## Courses of Study and Scheme of Assessment

### M.E. LEAN MANUFACTURING

**Courses of Study and Scheme of Assessment**

(2018 REGULATIONS)

(Minimum No. of credits to be earned: 71)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours/Week</th>
<th>Credits</th>
<th>Maximum Marks</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lecture</td>
<td>Tutorial</td>
<td>Practical</td>
<td>CA</td>
</tr>
<tr>
<td><strong>I SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18ML01</td>
<td>Applied Statistics and Reliability</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML02</td>
<td>Operations Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML03</td>
<td>Lean Manufacturing Tools and Techniques</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML04</td>
<td>Lean Supply Chain Management</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML05</td>
<td>Information Systems for Manufacturing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML51</td>
<td>Manufacturing Simulation Laboratory</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>18MD81</td>
<td>English For Research Paper Writing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Grade</td>
</tr>
<tr>
<td></td>
<td><strong>Total 21 hrs</strong></td>
<td><strong>13</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>17</strong></td>
</tr>
<tr>
<td><strong>II SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18ML06</td>
<td>Lean Six Sigma in Manufacturing and Service</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>18ML07</td>
<td>Lean Product Design and Development</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML08</td>
<td>Total Productive Maintenance</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML09</td>
<td>Costing and Engineering Economics</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML--</td>
<td>Professional Elective 1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML--</td>
<td>Professional Elective 2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML52</td>
<td>Lean Manufacturing Laboratory</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>18ML61</td>
<td>Industry Visit and Technical Seminar</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>18MD82</td>
<td>Research Methodology and IPR</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Grade</td>
</tr>
<tr>
<td></td>
<td><strong>Total 29 hrs</strong></td>
<td><strong>17</strong></td>
<td><strong>4</strong></td>
<td><strong>8</strong></td>
<td><strong>23</strong></td>
</tr>
<tr>
<td><strong>III SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18ML--</td>
<td>Professional Elective 3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML--</td>
<td>Professional Elective 4</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML--</td>
<td>Professional Elective 5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML--</td>
<td>Professional Elective 6</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML53</td>
<td>Operations Research Laboratory</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>18ML71</td>
<td>Project Work I</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total 22 hrs</strong></td>
<td><strong>12</strong></td>
<td><strong>0</strong></td>
<td><strong>10</strong></td>
<td><strong>17</strong></td>
</tr>
<tr>
<td><strong>IV SEMESTER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18ML72</td>
<td>Project Work II</td>
<td>0</td>
<td>0</td>
<td>28</td>
<td>14</td>
</tr>
<tr>
<td><strong>PROFESSIONAL ELECTIVE COURSES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18ML21</td>
<td>Human Factors Methods</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML22</td>
<td>Entrepreneurship Development</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML23</td>
<td>Agile Project Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML24</td>
<td>Management of Service Operations</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML25</td>
<td>Inventory and Warehouse Management</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML26</td>
<td>Human Resource Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML27</td>
<td>Marketing Management and Strategy</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML28</td>
<td>Facilities Design and Analysis</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML29</td>
<td>Sequencing and Scheduling</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML30</td>
<td>Enterprise Resource Planning</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18ML31</td>
<td>Advanced Optimization Techniques</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>18ML32</td>
<td>Advanced Operations Research</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

*Indicated is the minimum number of credits to be earned by a student.

CAT = Category; PC = Professional Core; PE = Professional Elective; EEC = Employability Enhancement Course
SEMESTER I

18ML01 APPLIED STATISTICS AND RELIABILITY
vide Industrial Engineering 18MN01

18ML02 OPERATIONS MANAGEMENT
vide Industrial Engineering 18MN05

18ML03 LEAN MANUFACTURING TOOLS AND TECHNIQUES

PRINCIPLES OF LEAN MANUFACTURING: Review of manufacturing paradigm; Objectives of lean manufacturing, key principles and implications of lean manufacturing, traditional versus lean manufacturing characteristics; Value creation and waste elimination-major kinds of manufacturing waste, concept of takt time, continuous flow, continuous improvement, single piece flow. (12)

