SEMESTER I

18MN01 APPLIED STATISTICS AND RELIABILITY 2 2 0 3

REGRESSION AND CORRELATION: Curve fitting, method of least squares- inferences based on the least squares estimator - correlation - curvilinear regression - multiple regression. (8+7)

STATISTICAL QUALITY CONTROL: Statistical process control – chance and assignable causes of quality variation, statistical basis of control charts - control charts for variables - X, R and s charts - control charts for attributes – p, np, c and u charts. (8+7)

ACCEPTANCE SAMPLING: Lot-by-Lot acceptance sampling for attributes – single sampling plans for attributes, double, multiple and sequential sampling plans, acceptance sampling by variables - chain sampling, continuous sampling, skip-lot sampling plans. (8+7)

RELIABILITY: Failure distribution - reliability function, mean time to failure, hazard rate function, bathtub curve, conditional reliability, constant failure rate model – exponential reliability function, failure models, time dependent failure models - Weibull and normal distributions - serial configuration, parallel configuration, combined series parallel systems, system structure function, minimal cuts and minimal paths, state dependent systems. (8+7)

REFERENCES:

Total L:32 + T:28 = 60

18MN02 ADVANCED OPERATIONS RESEARCH 3 2 0 4

LINEAR PROGRAMMING: Review of the principles of operations research; Linear programming: Formulation of linear programming problems, simplex algorithm, degeneracy, cycling and bland anti-cycling rules, revised simplex method, duality; dual simplex method – primal dual method; sensitivity analysis. (11+8)


PROJECT MANAGEMENT: Project planning, project scheduling, project controlling, constructing the project network, dummy activities and events, rules for network construction, critical path, floats, project evaluation and review techniques, applications - PERT/Cost analysis, costs and networks and lean cost scheduling rules. (10+6)

GAME THEORY: Two people zero sum games: maximin and minimax principles - mixed strategies, expected pay-off, method of oddments - dominance principle, game by matrix method; Two person zero sum 2 x n game - graphical method, 2 x n or m x 2 game - linear programming method, algebraic method; 3 x 3 games with mixed strategy by the method of oddment and iterative; Markov chains: matrices and matrix multiplication, transition matrix, modelling a situation with a Markov chain

UNCONVENTIONAL OPTIMIZATION TECHNIQUES: Genetic algorithms, simulated annealing, particle swarm optimization, ant colony optimization, neural networks – algorithms and applications, case studies in industrial engineering using genetic algorithms and simulated annealing. (12+8)

REFERENCES:

Total L: 45+T: 30=75

18MN03 ENTERPRISE RESOURCE PLANNING 3 0 0 3

FUNDAMENTALS OF ERP SYSTEMS: ERP an overview, enterprise an overview, ERP as integrated management information system; Evolution of ERP, benefits of ERP, ERP vs. traditional information systems, advantages of ERP; MRP II model and organizational processes. (10)
BUSINESS PROCESS REENGINEERING (BPR) SYSTEM: Need and challenges, management concerns about BPR, BPR to build
the business; Model for ERP, basic constituents of ERP, selection criteria for ERP packages, Procurement - Systematic way for ERP
package, features of various modules of ERP. (10)

ERP IMPLEMENTATION: ERP - implementation, lifecycle, implementation methodology, hidden costs in implementation, organizing
the implementation, vendors, consultants and users, project management and monitoring, issues in customizing ERP systems for
organizations, need for training; Finance - manufacturing, human resource, plant maintenance, materials management, quality
management, sales and distribution. (13)

ERP PACKAGES AND CASE STUDIES: SAP-R/3, SAP HANA, MFG/PRO, IFS/AVALON, ORACLE. Comparison between
different ERP packages; Survey of Indian ERP packages regarding their coverage, performance and cost - top management concerns
and ERP systems - extended ERP (ERP II), HRM, finance, production, materials, sales and distribution; Advance planning
optimization through Internet of Things. (12)

REFERENCES:

18MN04 SIMULATION MODELING AND ANALYSIS

SYSTEM SIMULATION: Definition, history, nature of computer modeling and simulation, limitations of simulation, areas of application,
components of a system, types of simulation, discrete and continuous systems, steps in simulation study; Simulation of Queuing
Systems - single server and multi-server models, simulation of inventory system, simulation of reliability problem. (10)

RANDOM NUMBER GENERATION AND TESTING: Techniques for generating random numbers; midsquare method, midproduct
method, constant multiplier technique, additive congruential method, linear congruential method, combined linear congruential
generators, feedback shift register generators; Tests for random numbers; Frequency test, Kolmogorov-Smirnov test, chi-square test;
Independence test: runs up and runs down, runs above and below the mean; Autocorrelation test, Gap test, Poker test. (12)

