for Estimation and planning - continual improvement ,Corrective and Preventive actions

UNIT IV ESTIMATION MODELS 5

Types of Estimation – Effort estimation models – COCOMO

UNIT V PREDICTION MODELS 5

Product Quality Prediction Models- Raleigh model, Exponential model

TOTAL: 45 PERIODS

REFERENCES:

1. Metrics and Models in Software Quality Engineering, Stephen H. Kan Pearson Education, 2006.
2. Applied Software Measurements: Global Analysis of Productivity and Quality by Capers Jones, McGraw-Hill Professional, 2008
3. Norman E-Fenton and Share Lawrence Pflieger, Software Metrics, International Thomson Computer Press, 1997
4. Roger S. Pressman Software Engineering: A Practitioners Approach McGraw- Hill International Edition, 6th Edition, 2006
5. http://www.sei.cmu.edu/

IE 9174	DATA ANALYSIS	L	T	P	C
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UNIT I INTRODUCTION 9

Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error

UNIT II LINEAR SYSTEMS ANALYSIS 9

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics

UNIT III RULE INDUCTION 9

Rule induction: rule learning as search, learning first order rules, evaluating quality of rules, ILP systems at work

UNIT IV TOOLS FOR DATA MODELLING 9

Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods

UNIT V VISUALIZATION-INTERACTION 9

Visualization: Visual data analysis techniques, interaction techniques; Systems and applications: Diversity of IDA applications

TOTAL: 45 PERIODS

REFERENCES:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer (2007)
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons (2007)

IE 9150 FACILITIES PLANNING AND DESIGN **L T P C**
3 0 0 3

UNIT I INTRODUCTION **5**

Facilities requirement, need for layout study – types of layout.

UNIT II PLANT LOCATION **10**

Plant location analysis – factors, costs, location decisions – single facility location models, multi facility location models- set covering problem – warehouse location problems.

UNIT III LAYOUT DESIGN **10**

Design cycle – SLP procedure, computerized layout planning procedure – ALDEP, CORELAP, CRAFT

UNIT IV GROUP TECHNOLOGY AND LINE BALANCING **10**

Group technology – Production Flow analysis (PFA), ROC (Rank Order Clustering) – Line balancing.

UNIT V MATERIAL HANDLING **10**

Principles, unit load concept, material handling system design, handling equipment types, selection and specification, containers and packaging.

TOTAL: 45 PERIODS

REFERENCES:

1. Tompkins, J.A. and J.A.White, “Facilities planning”, John Wiley, 2003.
2. Richard Francis.L. and John A.White, “Facilities Layout and location - an analytical approach”, PHI., 2002.
3. James Apple, M.Plant layout and “Material Handling”, John Wiley, 1977.
4. Pannerselvam,R, “Production and Operations Management”, PHI,2007

IE 9154 PRODUCTIVITY MANAGEMENT AND RE-ENGINEERING L T P C
3 0 0 3

UNITI PRODUCTIVITY 9

Productivity Concepts – Macro and Micro factors of productivity – Dynamics of Productivity - Productivity Cycle Productivity Measurement at International, National and Organization level - Productivity measurement models

UNIT II SYSTEMS APPROACH TO PRODUCTIVITY MEASUREMENT 9

Conceptual frame work, Management by Objectives (MBO), Performance Objectivated Productivity (POP) – Methodology and application to manufacturing and service sector.

UNIT III ORGANISATIONAL TRANSFORMATION 9

Elements of Organizational Transformation and Reengineering-Principles of organizational transformation and re-engineering, fundamentals of process re-engineering, preparing the workforce for transformation and re-engineering, methodology, guidelines, LMI CIP Model – DSMC Q & PMP model.

UNIT IV RE-ENGINEERING PROCESS IMPROVEMENT MODELS 9

PMI models, PASIM Model, Moen and Nolan Strategy for process improvement, LMICIP Model, NPRDC Model.

