Applied Statistics:

Fundamentals of probability theory and statistical inference used in engineering and applied science, descriptive statistics, Probability models, random variables, expectations, moment generating functions and its properties, conditional probability, useful discrete and continuous distributions, their properties and applications in Q-ing, reliability, quality control and simulation, law of large numbers, central limit theorem and its applications, case studies, statistical inference, confidence interval estimation, point estimation, case studies, concept of null hypothesis, testing of hypothesis, goodness of fit tests, linear regression, non-parametric test procedures, industrial applications, curve fitting and other techniques of estimation, introduction to software in statistics.

Quality Management:

Quality – concept and costs; Statistical quality control – process capability analysis, control charts for variables and attributes and acceptance sampling; Six sigma; FMEA, QFD, Poka Yoke. ISO 9000 series of standard, QS 9000, TQM, Quality circles. Benchmarking.
Reliability and Maintenance: Reliability, availability and maintainability; Distribution of failure and repair times; Determination of MTBF and MTTR, Reliability models; Determination of system reliability; Preventive and predictive maintenance and replacement, Total productive maintenance.

Product Design and Development:

Principles of product design, tolerance design; Quality and cost considerations; Product life cycle; Standardization, simplification, diversification; Value engineering and analysis; Concurrent engineering; Design for "X".

Work System Design:

Taylor's scientific management, Gilbreths's contributions; Productivity – concepts, Productivity Measurement at national level. Diversity of productivity concepts. Partial productivity, total productivity and total factor productivity, Productivity measurement model and productivity improvement techniques; Method study, Micro-motion study, Principles of motion economy; Work measurement – Time study, Work sampling, Standard data, PMTS; Ergonomics; Job evaluation and merit rating.

Facility Design:

Facility location factors and evaluation of alternate locations; Types of plant layout and their evaluation; Computer aided layout design techniques; Assembly line balancing; Materials handling systems.

Operation Research:

Linear programming – problem formulation, simplex method, duality and sensitivity analysis; Transportation and assignment models; Integer programming; Constrained and unconstrained nonlinear optimization; Markovian queuing models; Simulation – manufacturing applications. Scheduling techniques – Gantt chart, CPM, PERT and GERT.

Production control:

Forecasting techniques – causal and time series models, moving average, exponential smoothing, trend and seasonality; Aggregate production planning; Master production scheduling; MRP, MRP-II and ERP; Routing, scheduling and priority dispatching; Push and pull production systems, concepts of Lean and JIT manufacturing systems; Logistics, distribution, and supply chain management; Inventory – functions, costs, classifications, deterministic inventory models, quantity discount; Perpetual and periodic inventory control systems.