RANDOM VARIATE GENERATION: Inverse transform technique; Exponential distribution, uniform distribution, Weibull distribution,
Triangular distribution, Empirical continuous distribution, generating approximate normal variates, Erlang distribution, empirical
discrete distribution, discrete uniform distribution, Poisson distribution, geometric distribution; Acceptance-rejection technique;
Poisson distribution, gamma distribution. (11)

MANUFACTURING SYSTEMS SIMULATION: Input Modeling: Steps to build a useful model of input data, data collection, identifying
the distribution with data, parameter estimation, suggested estimators, goodness of fit tests, selecting input models without data,
models of arrival processes; Variance reduction techniques: antithetic variables, calibration and validation of models; Types of
simulation with respect to output analysis: stochastic nature of output data, measures of performance and their estimation, output
analysis for terminating simulation, output analysis for steady state simulation, objectives and performance measures of manufacturing
systems modeling, modeling system randomness, sources of randomness, machine downtime; Case studies - Study of various
simulation software, simulation of manufacturing systems, material handling system. (12)

REFERENCES:

18MN05 OPERATIONS MANAGEMENT

OPERATIONS AND PRODUCTION PROCESS: Operations: Functions, globalization, factors affecting operation
management, new trends in operation management. Operations strategy - forming operation strategies, strategy deployment, world
class manufacturing practices; Understanding processes: Design of processes - types of production processes, major factors affecting
process design decisions. Process Planning - steps in process planning, make-or-buy decision, process analysis, automated process
plan, productivity measurement, product design and process selection (11)

DESIGNING, PLANNING AND CONTROL OF OPERATIONS: Facilities layout: globalization of operations, factors affecting location
decisions, location planning methods, other issues, basic layout, designing product, process layout, hybrid layout, layout design
procedures; CRAFT and ALDEP; Capacity Planning: capacity and strategy, managing demand, break-even analysis; Forecasting:
strategic role of forecasting, components of forecasting demand, forecasting methods - time series methods, regression methods,
seasonal forecasting, cyclic forecasting, accuracy of forecasts. Aggregate Production Planning - framework, basic strategies, approaches to aggregate planning, graphical, empirical and linear programming. (12)

INVENTORY ANALYSIS AND CONTROL: Definitions, elements of inventory management, Inventory classification & control systems - ABC, XYZ, FSN, VED. Material management, inventory control, Lot sizing techniques, models of inventory, purchase model with instantaneous replenishment and without shortages, manufacturing models without shortages, purchase model with Service level, inventory models with price breaks, quantity discounts, inventory order policies, inventory models under uncertainty. (10)

SCHEDULING OPERATIONS and APPLICATION OF LEAN PRODUCTION SYSTEM: Scheduling and control in the job shop, priority rules and techniques, shop floor control, Gantt chart, tools of shop floor control constraints in a manufacturing system, Drum-Buffer-Rope (DBR) methodology; Lean Management: Philosophy of Lean Management, creating Lean Enterprise, waste elimination; JIT :Elements of JIT, Changes in the manufacturing architecture, lot-size reduction, set-up reduction through SMED, Kanban as a control tool; Production planning and control in JIT : push and pull scheduling, kanban system, design of kanban quantities; Continuous improvement : Task force for continuous improvement, quality circle, project based small group improvement activities (PBSGIA), visual control aids for improvement. (12)

REFERENCES:

18MN51 OPERATIONS RESEARCH LABORATORY

In this course, students will be provided with an orientation on the following topics for a duration of 12-16 hours. Each student is expected to perform a case study by formulating and completing an activity of interest derived from the orientation under the guidance of faculty. The details expected in the final report to be submitted at the end of the semester are: Problem definition, literature review, objectives, methodology, analysis and interpretation of results and conclusions.

TOPICS FOR ORIENTATION:
1. Linear and non-linear optimization, inventory and project management,
2. Use of statistical software for design of experiments, control charts, FMEA, reliability and forecasting.

REFERENCES:
1. Laboratory Manual prepared by the Department of Mechanical Engineering, PSG College of Technology.

SEMESTER II

18MN06 ENGINEERING ECONOMIC ANALYSIS

TIME VALUE OF MONEY AND EVALUATION OF TANGIBLE ALTERNATIVES: Interest and time value of money : Simple interest, compound interest, nominal interest rates, effective interest rates, continuous compounding ,compound interest factors, cash flow diagrams ,calculation of time value equivalences, single payments, multiple payments, continuous interest payments.
Present worth comparison: Conditions for PW comparison, Rule 72, Present Worth comparison patterns, PW equivalence, Net Present Worth; Comparison of assets, unequal lives, infinite lives, comparison of deferred investments; Valuation: bond valuation, equivalent annual worth comparison ,situations for EUAC; Rate of return calculations: Internal rate of return(IRR), Minimum acceptable rate of return(MARR). (11)