LEAN MANUFACTURING TOOLS AND METHODOLOGIES: Value stream mapping; Current state and future state value stream mapping; Standard work; Communication of standard work to employees, visual controls; Quality at the source, 5S principles, Total Productive Maintenance, Changeover and setup time reduction; Production leveling-Failure mode and effect analysis, line balancing, mistake proofing, case studies. (11)

GROUP TECHNOLOGY AND JUST IN TIME MANUFACTURING: Group technology philosophy: Part family, Machine cell design and analysis; JIT-Elements of JIT, Kanban, case studies. (11)

LEAN MANUFACTURING IMPLEMENTATION: Road map for lean manufacturing implementation; Reconciling lean with other systems; Lean six sigma, integrating lean principles in ERP and PLM; Lean production in Industry 4.0: Impact of industry 4.0 on lean production system, case studies. (11)

REFERENCES:

Total L: 45

18ML04 LEAN SUPPLY CHAIN MANAGEMENT

LEAN SUPPLY CHAIN AND INVENTORY MANAGEMENT: Lean opportunities in supply chain and logistics, Examples of JIT in the Supply chain, competitive strategy, logistics and customer value, measuring logistics cost and performance; Traditional inventory management versus lean inventory management, kanban sizing, WIP inventory: FIFO management, lot sizing in lean, one piece, Every Part Every Interval, lot sizing as part of scheduling, reducing pipeline inventory: kanban, visual car, inventory reduction through reducing lot sizes, point of sales data. (8+6)

LEAN SUPPLY CHAIN DESIGN: Principles, lean layouts, lean production schedules, lean service, traditional physical control of inventories, traditional relationships packaging, preparing an item for shipment, overall warehouse setup and item locations, traditional logistics, skill, freight cost, distribution requirements planning, lean warehousing, contractor management: selection of contractors, induction, onsite management, risk management, lean logistics: product availability and its effect on logistics, collaboration: visibility and reliability, the impact of globalization, enterprise resource planning, leveraging enterprise resource planning in supply chain, sales and operations planning, lean supply chain tools for the perfect order (10+6)

LEAN SUPPLY CHAIN EXECUTION: E-Commerce, QR, ECR, and CPFR, collaborative planning, forecasting, replenishment, vendor-managed inventory, other potential areas for collaboration, future opportunities, logistics of a global supply chain, value stream mapping to identify waste, areas to reduce waste policies and procedures, relevant lean supply chain and logistics metrics, balanced scorecard, display and control metrics, barriers to supply chain integration, trends in lean supply chain, data analytics, supply chain analytics and lean, potential obstacles to lean thinking in the supply chain. (6+8)

CASE STUDIES: Reverse logistics, warehouse management using lean concept, lean supply chain management of an automobile component manufacturing industry, introducing lean concept in E-procurement. (6+10)

Total L+T: 30+30=60
REFERENCES:

18ML05 INFORMATION SYSTEMS FOR MANUFACTURING


MANUFACTURING MODELS: Engineer to order, make to order, assemble to order, made to stock, and configure to order. Faster design throughput: Web based design, changing design approaches, engineering change management, product configuration management. Enterprise application and integration for product lifecycle management, risk management - case studies

IT ENABLED PROCESS AND RESOURCE PLANNING: Process planning: Structure of process planning software, Information requirements for process planning. Role of Manufacturing Resource Planning (MRP), Enterprise Resource Planning (ERP) – case studies

REFERENCES:

18ML51 MANUFACTURING SIMULATION 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. Manufacturing system simulation and performance measurement using simulation software
2. Solving inventory problems using simulation software
3. Solving transportation and assignment problems
4. Project evaluation and review based on time and cost
5. Measurement system analysis, process capability analysis, gauge repeatability and reproducibility using statistical software

CASE STUDY
➢ Manufacturing simulation of advanced manufacturing systems

REFERENCES:
SEMESTER II

18ML06 LEAN SIX SIGMA IN MANUFACTURING AND SERVICE

CONCEPTS OF LEAN SIX SIGMA: Overview of six sigma concept: definition, origin, terms. Foundations of lean six sigma – four keys, five laws of lean six sigma, types of lean six sigma: DMAIC versus DMADV – lean six sigma project selection: selection of team members, six sigma roles and responsibilities; Team stages: characteristics of effective teams, six sigma training plan; Six sigma metrics: DPMO calculation, quality cost, cost of poor quality - roadmap for implementation; Common implementation issues and 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 QC tools, measurement system analysis, Process capability calculations. (12+8)

