

Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)- MEM 502

Degree	Course Name	Course Code	Marks:100
M. Tech. Ind. Engg. & Management	Flexible & Computer Integ. Manufacturing	MEM 502	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
II	3	3-0-0	3 Hours

Unit - I

Introduction: Introduction to manufacturing systems; Different types of manufacturing systems; Volume-variety relationships for understanding manufacturing systems; FMS and FMS types. **(06 Hours)**

Unit - II

Flexibility and Automation: Different types of flexibility in manufacturing; Flexibility tests; Different types of FMS building blocks; Work station; Storage retrieved system; Material handling systems; Computer control system; FMS layouts. **(07 Hours)**

Unit - III

Machining System of FMS: Horizontal machining Centers; Vertical machining Centers; Integrated material handling; Automated guided vehicles; Automatic storage and retrieved system; Components of AS/RS systems; Analysis of AS/RS systems; FMS designing and planning problems; FMS advantages and disadvantages. **(08 Hours)**

Unit - IV

Computer Integrated Manufacturing: The meaning and origin of CIM; The changing manufacturing and management scene; External communication; Islands of automation and software-dedicated and open systems; Manufacturing automation protocol; Product related activities of a company- marketing engineering - production planning - plant operations - physical distribution- business and financial management. **(08 Hours)**

Unit – V

Group Technology: History of group technology- role of G.T. in CAD/CAM integration; Part families; Classification and coding - DCLASS and MICLASS and OPITZ coding systems; Facility design using G.T.; Benefits of G.T.; Cellular manufacturing.
(08 Hours)

Unit – VI

Process Planning: Process planning; Role of process planning in CAD/CAM integration; Approaches to computer aided process planning - variant approach and generative approaches; CAPP and CMPP process planning systems; Layout consideration for flexible manufacturing; Scheduling of flexible manufacturing system; FMS simulation.
(08 Hours)

Books recommended:

1. Automation; Production Systems and Computer Integrated Manufacturing; M. P. Groover; PHI Learning Private Ltd.; New Delhi.
2. Systems Approach to Computer Integrated Design and Manufacturing; Nanua Singh; John Wiley & Sons; Inc
3. Flexible Manufacturing Systems in Practice: Design: Analysis and Simulation; Talavage & Hunnam; CRC Press.
4. Hand-book of flexible Manufacturing Systems; Nand K. Jha; Academic Press; 1991.
5. FMS components manufacturers Catalogues.

School of Engineering (Mechanical Engineering)- MEI 504

Degree	Course Name	Course Code	Marks:100
M. Tech. Ind. Engg. & Management	Quality Engineering	MEI 504	SM+M T+ET 25+2 5+50
Semester	Credits	L-T-P	Exam
II	3	3-0-0	3 Hours

Unit – I

Introduction to Quality Engineering: Quality control concepts and definitions; History of quality control and improvement; Quality philosophies; Basics of inferential and descriptive statistics; Important continuous and discrete distributions. **(07 Hours)**

Unit – II

On-line Statistical Methods for Quality Control: The magnificent seven quality control tools; Control charts for variables and attributes; Special control charts: CUSUM and EWMA charts; Control charts for short production runs and multiple-stream processes. **(08 Hours)**

Unit – III

Off-line Statistical Methods for Quality Control: Process capability analysis;

Introduction to designed experiments and Taguchi orthogonal array design and analysis. **(07 Hours)**

Unit - IV

Multivariate Process Monitoring and Control: Introduction of basic matrix algebra; Hotelling T^2 control chart; Multivariate EWMA and CUSUM charts; Multivariate statistical projection based methods. **(08 Hours)**

Unit – V

Engineering Process Control: Process monitoring and process regulation; Process control by feedback adjustment; Combining SPC and EPC. **(07 Hours)**

Unit – VI

Acceptance Sampling: Guidelines for using acceptance sampling; Single – sampling plans for attributes; Double; Multiple and sequential sampling; The Dodge – Romig sampling plans. **(08 Hours)**

Recommended Books:

1. Introduction to Statistical Quality Control; D. C. Montgomery; Wiley.
2. Statistical Quality Control; Grant and Leavarrow; McGraw Hill.
3. Total Quality Management; Dale H. Besterfield; Pearson Education Asia.