STRUCTURAL ANALYSIS AND REPLACEMENT ANALYSIS: Development of alternatives, classification of alternatives, IRR analysis of mutually exclusive alternatives, analysis of independent alternatives, alternatives with unequal lives, reinvestment dependent alternatives. Replacement studies: Current salvage value of the defender, defender and challenger with unequal lives, replacement due to deterioration, replacement due to obsolescence, replacement due to inadequacy; Economic life for cyclic replacements zero interest rates, non zero interest rates, group replacement. (12)

DEPRECIATION BREAK EVEN AND MULTI STAGE SEQUENTIAL DECISION ANALYSIS: Depreciation Causes of declining value, basic methods of computing depreciation charges ,straight line method, declining balance method; MACRS depreciation. MACRS declining balance depreciation, MACRS recovery percentages. Basic concepts of break even analysis: Linear break even analysis, break even charts, algebraic relationships, break even point alternatives, dumping, multiproduct alternatives. Including risk in economic analysis, probability concepts, expected value, measures of variation, coefficient of variation; Application of probability
concepts: Payoff table, EV of perfect information; Probability concepts of decision tree – Formulation of a discounted decision tree, application of decision trees.


REFERENCES:

18MN07 QUALITY ENGINEERING AND WORK STUDY


ON-LINE QUALITY CONTROL: On-line feedback quality control variable characteristics-control with measurement interval- one unit, multiple units-control systems for lot and batch production. On-line process parameter control variable characteristics- process parameter tolerances- feedback control systems- measurement error and process control parameters.

ON-LINE QUALITY CONTROL ATTRIBUTES CHARACTERISTICS AND METHODS FOR PROCESS IMPROVEMENTS: Checking intervals-frequency of process diagnosis. Production process improvement method-process diagnosis improvement method-process adjustment and recovery improvement methods.

TOTAL QUALITY MANAGEMENT: Definition of Quality, Quality assurance, Quality Control, TQM and Deming’s principles, Old and New Quality Tools. WORK STUDY: Introduction on Work study, method study, time study, determination of standard time. Case study in lathe operation, assembling of electric motor.

REFERENCES:

18MN08 SUPPLY CHAIN MANAGEMENT

SUPPLY CHAIN MANAGEMENT, SUPPLY CHAIN PERFORMANCE MEASURE AND SUPPLY CHAIN NETWORK DESIGN: Definition, house of supply chain - customer satisfaction, integration, coordination - decision phases in a supply chain, objectives of SCM, examples of supply chains, supply chain drivers, supply chain performance measures; Supply chain network design; Data collection – data aggregation, transportation modes and rates, mileage estimation, warehouse costs, warehouse capacity, potential warehouse locations, service level requirements and future demand; Network design in the supply chain – factors influencing the network design, framework for network design decisions, models for facility location and capacity allocation – capacitated plant location model, gravity location model, allocating demand to production facilities, simultaneous location of plants and warehouses – impact of uncertainty on network design.


DISTRIBUTION NETWORK DESIGN AND STRATEGIES: Role of distribution in supply chain – distribution network design – factors influencing distribution network design. push strategy – pull strategy – Kanban replenishment systems, types, implementation, and
push–pull strategy – demand driven strategy – impact of internet on supply chain strategy; Distribution networks in practice – direct
shipment, cross docking, warehousing, transshipment; Framework for strategic alliance - 3PL and 4PL – retailer-supplier partnerships
– distribution integration – procurement and outsourcing – benefits, make/buy decisions. E-Procurement, supplier relationship
management – supplier scoring and assessment, supplier selection and contracts – E-Business and the supply chain; Design for
logistics: Reverse logistics, case studies in paper and furniture industry; Supplier integration into new product development – mass
customization.

CUSTOMER VALUE AND GLOBAL SUPPLY CHAINS: Customer value – dimensions, strategic pricing, customer value measures,
information technology and customer value – customer relationship management. global supply chains – introduction, driving factors,
risks and advantages, issues, regional differences in logistics. Information technology for supply chain - Goals – standardization –
infrastructure – interface devices, communications, databases, system architecture – system components – integrating the supply
chain information technology - DSS for supply chain management.

REFERENCES:
Ltd, New Delhi, 2007.
4. David Brunt and David Taylor, “Manufacturing Operations and Supply Chain Management: The Lean Approach”,
5. HartmudStadler and ChristophKilger, “Supply Chain Management and Advanced Planning: Concepts, Models,

18MN09 MODELING AND ANALYSIS OF ADVANCED MANUFACTURING SYSTEMS

MANUFACTURING SYSTEMS AND DESIGN: Types and principles of manufacturing systems, types and uses of manufacturing
models, physical models, mathematical models, model uses, model building; Assembly lines - reliable serial systems; Approaches to
line balancing – largest candidate rule, Kilbridge and Wester method, ranked positional weight heuristic, COMSOAL, sequencing
mixed models; Transfer lines and general serial systems – paced lines with and without buffers, unpaced lines.

FACILITY LAYOUT AND FLEXIBLE MANUFACTURING SYSTEMS: Types of layout, advantages, limitations, systematic layout
planning, layout design procedures - quadratic assignments approach, graph theoretic approach; Robotics and automated assembly;
Cellular systems -Group technology, coding schemes, assigning machines to groups, production flow analysis, binary ordering
algorithm, single pass heuristic, similarity coefficient method; System components – planning and control hierarchy, system design,
system setup, scheduling and control – flow shop scheduling, job shop scheduling; Flexible inspection system.

MATERIAL HANDLING AND STORAGE: Material handling principles, equipments, conveyor analysis, AGV systems; Warehousing
– warehouse components, analysis of storage and retrieval systems, carousel storage systems; Introduction to material handling and
storage software.

GENERAL MODELING APPROACHES: Queuing models – notations, performance measures, m/m/1 queue, m/m/m queue, batch
arrival queuing systems, queues with breakdowns; Queuing networks – open and closed networks, central server model; Petri net
modeling - classical petrinets, transformation firing and reachability, reachability graphs, representation schemes, timed Petrinets,
modeling of manufacturing systems.

REFERENCES:
Sons, New York, 1996.

18MN52 INDUSTRIAL ENGINEERING LABORATORY

In this course, students will be provided with an orientation on the following topics for a duration of 12-16hours. Each student is
expected to perform a case study by formulating and completing an activity of interest derived from the orientation under the guidance
of faculty. The details expected in the final report to be submitted at the end of the semester are: Problem definition, literature review, objectives, methodology, analysis and interpretation of results and conclusions.

TOPICS FOR ORIENTATION:
1. Use of statistical software for hypothesis testing, gauge repeatability and reproducibility and process capability.
2. Use of ergonomics tools for human anthropometric studies, force, noise, illumination and postural analysis.
3. Use of lean tools for line balancing, Poka-Yoke, time and method study.

REFERENCE:
1. Laboratory Manual prepared by the Department of Mechanical Engineering, PSG College of Technology.

18MN61 INDUSTRY VISIT AND TECHNICAL SEMINAR

This course, likened to a mini-intern, requires each student to identify a manufacturing or service industry and pursue the solution of an industrial problem consistent with the credits allotted for the course. Students are expected to study the problem, survey pertinent literature, gather relevant data and carry out engineering and scientific analysis followed by a detailed presentation both oral and written. The report submitted for final assessment should be in line with that required for Project Work.

Total P: 60

SEMESTER III
18MN53 MANUFACTURING SYSTEMS DESIGN LABORATORY

In this course, students will be provided with an orientation on the following topics for a duration of 12-16hours. Each student is expected to perform a case study by formulating and completing an activity of interest derived from the orientation under the guidance of faculty. The details expected in the final report to be submitted at the end of the semester are: Problem definition, literature review, objectives, methodology, analysis and interpretation of results and conclusions.

TOPICS FOR ORIENTATION:
1. Use of simulation software for layout analysis and optimization, scheduling and inventory management
2. Use of simulation software for random number generation and study of manufacturing system
3. Use of simulation software for value stream mapping and study of service system

REFERENCE:
1. Laboratory Manual prepared by the Department of Mechanical Engineering, PSG College of Technology.

18MN71 PROJECT WORK I

Project work involves the following:
- Identification of a real life problem in thrust areas
- Developing a mathematical model for solving the above problem
- Finalisation of system requirements and specification
- Proposing different solutions for the problem based on literature survey
- Future trends in providing alternate solutions
- Consolidated report preparation of the above

Total P: 90

SEMESTER IV
18MN72 PROJECT WORK II

Project work involves the following:

Preparation of a project - brief proposal including
- Problem Identification
- A statement of system / process specifications proposed to be developed (Block Diagram / Concept tree)
- List of possible solutions including alternatives and constraints
- Cost benefit analysis
- Time Line of activities
A report highlighting the design finalization [based on functional requirements & standards (if any)]

A presentation including the following:
- Implementation Phase (Hardware / Software / both)
- Testing & Validation of the developed system
- Learning in the Project

Consolidated report preparation

PROFESSIONAL ELECTIVE THEORY COURSES

18MN21 BUSINESS MODELS AND ENTREPRENEURSHIP 3 0 0 3


IMPLEMENTING BUSINESS EXCELLENCE MODEL: Basic concepts – Training -Report writing – Internal audit-Report submission – Initial assessment - Site visit – Scoring – Criteria for Award, Award finalization - Case Study-Development of business excellence model for industrial application in production systems, inventory systems, maintenance. (10)


REFERENCES:

18MN22 COMPUTER INTEGRATED MANUFACTURING 3 0 0 3

CONCEPTS OF CIM: Definition of CIM, CIM wheel, evolution of CIM concept, development of numerical control, computers, computer-aided design (CAD), computer-aided manufacturing (CAM), islands of automation, evolution of the CIM concept, CIM II, benefits of CIM; Manufacturing: An Overview: Standard industrial classifications. Types of manufacturing - continuous of discrete manufacturing, variety and volume, raw material to final product. Needs of CIM hardware, CIM software. (10)


DISTRIBUTED NUMERICAL CONTROL AND PROGRAMMABLE CONTROLLERS: Types of communications. Fundamentals of computer communications, representation of data, coding, transmission, medium, types of communication lines, communications hardware. Network architectures - the seven layers-OSI model, local area network (LAN), manufacturing automation protocol (MAP), DNC system - communication between DNC computer and machine control unit - hierarchical processing of data in DNC system - features of DNC systems, PLC - control system architecture - elements of programmable controllers: languages, control system flowchart, comparison of programming methods. (12)

planning in CAD/CAM Integration – approaches to computer aided process planning – variant approach and generative approaches. Role of management in CIM, cost justification, expert systems, participative management. Impact of CIM on personnel, role of manufacturing engineers - CIM engineer and technologist, CIM technicians, Roles of institutions. (12)

REFERENCES:

18MN25 FACILITIES LOCATION AND DESIGN

SINGLE AND MULTI FACILITY LOCATION: Introduction, nature of facilities location problem, distance measures in location problems, relevant costs, types of single facility location problem - straight line distance problem, rectangular distance problem, $L_p$ distance problem; Variants of single facility location problems: Points and area destinations with rectangular distance, location of a linear facility, probabilistic destination locations; Multi-Facility location: rectangular and $L_p$ distance models (12)

FLOOR LAYOUT: Quadratic assignment problem, Branch and bound technique, heuristic procedures, the Hall m-dimensional quadratic placement algorithm. (11)

FLOW, SPACE AND ACTIVITY RELATIONSHIP: Departmental planning, flow patterns and measurement, space requirements. (11)

LAYOUT PLANNING MODELS: Design cycle – SLP procedure, computerized layout planning procedure – ALDEP, CORELAP, and CRAFT. (11)

REFERENCES:

18MN26 FINANCIAL AND COST ACCOUNTING


REFERENCES:

18MN27 KNOWLEDGE MANAGEMENT

REFERENCES:
OVERVIEW OF KNOWLEDGE MANAGEMENT (KM): Evolution of KM, types of knowledge, life cycles for KM systems, Integrative framework involving technology, person and organization, Nonaka's model of knowledge creation and transformation, managing knowledge in organizations, ethics in KM. (12)

TOOLS AND METHODS FOR KM: Building the learning organization, Internet search engines, data mining, telecommunications and networks, information mapping, coding and retrieval, repackaging information. (11)

KM SYSTEM DEVELOPMENT: KM Codification, KM system analysis, design and development, knowledge transfer and sharing, team, infrastructure and audit. (11)

EVALUATION OF KM SYSTEMS: Metrics to evaluate KM effectiveness, managerial, ethical and legal issues, KM Innovation and case studies from leading organizations. (11)

REFERENCES:

18MN28 LEAN SIX SIGMA IN MANUFACTURING AND SERVICE

CONCEPTS OF LEAN SIX SIGMA: Lean Principles, eight major wastes; Six-Sigma: Concept, methodology, definition, origin, common terms; Lean six sigma: four keys, five laws of lean six sigma, types - DMAIC, DMADV, project selection; Selection of team members; Six Sigma roles & responsibilities; Team: stages, characteristics of effective teams, six sigma training plan; Six-sigma metrics: DPMO calculation; Quality cost: cost of poor quality, cost of quality; Roadmap for implementation: Plan, issues, management strategies. (12+6)

DEFINE AND MEASURE PHASE: Customer identification, voice of customer (VOC), VOC data collection, Critical to Quality (CTQ); Value Stream Mapping; SIPOC; Project charter; Types of measures; Types of data; Applications of old and new 7 QC tools; Measurement system analysis; Process capability calculations. (12+6)

ANALYSE PHASE: Inferential and Descriptive Statistics; Patterns of Variation; Normality Analysis, multivariate analysis; Hypothesis testing for Normal Data: Selection and application problems; Introduction to statistical software; Failure mode and effects analysis - applications; Analysis of Lean Wastes. (9+8)

IMPROVE AND CONTROL PHASE: Process redesign principles; Generating improvement alternatives; Quality Function Deployment (QFD); Theory of Inventive Problem Solving (TRIZ); Introduction to design of experiments; Lean waste elimination methods, cycle time reduction; Cost/benefit analysis; Process scorecard: Control Plan. Case studies in manufacturing and service sectors. (12+8)