UNIT V RE-ENGINEERING TOOLS AND IMPLEMENTATION 9

Analytical and process tools and techniques – Information and Communication Technology – Implementation of Reengineering Projects – Success Factors and common implementation Problem – Cases.

TOTAL: 45 PERIODS

REFERENCES:

1. Sumanth, D.J., 'Productivity Engineering and Management', TMH, New Delhi, 1990.
2. Edosomwan, J.A., "Organisational Transformation and Process Re-engineering", Library Cataloging in Pub. Data, 1996.
3. Rastogi, P.N., "Re-engineering and Re-inventing the Enterprise", Wheeler Pub. New Delhi, 1995.
4. Premvrat, Sardana, G.D. and Sahay, B.S., "Productivity Management – A Systems Approach", Narosa Publishing House. New Delhi, 1998.

QE9160 ENGINEERING ECONOMICS L T P C

3 0 0 3

UNIT I DEMAND ANALYSIS AND FORECASTING 10

Managerial Economics – Meaning, Nature and Scope – Managerial Economics and Business decision making – Role of Managerial Economist – Demand Analysis – Fundamental Concepts of Managerial Economics – Meaning, Determinants and Types of Demand – Elasticity of demand - Demand forecasting and forecasting methods.

UNIT II PRODUCTION FUNCTION AND COST ANALYSIS 10

Supply: Meaning and determinants – production function- Isoquants – Expanstion path Cobb Douglas function – Cost concepts – Cost output relationship – Economies and diseconomies of scale – Cost functions- Determination of cost- Estimation of cost.

UNIT III MARKET COMPETITION AND PRICING 10

Market Structure – Various forms – Equilibrium of a firm – Perfect competition – Monopolistic competition – Oligopolistic competition – Pricing of products under different market structures – Methods of pricing – Factors affecting pricing decision – Differential pricing – Government Intervention and pricing.

UNIT IV PROFIT ANALYSIS 07

The concept of profit: Profit planning, control and measurement of profits. Profit maximisation – Cost volume profit analysis – Investment Analysis.

UNIT V NATIONAL INCOME AND POLICY 08

National Income – Accounting – Consumption and investment – Business Cycle and unemployment – Inflation and deflation, Balance of Payments – Monetary and Fiscal policies.

TOTAL: 45 PERIODS

REFERENCES:

1. A. Ramachandra Aryasry and V.V. Ramana Murthy. " Engineering Economics and Financial Accounting:, Tata Mc graw Hill Publishing Company Ltd., New Delhgi, 2004
2. V.L. Mote, Samuel and G.S.Gupta, "Managerial Economics – Concepts and cases", Tata McGraw Hill Publishing Coimpany Ltd, New Delhi, 1981.
3. A.Nag, :Macro Economics for Management Students" MacMillan India Ltd., New Delhi, 1999.

IE 9167 INDUSTRIAL SAFETY AND HYGIENE L T P C

3 0 0 3

UNIT I OPERATIONAL SAFETY 9

Hot metal operation, boiler, pressure vessels – heat treatment shop – gas furnace operation – electroplating – hot bending pipes – safety in welding and cutting, Cold – metal operation – safety in machine shop – cold bending and chamfering of pipes-metal cutting – shot blasting, grinding, painting – power press and other machines. Management of toxic gases and chemicals – industrial fires and prevention – road safety – highway and urban safety – safety of sewage disposal and cleaning – control of environmental pollution – managing emergencies in industries – planning security and risk assessments, on – site and off site. Control of major industrial hazards.

UNIT II SAFETY APPRAISA L AND ANALYSIS 9

Human side of safety – personal protective equipment – causes and cost of accidents. Accidents prevention program – specific hazard control strategies – HAZOP training and development of employees – first aid – fire fight devices – accident reporting, investigation. Measurement of safety performance, accident reporting and investigation – plant safety inspection, job safety analysis – safety permit procedures. Product safety – plant safety rules and procedures – safety sampling – safety inventory systems. Determining the cost effectiveness of safety measurement.

UNIT III OCCUPATIONAL HEALTH 9

Concept and spectrum of health functional units and activities of operational health service – occupational and related disease – levels of prevention of diseases – notifiable occupational diseases Toxicology Lead – Nickel, chromium and manganese toxicity – gas poisoning (such as CO, Ammonia Chlorise, So2, H2s.) their effects and prevention – effects of ultra violet radiation and infrared radiation on human system.

UNIT IV SAFETY AND HEALTH REGULATIONS 9

Safety and health standards – industrial hygiene – occupational diseases prevention welfare facilities. The object of factories act 1948 with special reference to safety provisions, model rules 123a, history of legislations related to safety – pressure vessel act – Indian boiler act – the environmental protection act – electricity act – explosive act.

UNIT V SAFETY MANAGEMENT 9

Evaluation of modern safety concepts – safety management functions – safety organization, safety department- safety committee, safety audit – performance measurements and motivation – employee participation in safety - safety and productivity.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. John.V .Grimaldi and Rollin. H Simonds, “Safety Managenent”, All India traveler Book seller, New Delhi – 1989.
2. Krishnan N.V, “Safety in Industry” , Jaico Publisher House, 1996.

REFERENCES:

1. Occupational Safety Manual BHEL.
2. Industrial Safety and the law by P.M.C Nair Publishers, Trivandrum.
3. Managing emergencies in industries, loss prevention of India Ltd., proceedings, 1999.
4. Safety security and Risk management by U.K singh & J.M Dewam,. A.P.H. publishing company, New Delhi, 1996.
5. singh, U.K and Dewan, J.M., “Sagety, Security And Risk Management”, APH publishinf company, New Delhi, 1996.
6. John V Grimaldi, Safety Manageemnt. AITB publishers, 2003.
7. Safety MaNUAL. EDEL engineering Consultancy, 2000.

IE 9168 LOGISTICS AND DISTRIBUTION MANAGEMENT L T P C

3 0 0 3

UNIT I INTRODUCTION TO LOGISTICS MANAGEMENT 5

Logistics Management: Definition of logistics and the concepts of logistics. Logistics Activities: Functions of the logistics system – transportation, warehousing, order processing, information handling and procurement

UNIT II DISTRIBUTION MANAGEMENT 10

Distribution Management, Outbound logistics, Facility location, Classical location problems, Strategic planning models for location analysis, location models, multi objective analysis of location models.

UNIT III TRANSPORTATION MANAGEMENT 10

Transportation alternatives and technologies; transportation performance analysis; total transportation cost analysis; fleet development and management; fleet performance indicators; routing and scheduling; shipment planning; vehicle loading; transportation management and information systems requirements.

UNIT IV LOGISTICS MODELLING 10

Logistics Customer Service, Modeling logistics systems, Simulation of logistic systems, cost effective distribution strategies, Value of information in logistics, E-logistics, risk pooling effect, International and global issues in logistics, Integrated functional activities in logistics, Role of government in international logistics and Principal characteristics of logistics in various countries and regions

UNIT V LOGISTICS IN DIFFERENT INDUSTRIES 10

Logistics in different industries: Third party, and fourth party logistics, Reverse logistics,Airline Schedule Planning, Railway Networks, Postal services, the maritime industries, health care industry and other service industries

REFERENCES:

1. David Bloomberg, Stephen LeMay, Joe Hanna: Logistics, Prentice Hall 2002
2. Thomas Teufel, Jurgen Rohricht, Peter Willems: SAP Processes: Logistics, Addison-Wesley, 2002.
3. Julien Bramel, David Simchi-Levi. “The logic of logistics: theory, algorithms, and applications for logistics management", Springer,2006
4. Murphy, G.J. "Transport and Distribution", 2nd Edition, Business Books
5. Ballou, R.H., Business Logistics Management/Supply Chain, 5th edition, 2004, Prentice-Hall

IE 9171 INDUSTRIAL PSYCHOLOGY **L T P C**
3 0 0 3

UNIT I INTRODUCTION **8**

Definition-development-scope-objectives-importance of individual behavior-causes-Role of learning in shaping behavior- the influence of thinking and perception.

