MMCM – 201 Operations Management

Unit 1

Operations Management (OM): Definition, history, industrial and IT revolution (ERP); tangible and service products continuum, employment shift from agriculture, manufacturing to service; customer orientation; basic process formats on product volume-variety graph; concept of raw process time, critical WIP, bottle neck thruput and cycle-time with example of Penny-Fab-1,2; Little's law, best and worst case performance, thruput and cycle time formula in practical-worst-case; criteria of performance, decision area, business strategy, environment scan, SWOT, Porters' five forces, core competency, competitive priorities of cost, quality, time and flexibility, order winners; production strategy of Make To Order-MTO, MTS and ATO (assemble to order); productivity, standard of living and happiness.

Unit 2

Product:-Life Cycle and PLC management; design steps, evolution and innovation, traditional v/s concurrent design, form and functional design, simplification and standardization, differentiation/ mass customization, modular design, design for mfg and environment (DFM, DFE), technologies used in design. Service characteristics and classification based on people-things v/s direct-indirect service actions, service triangle of customer, provider and system; technical and functional (delivery) service quality and other service performance factors, Valerie's service quality model; globalization of services.

Unit 3

Processes: transformation and value addition, selection based on cost, quality and flexibility considerations; reliability, failure density and hazard rate graphs for constant hazard bath-tub curve, series and parallel components, MTBF; availability and maintainability, preventive maintenance, TPM; value analysis; replacement models; Quality-definition, Taguchi loss function, cost of quality, chain action of improving quality to productivity to motivation and low cost; product and process specs; the funnel-marble experiment and variance reduction, process capability, six sigma and its implementation by DMAIC, QFD, TQM and ISO-9000.

Unit 4

Plant-facilities: Impact of organization strategies on choice of region and site, existing or new organization, decision-affecting factors for location, load distance, dimensional and factor analysis methods, Brown-Gibson model, foreign locations, non-profit govt. services (health, school) locations. facility layout objectives and factors, basic layouts, merits and optimization; subjective relationship ranking method, computer programs CRAFT and 3-d modeling; problems of inventories flow and operators in process layout and inflexibility in product layout, flexible cellular layout, group technology; capacity and equipment selection, importance of spare capacity to reduce Q-length and cycle time.

Unit 5

Programs/ procedures of production control (PPC): corporate and production planning process, aggregate plan, master production schedule and material planning; matching supply to demand fluctuations over time horizon, Forecasting elements, time series, regression, causal and Delphi methods; use of LP in aggregate plan and HMMS model, assembly line balancing, elemental task, station time and cycle time, balance delays; sequencing, Johnson method for n-job 2/3 m/c, NP hard job-shop sequencing, heuristic dispatch rules; synchronous mfg, TOC, drum-buffer-rope and focus on bottleneck as control point; JIT lean mfg, Kanban and CONWIP shop floor controls, Kaizen.

References:

1. Chary SN; Production and Operations Management; TMH
2. Hopp W and Spearman M; Factory Physics; TMH
3. Gitlow Howard et al; Quality Management; TMH
4. Stevenson W J; Operations Management; TMH
5. Khanna RB; Production and Operations Management; PHI
6. Vollman, Berry et al; Manufacturing planning and control for SCM; TMH.
7. Chase Richard B et al; Operations management; SIE-TMH
8. Adam EE and Ebert RJ; Production and Operations Management Concepts…; PHI Learning.

MMCM – 202CAD-CAM-CIM

UNIT- I

CAD: Parametric representation of Analytical and Synthetic Curves. Surface Models: Parametric Representation of Analytical and Synthetic Surfaces. Solid Modeling : Boundary Representation, Constructive Solid Geometry, Parametric and Variational modeling, Feature Based Modeling, Product Data Exchange (DXF, IGES and STEP), Introduction of CAD software and Hardware.

UNIT-II

CAM & CIM : Online and Offline CAM, Fields of CAM, Computers Integrated Manufacturing Definition, CIM wheel concept, Evolution of CIM, Computer Numerical Control: Concepts and Types, Position and motion control, Constructional features of NC machines, CNC, DNC and Machine Center, Adaptive Control.

UNIT-III

CNC Programming: Programming of CNC Lathe and Milling machine for common machining operations. Absolute and Incremental Programming. Canned cycles of CNC milling machine. Introduction to Computer Assisted Part Programming

UNIT-IV

Group Technology and CAPP: Concept, Part family formation, Part Classification and Coding Systems types, OPITZ system, Production Flow Analysis, Composite Part Manufacturing and Machine Cell formation. Computer Aided Process Planning and its Types, Design For Manufacturing and Assembly.

UNIT-V

Robotics and Flexible Manufacturing Systems: Robotics: characteristics and classification, anatomy and configurations, introduction to robot kinematics, robot applications. Concept, Components and Types. Automated Storage and Retrieval Systems, AGVs and their types, Adoption Strategies of FMS, Flexibility Analysis. FMS Scheduling.

Books & References Recommended:

1. Groover, Production System & Computer Integrated Manufacturing, PHI.
2. Zeid, CAD/CAM Theory & Practice, McGrawHill
3. Principles of Computer Integrated Manufacturing: S. Kant Vajpayee – PHI
4. CAD CAM, Principles, Practice and Manufacturing Management, Chris McMahon, Jimme Browne- Pearson Education Asia

MMIE/MMIP/MMCM – 203 Product Design and Lifecycle Management

UNIT- I

Product Design : Product specifications, concept development, configuration design involving synthesis, analysis and optimization, Detailed design, Presentation of design Oral and Visual presentations, various types of models used in product design, Design through creative routes, Adaptive and variant design, Concurrent Engineering.

UNIT- II

Robust Design using Taguchi methods, Reliability based design. Modular versus integral design. Value analysis-scope techniques and job plan, Standardization, Renard series, Simplification visa - vis Variety in products. Patents, copyright and Intellectual Property Rights.

UNIT- III

PLM definition, Evolution of PLM, Pre-requisites for PLM. PLM benefits. PLM implementation methods. Product Life Cycle Engineering: Design for X, Components of DFX. Design for manufacture, Manufacturability evaluation, approaches to DFM. Design for Cost: Target costing, common routes for target costing.

UNIT- IV

Design for Quality: concept of six sigma quality, design for six sigma, quality function deployment. Application of simulation software for design for quality. Design for Maintainability, Design for Aesthetics and Human Factors and design for Safety.

UNIT- V

Design for environment (DFE), Life cycle assessment (LCA), Steps of LCA. Determining system boundaries, Life Cycle Inventory compilation, Common LCA methods and their impact categories. Applying DFE through LCA. Case studies

.

Reference

1. Grieves Michael, Product Life Cycle Management, McGraw Hill
2. John Stark, Product Life Cycle Management: Paradigm for 21st Century, Springer-Verlag
3. Product Life Cycle Engineering and Management, CEP Lecture notes, Prof B Ravi, IIT Bombay