REFERENCES:

18MN29 LOGISTICS AND DISTRIBUTION MANAGEMENT


WAREHOUSING AND STORAGE: Principles of warehousing Storage and handling systems (palletized and non-palletized) – Order picking and replenishment- Receiving and dispatch - Warehouse design- Warehouse management and information. (11)

FREIGHT TRANSPORT AND OPERATIONAL MANAGEMENT: International logistics: modal choice - Maritime transport - Air transport - Rail and intermodal transport- Road freight transport: vehicle selection, vehicle costing and planning and resourcing –
International transportation systems in Global perspective. Cost and performance monitoring- Benchmarking- Information and communication technology in supply chain- Outsourcing: services and decision criteria, the selection process – Outsourcing management- Security and safety in distribution - Logistics and the environment.  


REFERENCES:  

18MN30 MARKETING MANAGEMENT  

MARKETING: Core concepts of marketing, product concept, selling concept and marketing concept, marketing process, analyzing market opportunities, designing marketing strategies, planning marketing programmes, organizing, implementing and controlling the marketing effort, marketing planning, current marketing situation, opportunity and issue analysis, action programmes, profit and loss statement. Concepts in demand measurement, estimating current demand, estimating future demand, market segmentation, general approach to segmenting a market, patterns of market segmentation.  

PRODUCTS AND SERVICES: New product development, effective organizational arrangements, idea generation, idea screening, concept development and testing, product development, market testing, commercialization, consumer adoption process, product life cycle - introductory stage, growth stage, maturity stage and decline stage. Managing product lines, brands and packaging, product mix decisions, product line decisions, brand decisions, packaging and labeling decisions, managing service businesses and ancillary services.  

MARKETING CHANNELS: Nature of marketing channels, channel design decision, channel management decisions, channel dynamics, channel co-operation, conflict and competition, retailing, wholesaling and distribution systems, nature and importance of retailing, types of retailers, wholesaling and physical distribution.  

COMMUNICATION AND PROMOTION-MIX STRATEGIES: The communication process, steps in developing effective communication, measuring promotion results, managing the sales force, designing the sales force, principles of personal selling.  

REFERENCES:  

18MN31 PRICING AND REVENUE MANAGEMENT  


REVENUE MANAGEMENT: Overview of Revenue Management (RM) and its applications, Quantity based RM- Introduction to dynamic programming, capacity allocation and protection levels for a single leg with single and multiple fare classes-overbooking  

PRICE BASED AND NETWORK BASED REVENUE MANAGEMENT: Price based RM; Basic pricing theory – dynamic pricing, Network based RM; decomposition methods-approximate dynamic programming-stochastic approximate techniques.
CHOICE BASED REVENUE MANAGEMENT AND JOINT DEMAND ESTIMATION: Choice based RM; Choice models- assortment optimization – Joint demand estimation- dynamic pricing with demand learning-the multi-armed bandit paradigm-contextual bandits. (11)

REFERENCES:

18MN32 PRODUCT ANALYSIS AND COST OPTIMIZATION 3 0 0 3


ACTIVITY BASED COSTING AND TARGET COSTING: Introduction - traditional approach, comparison- examples– activity based management; introduction to target costing, market driven, product driven and component driven target costing. (10)


PRODUCT DEVELOPMENT AND PROCESS SELECTION: New products, new product strategy - market definition, idea generation - introduction to the design process – quality function deployment - forecasting sales potential - product engineering and markets, monopoly, competitive; Manufacturing planning; Selection of optimum process, standardization. - Process capability analysis - break even analysis - application and area of use - problems - multi - product analysis. (12)

REFERENCES:

18MN33 PROJECT MANAGEMENT 3 0 0 3

PROJECT MANAGEMENT AND INITIATION: Definition of Project, why project management, Project Life Cycle, Selecting Projects Strategically – Project Management maturity, Project selection and criteria of choice, the nature of project selection models, types of project selection models, analysis under uncertainty-the management of risk, project portfolio process, project proposals. Role of project managers – project management and project manager, special demands on the project manager, problems of cultural differences, impact of institutional environments, multicultural communication and managerial behavior. Working and partnering with others – Nature of negotiation, partnering, chartering and scope change, conflict and the project life cycle, requirements and principles of negotiation. Role of Projects in organization – projects as part of functional organization, pure project organization, the matrix organization, mixed organizational systems, choosing an organizational form, the project team. (11)

PROJECT PLANNING AND CONTROL: Initial project coordination and the project plan, systems integration, the action plan. Project costs and Budgets – estimating project budgets, expert opinion, analogy, parametric estimate; cost engineering – example, contingency amount, elements of budgets and estimates improving the process of cost estimation. The planning, monitoring and controlling cycle, information needs and reporting, earned value analysis, computerized PMIS. Controlling Project execution – fundamental purpose of control, types of control processes, design of control system, control of change and scope creep. (10)

TOOLS AND RESOURCE MANAGEMENT: Case studies in Network diagram, PERT/CPM and crashing a project. WBS, responsibility matrix, events and milestones, Gantt charts. Allocating resources on the project – Case resource loading, resource leveling, constrained resource scheduling, multi-project scheduling and resource allocation.