School of Engineering (Mechanical Engineering)- MEE 505

Degree	Course Name	Course Code	Marks:100
M. Tech.	Operation Research	MEE 505	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
I / II	4	3-1-0	3 Hours

Unit - I

Linear programming; Graphical and simplex method; Sensitivity analysis in linear programming; Computer application in linear programming. **(07 Hours)**

Unit - II

Network analysis; Transportation models; Transshipment models; Maximal flow model; Shortest route model; Minimum spanning tree; Project management; Computer application in network analysis. **(08 Hours)**

Unit - III

Advanced topic in linear programming: Duality and its application; Parametric programming; Integer programming; Linear fractional programming; Goal programming; Sensitivity analysis. **(08 Hours)**

Unit - IV

Dynamic programming: Basic concept; Development of dynamic; Programming; continuous state dynamic programming; Multiple state variable; stochastic system. **(08 Hours)**

Unit - V

Non linear programming: Unconstrained optimization; Constrained optimization with equality constraints; Constrained optimization with inequality constraints; Optimization by cutting plane method; Optimization by geometric programming. **(08 Hours)**

Unit - VI

Genetic algorithm; Taboo search; Simulating Annealing. **(06 Hours)**

Recommended Books:

1. Operation Research; Ravindran; Phillips & Solberg; Wiley India Edition.
2. Operation Research; Hira & Gupta; S. Chand & Company Ltd.
3. Operation Research; A. M. Natrajan; P. Balasubramani; A. Tamilarasi; Pearson Prentice.
4. Operation Research; S. D. Sharma; Prentice Hall of India.

School of Engineering (Mechanical Engineering)- MEI 506

Degree	Course Name	Course Code	Marks:100
M. Tech. Ind. Engg. & Management	Supply Chain Management	MEI 506	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
II	3	3-0-0	3 Hours

Unit - I

Introduction to Supply Chain: Basic concepts of supply chain management (definitions and key issues); Decisions phases in a supply chain; Push and pull views of supply chain; Bull-Whip effect; supply chain strategies.
(05 Hours)

Unit - II

Performance Evaluation and Design of Supply Chain Network: Drivers of supply chain performance and their associated Metrics; Supply chain decision making framework; Network design factors; Facility location and capacity allocation models; Distribution network design.
(10 Hours)

Unit - III

Supply Chain Planning Phase: Demand forecasting; Basic approaches of demand forecasting; Qualitative forecasting methods; Quantitative forecasting methods; Measures of forecast error capacity and aggregate planning; Aggregate planning strategies; Planning and managing inventories; Managing uncertainty in inventory levels; Designing and planning of transportation networks: Design options for a transportation network; Performance characteristics for evaluating transportation modes; Trade-offs in transportation design; Managing risk in transportation.
(11 Hours)

Unit - IV

Supply Chain Pricing and Revenue Management: Role of pricing and revenue management; Pricing and revenue management for perishable and seasonal goods; Pricing and revenue management for bulk and spot contracts.

(07 Hours)

Unit - V

Information Technology in Supply Chain: Supply chain IT framework; Role of IT in network design; role of IT in risk management; Role of IT in

coordinating supply chain functions; Future of IT in supply chain.
(06 Hours)

Unit - VI

Supply Chain Outbound Logistics: Types of warehouses; Design criteria for warehouses; Packaging and packing; Material handling equipments.
(06 Hours)

Recommended Books:

1. Supply Chain Management; Sunil Chopra; Peter Meindl and D. V. Kalra; Pearson Education.
2. Supply Chain Management; Janat Shah; Pearson Education.
3. Essentials of Supply Chain Management; Michael Hugos; John Wiley & Sons.
4. Operations Management; Russel and Taylor; Prentice Hall India.
5. Modeling the Supply Chain; J. F. Shapiro; Duxbury Thomson Learning.

School of Engineering (Mechanical Engineering)- MEE 508

Degree	Course Name	Course Code	Marks:100
M. Tech. Ind. Engg. & Management	Modeling & Simulation	MEE 508	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
I	4	3-1-0	3 Hours

Unit - I

Introduction to simulation; Systems; Models; Data collection and analysis; Monte carlo simulation; Types of system simulation; Decision making with simulation; Areas of simulation application. **(06 Hours)**

Unit - II

Queuing models; Characteristics of queuing systems; Queuing notions; Long run measures of performance of queuing systems; Steady state behavior of Markovian models (M/G/1; M/M/1; M/M/c); Overview of finite capacity and finite calling population models; Network of queues; Monte carlo simulation and its applications in queuing and inventory models. **(06 Hours)**

Unit - III

Generation of (Pseudo) random numbers; Probability distributions and probability densities; Sampling from probability distribution: Inverse method; Convolution method; Acceptance rejection method. **(08 Hours)**

Unit - IV

Discrete simulation; Continuous simulation; Combined simulation; Problem formulation; Mechanics of discrete simulation- discrete events; Representation of time; Generation of arrival pattern; Simulation examples; Simulation programming tasks; Gathering statistics; Measuring utilization and occupancy recording distributions and transit times. **(08 Hours)**

Unit - V

Steps to build a useful model of input data; Data collection; Verification of simulation models; Validation process; Simulation software; Classification of simulation software and desirable software features; Comparison of simulation packages with programming languages; General purpose simulation packages; Object oriented packages; Case studies. **(11 Hours)**

Unit - VI

Analysis of simulation output; Importance of the variance of the sample mean; Procedure for estimating variance; Subinterval method; Replication method; Regenerative method; Variance reduction techniques; Start up policies;

Stopping rules; Statistical inferences; Design of experiments.

(06 Hours)

Recommended Books:

1. Discrete Event System Simulation; Banks; Pearson's Education
2. Simulation Modeling and Analysis; 3rd edition; A. M. Law and W. D. Kelton; McGraw Hill.
3. System Simulation 2nd edition; G. Gordon; PHI Learning.
1. Probability and Statistics with Reliability; Queuing; and Computer Science Applications; K. S. Trivedi; Prentice Hall of India.
2. Introduction to Probability and Random Variables; G. P. Wadsworth and J. G. Bryan; McGraw-Hill.
3. Theory of Modeling and Simulation; Bernard.
4. Performance Modeling of Automated Manufacturing Systems; N. Viswandhan and Y. Narhari; Prentice Hall of India.
5. Simulation Model Design and Execution; P. Fishwick; Prentice Hall.
6. Simulation; S. Ross; Academic Press.

School of Engineering (Mechanical Engineering)- MEI 510

Degree	Course Name	Course Code	Marks:100
M. Tech. Ind. Engg. & Management	Industrial Ergonomics	MEI 510	SM+M T+ET 25+2 5+50
Semester	Credits	L-T-P	Exam
II	4	3-1-0	3 Hours

Unit - I

Introduction: Factors affecting physiological performance; Physical work load and energy expenditure; Heat stress; Manual lifting; Shift work. **(07 Hours)**

Unit - II

Work Space Design: Anthropometry; Workspace designs for standing and seated workers; Arrangement of components within a physical space; Interpersonal aspect of workplace design. **(08 Hours)**

Unit - III

Design of Equipment: Ergonomic factors to be considered in the design of displays and control; Design for maintainability; Design of human computer interaction. **(08 Hours)**

Unit IV

Cognitive Ergonomics: Information theory; Information processing; Signal detection theory; Human response; Human errors; Cognitive task analysis. **(08 Hours)**

Unit - V

Design of Environment: Design of physical environment; Human thermoregulation; Measuring thermal environment; Measurement of light; Lighting design considerations; Measurement of sound; Industrial noise control; Vibration; Principles for the design of visual displays; Design of control; Work organization and work system design. **(08 Hours)**

Unit – VI

Case Studies: A set of case studies will be used to demonstrate how ergonomics has lead to changes in work activity; Safety and product design. Case studies will include advanced computer applications; Workplace assessment and re-design; Accident analysis and industrial inspection and in manufacturing; Students will be required to apply the principles to a real life ergonomic design as applied to a product; Service or computer application.

Hours)

Recommended Books:

1. Introduction to Ergonomics; R.S. Bridger; McGraw Hill.
2. A guide to Human Factors and Ergonomics; Martin Helander; 2nd Edition; CRC; Taylor & Francis Group.
3. Human Factors Engineering and Design; J. McCormik; McGraw Hill.

School of Engineering (Mechanical Engineering)- MEI 512

Degree	Course Name	Course Code	Marks:100
M. Tech.	Project	MEI 512	SM+EM 50+50
Semester	Credits	L-T-P	Exam.
II	10	0-0-3	3 Hours

The objectives of this course are:

- To provide a black box problem to a student related to relevant engineering areas under the guidance of a faculty member of the department.
- To develop the ability to analyze a given problem in a simple and scientific manner.
- Student should aim to publish their work in journal / conference.
- Pedagogy: The pedagogy will be student-teacher interaction at regular intervals.

Course Requirements:

- Since much of the work is to be carried out by student involving visits to library, search on internet. It is important that student is regular in his/her work. He/ she will report to the supervisor regularly and the work to be carried out his satisfaction of the supervisor and expectations of the department / programme.

Evaluation Scheme:**SM**

Presentation : 25 Marks

Peer review/ Viva voce : 25 Marks

The evaluation will be done by a committee consisting of the following:

- 1) Chairperson/ HoD/ Programme coordinator or his/ her nominee;
- 2) Supervisor of the candidate;
- 3) Project faculty coordinator;
- 4) Any other faculty member appointed by Dean, SoE, if any.

EM:

Final report : 10 Marks

Presentation : 20 Marks

Peer review/ Viva voce : 20 Marks

The evaluation will be done by a committee consisting of the following:

- 1) Chairperson/ HoD/ Programme coordinator or his/ her nominee;
- 2) Supervisor of the candidate;
- 3) Project faculty coordinator;
- 4) Any other faculty member appointed by Dean, SoE, if any.