UNIT II GROUP BEHAVIOR **12**

Group Behavior-Groups- Contributing factors- Group Norms, Communication-Process-Barriers to communication-Effective communication, leadership-formal and informal characteristics-Managerial grid-Leadership styles-group Decision making-Leadership Role in Group Decision, Group Conflicts-Types-Causes-Conflict Resolution-Intergroup relations and conflicts –Organization centralization and decentralization-formal and informal- organizational structures- organizational change and development- change process-resistance to change-culture and ethics

UNIT III MOTIVATION **9**

Motivation and motivators-The hierarchy of needs theory-the motivation-hygiene approach to motivation-Expectancy-equity-reinforcement-McClelland's needs theory of motivation-special motivational techniques-job enrichment- a systems and contingency approach to motivation.

UNIT IV TRAINING AND DEVELOPMENT **9**

Training & Development: Training – Need and Importance – Steps in Training Programme – Evaluation of Training Programmes – Concept of Management Development Programme – Techniques of Training and Development – Group Discussion- Conferences and Seminar – Case Studies – Role Playing – Business Games – Sensitivity Training – Stages of Career Development.

UNIT V INDUSTRIAL FATIGUE **7**

Definition-concept-Nature-Effects-causes-Elimination- Safety management practices-Effect of environment-Hazard control Technology-Working conditions-environmental conditions

TOTAL: 45 PERIODS

REFERENCES:

1. Herald Knottz and Heinz Weihrich, 'Essentials of management'; Mcgraw Hill Publishing Company, Singapore International Edition, 1980.
2. Ties, AF stoner, and R.Edward Freeman, 'Management', PHI Pvt ltd, New Delhi, 1992.
3. Joseph J, Massie, 'Essentials of Management', PHI, Ltd, 1985.
4. Nicky Hayes, Foundations of Psychology and Introductory Text, Routledge, UK, 1994.

IE 9173 TECHNOLOGY MANAGEMENT L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Technology management - Scope, components, and overview. Technology and environment, Technology and society, Technology Impact analysis, environmental, social, legal, political aspects, techniques for analysis - steps involved. Technology policy strategy: Science and technology Policy of India, implications to industry, The dynamics of technology change

UNIT II TECHNOLOGY FORECASTING 9

Need, methodology and methods - trend Analysis, Analogy, Delphi, Soft System Methodology, Mathematical Models, Simulation, and System Dynamics.

UNIT III TECHNOLOGY CHOICE AND EVALUATION 9

Issues in the development new high tech products, Methods of analyzing alternate technologies, Techno-economic feasibility studies, Need for multi-criteria considerations such as, social, environmental, and political, Analytic hierarchy method, Fuzzy multi-criteria decision making, and other methods.

UNIT IV TECHNOLOGY TRANSFER AND ACQUISITION 9

Import regulations, Implications of agreements like Uruguay Round and WTO, Bargaining process, Transfer option, MOU- Technology Adoption and Productivity - Adopting technology-human interactions, Organisational redesign and re-engineering, Technology productivity.

UNIT V TECHNOLOGY ABSORPTION AND INNOVATION 9

Present status in India, Need for new outlook, Absorption strategies for acquired technology, creating new/improved technologies, Innovations, Technology Measurement- Technology Audit, Risk and exposure, R&D portfolio management

TOTAL: 45 PERIODS

REFERENCES:

1. Joseph M. Putti, Management – A Functional Approach, McGraw Hill, 1997
2. Kenneth C. Lauden , MIS: Organisation and Technology, Prentice Hall, 1995
3. James A.Senn, Information technology in Business, Prentice Hall, 1995
4. Ronald J. Jordan, Security analysis and Portfolio Management, Prentice Hall, 1995
5. Irvin M. Rubin, Organisational behavior an experimental approach, Prentice Hall, 1995
6. Gerard H. Gaynor, Handbook of Technology Management, McGraw-Hill Professional, 1996
7. Richard C. Dorf, Technology Management Handbook, CRC, 1999