INTER FUNCTIONAL KNOWLEDGE IN PROJECT MANAGEMENT: Active listening Applicable laws and regulations, Brainstorming techniques, Communication - channels, tools, techniques, and methods, Data gathering - techniques, Diversity and cultural sensitivity, Expert judgment technique, Information - management tools, techniques, and methods, Leadership - tools, techniques, and skills, Organizational and operational awareness, Presentation - tools and techniques, Quality assurance and control techniques, Situational
RISK AND EVALUATION: Risk analysis – objectives of risk analysis, identify the risk, determine the most important risk, identify control measures. Performing risk analysis – objectives and desired result, design of risk analysis, activities and time frame for implementing risk analysis. Risk management – choosing, implementing and evaluating control measures. Performing risk management. Project evaluation – goals of the system, project audit, construction and use of audit report, project audit life cycle, essentials of audit/evaluation, measurement. Completing the project – varieties of project termination, when to terminate a project, termination process, final report. (12)

REFERENCES:

18MN34 SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM


SAFETY IN MATERIAL HANDLING: Selection of material handling equipment, equipment used, ropes, chains, slings, hooks, clamps, procedure for testing and checking as per standard. Design conservation, conveyor systems, belt, roller chain and elevator and lifts, industrial hoists, mobile crane, forklift, operation maintenance and checking procedure. (11)

FIRE PREVENTION SYSTEM: Automated fire fighting system: water sprinkler, fire hydrant, alarm and detection system. Suppression system, CO2 system, foam system, DCP system, halon system, portable fire extinguisher. Safety in process: Design for safety, safety in use of power press. Safety in foundry, forging, welding, hot working and cold working, electroplating and boiler operation. (10)


REFERENCES:

18MN35 SEQUENCING AND SCHEDULING

SINGLE AND PARALLEL MACHINE SCHEDULING: Scheduling as a function and theory, scheduling problem, sequencing - objective, constraints, difference between sequencing and scheduling; Single machine models - Characteristics, terminology, theorems, SPT and EDD sequences, minimizing in - process inventory, mean flow time, weighted mean flow time, number of tardy jobs and mean tardiness, Hodgson's algorithm, Wilkerson -Irwin algorithm, applications of dynamic programming and branch and bound techniques, minimizing total cost, non-simultaneous arrivals, dependent jobs, sequence dependent set up time, use of assignment model, heuristic solutions; Parallel Machine Models - Minimizing make span, independent jobs- McNaughton's algorithm, heuristic procedures, minimizing weighted mean flow time, jobs- Hu's algorithm, Muntz-Coffman algorithm. (8+8)

FLOW SHOP AND JOB SHOP SCHEDULING: Flow shop-Permutation schedule, Johnson's problem, branch and bound algorithms, dominance properties for make span problems, heuristic approaches, flow shops without intermediate queues, other performance measures; Job shop - Types of schedules, schedule generation - branch and bound approach, heuristic procedures, integer programming approach. (7+7)

RESOURCE CONSTRAINED PROJECT SCHEDULING AND SIMULATION: Extending job shop model - extending project model, integer programming approach - heuristic methods; Project Scheduling - Logical constraints, network constructions, temporal analysis,
probabilistic network analysis, time/cost trade-off, resource allocation; Simulation -Elements of simulation models, reducing mean flow time, meeting due dates, case studies.

RESOURCE SCHEDULING: Interval scheduling, reservations and timetabling -Reservation without slack, reservation with slack, timetabling with workforce, operator constraints - Case study; Planning, scheduling and timetabling in transportation -Tanker and aircraft scheduling, train scheduling; workforce scheduling -Day-off scheduling, shift scheduling- cyclic staffing problem, operator scheduling in a callcenter.

REFERENCES:

18MN36 SERVICE AND OPERATIONS MANAGEMENT

SERVICES AND CUSTOMER RELATIONSHIPS: Introduction, types of services, types of service processes, the service concept – defined, service concept as a strategic tool, focused and unfocused service operations. Customers, customer segmentation, customer retention, managing customer and business relationships. Customer expectation and satisfaction – defining expectations, finding expectation and assessing satisfaction, managing perceptions.

SUPPLIER RELATIONSHIPS AND SERVICE DELIVERY: Managing supply relationships – types of supply relationships, managing service supply chains, managing through intermediaries, supply partnerships, service level agreements. Service processes, understanding the nature of service processes, Engineering service processes, Controlling service process, repositioning service process. Service people – understanding the pressure on service providers, managing and motivating service providers, managing customers.

SERVICE MANAGEMENT AND PERFORMANCE MANAGEMENT: Resource utilization – capacity management, operations planning and control, managing bottlenecks and queues, managing the coping zone, improving resource utilization. Networks, performance and information – how it is transforming service, managing physical and virtual networks, managing technology and information flows, integrating networks, technology and information. Purpose of performance measurement, balance of measures, interlinking, targets and rewards, benchmarking. Linking operations decisions to business performance – relationship, service performance network, key stages in developing a network, world-class service. Driving operational improvement – approaches to operational improvement, service recovery, service guarantees.

MANAGING STRATEGIC CHANGE: Service strategy – service as competitive advantage, turning performance objectives into operational priorities, strategy formulation and development, sustaining a strategy. Service culture – understanding organizational culture, types of culture, national cultures, management of change and service delivery. Operational Complexity – operational sequence of complexity.

REFERENCES:

18MN37 TOTAL PRODUCTIVE MAINTENANCE

CONCEPTS OF TOTAL PRODUCTIVE MAINTENANCE (TPM): Six basic principles. TPM definition, development stages of TPM, principle of learning – improving machine performance zero defects and TPM. Overall Equipment Effectiveness; Power of OEE, six major losses, OEE metrics, OEE calculation for a single machine, plant OEE calculations, process average method, weighted process average method, total equipment effectiveness equipment performance (TEEP), financial aspects of OEE.

RESTORING EQUIPMENT TO ‘NEW’ CONDITION: Specific goals for equipment, operators, technicians, detecting minor machine defects, setting comp. standards, typical examples, machine tags, and one point lessons – typical examples. Autonomous Maintenance: Seven levels - initial cleaning, preventive cleaning machines, cleaning and lubrication standard, general inspection, autonomous inspection, process discipline, independent autonomous maintenance.

MACHINE PREVENTIVE MAINTENANCE PLAN: Elements of a complete preventive maintenance, PM checklist, PM schedules, inspection specification, replacement parts numbers, PM procedure, part logs, quality checks, PM Master-plan.
TPM IMPLEMENTATION: Introduction of TPM to the organization, creation of organization structure, Basic TPM policies and aids, master plan, Kick start. TPM implementation stages: Small group activities, implementing AM, establishing planned maintenance, training and education, developing equipment management program, perfecting TPM implementation – raising TPM levels, case studies.

REFERENCES:

18MN38 VALUE ENGINEERING


REFERENCES:

18MN39 WASTE DISPOSAL MANAGEMENT AND OCCUPATIONAL HAZARDS

SOURCES OF WASTE: Definitions of waste, waste arising, municipal solid waste (MSW), hazardous waste, sewage sludge, other wastes, waste containers, collection systems and transport. Waste recycling, examples of waste recycling, economic considerations, life cycle analysis of materials recycling.

SOLID WASTE MANAGEMENT: Sources of solid waste, effects of solid waste, types of solid waste, quantities and characteristics, objective of solid waste management, functional activities of solid waste disposal, hazardous waste, biomedical waste, refuse-recycling-reduction-and recovery of solid wastes, theory of biogas generation, various solid conversion and utilization, red mud.

ENVIRONMENTAL POLLUTION AND RELATED ISSUES: Environmental impact assessment, environmental management planning (EMP), some examples of impact assessments conducted in India, information for assessing EIA of a proposed project, notification on environment impact assessment, environmental protection acts, man and environmental pollution, use of pesticides and their impacts on environment, pollution control methods, green technology, life cycle assessment, ISO 14000 series environmental management systems, environmental audit, conservation of natural resources.


REFERENCES:

18MN40 HUMAN FACTORS ENGINEERING

INFORMATION INPUT: Human Factors: Definition, focus and objectives; Man-Machine Systems: characteristics and components; Information: Types of information, displaying information, display modality selection, compatibility, attention, display of static and dynamic information-visual, auditory and tactual.

HUMAN OUTPUT AND CONTROL: Muscle and Work Physiology, measures of physiological strain, physical workload, manual materials handling; Biomechanics of human motion, compatibility- Spatial, movement and modality; Controls: Functions, factors in control design, design of hand and foot-operated controls, principles of hand tool and device design.


WORKPLACE DESIGN: Anthropometry: Static and dynamic dimensions, use of anthropometric data; Work spaces, design of work surfaces; Seating: principles of seat design; Arrangements of components within a physical space-Principles, methodologies; General location of controls and displays within workspace.

REFERENCES:

Total L: 45

AUDIT COURSES

18MN81 ENGLISH FOR RESEARCH PAPER WRITING
vide Automotive Engineering 18AE81

18MN82 RESEARCH METHODOLOGY AND IPR
vide Automotive Engineering 18AE82