ANALYSE PHASE: Inferential and Descriptive Statistics, Patterns of Variation, Normality Analysis, Multi-Vari Analysis; Hypothesis testing for Normal Data: Selection and application problems; Introduction to statistical software, failure mode and effects analysis, 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); Design of experiments; Waste elimination methods, Cycle time reduction, Cost/benefit analysis; Process scorecard – Control Plan. (12+8)

REFERENCES:

18ML07 LEAN PRODUCT DESIGN AND DEVELOPMENT

INTEGRATED PRODUCT DESIGN AND DEVELOPMENT: Product development system, process particularities, performance drivers, metrics; integrated product development-sequential product design and integrated product design; Rescue movement, tools and teams; lean thinking, value on product development, waste in product development. Green manufacturing: lean sustainability, continuous improvement. (12)

LEAN PRODUCT DEVELOPMENT- ORGANIZATIONAL CULTURE: Lean enabling organizational culture-hard on the problem, soft on the people; power of communication, lean product development organization knowledge management organized to learn (and to lean); knowledge identification-creation-representation-distribution, enabling; A3 report planning method- problem-solving A3. (11)

LEAN PRODUCT DEVELOPMENT PROCESS: Process and its phases, portfolio management activities; value identification, proposition, delivery planning, design and development, production/ramp-up, product/process follow-up and product process discontinuation; activities; product development and visual management; value function deployment, identification activities , planning activities; board to guide the value delivery planning; execution phase - board to guide the design and development-production. (11)

LEAN JOURNEY: Setting attitude and plan; breaking the roots from the traditional paradigm; thermo baby development project; robot based flight simulator development project; product development performance drivers, case studies. (11)

REFERENCES:
**PRINCIPLES OF TOTAL PRODUCTIVE MAINTENANCE:** Review of TPM concept-Objectives and functions, Reliability centered maintenance, Maintainability prediction, availability and system effectiveness, maintenance cost. (12)

**TPM IMPLEMENTATION:** Developing the TPM implementation plan; Preventive maintenance, Minimal repair, Maintenance types, Balancing PM and breakdown maintenance. (11)

**ZERO BREAK DOWN:** Zero defects and TPM, Maximizing equipment effectiveness, Autonomous maintenance program, Pillars of TPM, TPM small group activities, TPM organization, Improving maintenance efficiency and effectiveness. (11)

**HUMAN FACTORS IN MAINTENANCE:** Maintenance manuals, Maintenance staffing methods, Simulation, Spare parts management; Maintenance planning and scheduling; Condition monitoring techniques. Maintenance management information systems, total economic maintenance, team-based maintenance, fault diagnosis, TPM online diagnostics. (11)

**REFERENCES:**

---

**18ML09 COSTING AND ENGINEERING ECONOMICS**

**COST CONCEPTS:** Cost structure: Labor, material, overhead cost; Nature of overhead Cost, Overhead absorption methods: Direct labor, direct material, number of pieces, labor hour rate, machine hour rate methods – Cost control: labor, material, overhead variance analysis. (8+8)

**ECONOMICS:** Present economic policy: liberalization, privatization, globalization, scope for industrial growth, interest and time value of money, cash-flow diagram, simple interest, compound interest, single payments: uniform series payments - interest factors and tables - nominal and effective interest rates - continuous compounding - uniform continuous payments. Present worth comparison - equal, unequal lived assets - study period – assets with infinite life - capitalized cost. Equivalent uniform annual cost comparison – situations for EUAC. (10+8)

**REPLACEMENT ANALYSIS:** Review of conventional approach – group replacement - analysis with time value accounting – replacement due to deterioration, obsolescence, inadequacy – economic life for cyclic replacements - current salvage value of the defender - defender and challenger with different lives - additional one year assessment. (6+8)

**PROJECT FEASIBILITY ANALYSIS:** Case study - report preparation. Depreciation - reasons - depreciation accounts - causes of declining value - depreciation methods, multi product break even analysis. - review of project management - PERT - CPM - crashing - cost system. (6+6)

**REFERENCES:**

---

**18ML52 LEAN MANUFACTURING 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. Facility layout design and study of layout performance
2. Value Stream Mapping: Study of current state and future state diagrams
3. Ergonomic study of human performance
4. Study of lean factory (cycle time, WIP, time and motion study, Poka-Yoke)
5. Process capability study and use of six sigma
6. Study of failure mode and effects analysis

Case study:
- Implementation of lean techniques in a manufacturing industry and perform lean audit.

REFERENCES:


18ML61 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

18ML53 OPERATIONS RESEARCH LABORATORY
Vide Industrial Engineering 18MN51

18ML71 PROJECT WORK I

Total P: 60

SEMESTER IV

18ML72 PROJECT WORK II

The project work involves the following:

Preparing a project - brief proposal including

a) Problem identification
b) A statement of system / process specifications proposed to be developed (block diagram / concept tree)
c) List of possible solutions including alternatives and constraints
d) Cost benefit analysis
e) Time Line of activities

A report highlighting the design finalization [based on functional requirements and standards (if any)]

A presentation including the following:

a) Implementation phase (Hardware / Software / both)
b) Testing and validation of the developed system
c) Learning in the project

Total P: 420
ELECTIVES

18ML21 HUMAN FACTORS METHODS

HUMAN FACTORS: Goals and Scope of human factors, Systems thinking, Human centered design, Steps in performing task analysis, Iterative design and refinement, Evaluation methods – Purpose and types of evaluation, Factorial designs with interactions, Analysis of data, Statistical and practical significance.

COGNITIVE ELEMENTS: Visual environment and receptor system, sensory processing characteristics, Influence of vision on cognition, Auditory environment, Noise and annoyance, Tactile and Haptic senses; Information processing model of cognition, Working and Long term memory, Divided attention and time sharing.

HOMINAL SYNERGY WITH WORKSPACE: Theories for interface and interaction design, Types of automation; Fifteen principles of human centered automation, problems with automation; Principles of workspace design, Use of anthropometric data in design, Standing and seated workplace.

BIOMECHANICS OF WORK: Biomechanical models, Low-back problems, Cumulative trauma disorders, Work load assessment, Energy cost of work, Whole body fatigue, Work capacity, Environmental and Psychological stressors, Remedies for overload, Vigilance, fatigue and sleep disruption, Safety and accident prevention – OSHA and NIOSH.

REFERENCES:

18ML22 ENTREPRENEURSHIP DEVELOPMENT

FUNDAMENTALS OF ENTREPRENEURSHIP: Forms of ownership, systematic business transformation, innovation in entrepreneurship, seven sources for innovative opportunity, social and psychological factors, types, competencies and pre-requisites of entrepreneurs.

ENTREPRENEURIAL MOTIVATION: Propensiy to taking risks, McClelland’s need–Achievement Theory, Herjburg’s theory, Mcgragor’s Theory, thematic apperception test – stress management, use of E-commerce in business

STRATEGIES FOR BUSINESS: Market assessment, value chain analysis, SWOT analysis, Porter’s 5-forces model, sources of finance, financial statement analysis, manpower planning, tools and techniques for performance appraisal, process of image building, promotion and distribution.

ETIQUETTES AND ETHICS: Effective presentation styles and body language, employee rights and gender issues, customer care, grievance redressal, values and morals at workplace, case study of successful entrepreneurs.

REFERENCES:

Total L: 45
PROJECT MANAGEMENT AND INITIATION: Definition of Project, 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, Role of project managers, Nature of negotiation, partnering, chartering and scope change, conflict and the project life cycle, requirements and principles of negotiation.

PROJECT PLANNING, TOOLS AND TECHNIQUES: Initial project coordination and the project 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. Network diagram and Network Techniques; Risk analysis – objectives of risk analysis, identify the risk; Risk management – choosing, implementing and evaluating; Project control, evaluation and termination.

AGILE PROJECT MANAGEMENT: Agile revolution’s impact on product development - Agile Project Management, Agile values and principles for organization; Optimizing all five stages of the agile project: Envision, Speculate, Explore, Adapt, and Close

AGILE ENTERPRISE FRAMEWORK: Governance, project and iteration management, technical practices; Organizational and product-related processes for scaling agile, agile project governance solutions; The “Agile Triangle”: measuring performance, changing role of the agile project leader.

REFERENCES:

SERVICE CHARACTERISTICS: Services – Importance, role in economy, service sector – growth; Nature of services -Service classification, Service Package, distinctive characteristics , open-systems view; Service strategy – Strategic service vision, competitive environment, generic strategies, winning customers; Role of information technology; stages in service firm competitiveness; Internet strategies - Environmental strategies.


SERVICE QUALITY: Service quality- dimensions, service quality gap model; measuring service quality- quality service by design - service recovery - service guarantees; service encounter – triad, creating service orientation, service profit chain; front-office back-office interface – service decoupling.

SERVICE STRATEGIC CHANGE: Managing demand – strategies; managing capacity – basic strategies, supply management tactics, operations planning and control; yield management; inventory management in services– retail discounting model, newsvendor model; managing waiting lines –queueing systems, psychology of waiting; managing for growth- expansion strategies, franchising , globalization.

REFERENCES:
INVENTORY MANAGEMENT AND TOOLS: Types of inventory, types of inventory demand, reorder point, techniques, safety stock, safety time, Economic Order Quantity; Inventory cost - purpose of inventory, types of stocks; Inventory Strategy: replenishment, fulfillment, customization and outsourcing, framework of Inventory management; Obsolete Inventory: obsolete inventory identification, disposal, presentation and NCNR inventory reduction; Case study on total landed cost. Inventory record accuracy - fill rates; Tools to uncover system dysfunction: run charts, flow charts, logic charts, variance report - cycle count: annual inventory, cycle count methodologies. (8+10)

WAREHOUSE MANAGEMENT AND PROCESS: Types of warehouse operations, supply chain trends affecting warehouse, transportation issues; Assets, activities; Warehouse manager role: warehouse trade-offs, challenges, people management, attracting and retaining warehouse employees and training: receiving, pre-receipt, in-handling, preparation, offloading, checking, cross-checking; Pick preparation: preparation and warehouse layout. (8+6)

WAREHOUSE MANAGEMENT TOOLS: Warehouse audit, 5S or 5C (Gemba Kanri), Pareto analysis, ABC analysis and XYZ analysis for warehouse design, Order picking strategy, choice of picking system, cross docking, slotting or item profiling, resource planning, task inventory, selection of warehouse storage equipment, warehouse location number, selection of material handling equipments, warehouse space calculation, selection of warehouse management system. (8+6)

OUTSOURCING, AUTOMATION IDENTIFICATION AND ROLE OF INFORMATION TECHNOLOGY: Decision for outsourcing, core activity/ core competence, cost reduction, labor relation, financial strategy, flexibility; Role of third-party contractors, future of outsourcing, basics of bar coding - elements of bar code symbols - bar code applications. (8+6)

REFERENCES:


TRAINING AND DEVELOPMENT: Principles of learning, objectives, types and training methods, multi-skilling, management development: meaning, scope and objectives; Process: methods, factors that distort appraisal, methods to improve performance, role of performance in the performance management process, performance appraisal versus potential appraisal. (12)

WAGE AND SALARY ADMINISTRATION: Principles and techniques of wage fixation, job evaluation, incentive schemes; Morale: importance of moral-employee attitudes and behaviour and their significance to employee productivity; Motivation methods of employees, empowerment: factors affecting empowerment – process – benefits. (12)

WORK ENVIRONMENT AND TERMS AND CONDITIONS OF EMPLOYMENT: Fatigue, safety, accident prevention accident records, industrial relations; Model variables that outline difference between local and international HRM: approaches to IHRM, linking HRM to international expansion strategies; HR outsourcing: Human resource information system – management of turnover and retention. (10)

REFERENCES:
MANAGEMENT OBJECTIVES: Objectives and success: stakeholders’ objectives and constraints, developing balanced objectives, developing a strategy, criteria for strategic success, strategic intent core competences, organizational dimensions. Theory of marketing: the customer-led business, focus on needs, competitive advantage, customers as assets, creating the customer-led business.


COMMUNICATION STRATEGY: Communications and buyer behavior: advertising planning, direct response marketing, interactive marketing, sales promotion, public relations, communications mix. Sales management: selling process, negotiations, managing account relationships.

MARKETING IN SERVICE: Nature of services: service characteristics, service tasks, services marketing strategy. Marketing: a recapitulation, changing marketing environment, market prediction, corporate responsibility. Case studies.

REFERENCES: