

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सत्यं शिवं सुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Computer Aided Design and Manufacturing (MEC 2147)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week		Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	
		Page : 1 of 1 Academic Year : 2003-04	
		M. E. Part - I	

Syllabus

1. Introduction to Computer Systems:

Influence of hardware and software during its applications in design, manufacturing and integrated manufacturing. CPU, mass storage devices, standard input/output devices, graphic input/output devices interfacing and communication networking.

2. Computer Aided Design:

Host system software, operating systems, single users/multi-users, graphic system, overlay system, graphic database and structure, graphic transformation, graphic standards GKS, CORE, IGES. Transformation systems, Windowing & clipping, 2D and 3D transformations, Geometric modelling-modelling techniques, wire frame and surface models, geometric entities, curves and surfaces, cubic and bi-cubic curves solid modelling.
FEA and CAD mesh generation, FEM, post processing.

3. Computer Aided Manufacturing:

Part programming for NC machine tools – APT, COMPACT II languages, post processes. Programmable logic controllers, construction and operation, programming techniques, CNC part programming loops, subroutines and macros, manual data inputs. Computer aid in materials handling, robots, automated guided vehicles, computer aided inspection, surface finish, roundness, co-ordinate measurements.
Computer aid in production management MRP – Manufacturing resource planning CRP-capacity resource planning CAPP-computer aided process planning.

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सत्यं शिवं सुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Engineering Materials Technology (MEC 2151)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: Nil	Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : Nil Total : 100 Marks	Page : 1 of 1	
		Academic Year : 2003-04	
		M. E. Part - I	

Syllabus

1. Review of elastic, plastic and mechanical properties of materials. Engineering materials used in practice and brief idea of manufacturing processes related to them.
2. Ferrous metals and their heat treatment processes.
3. Application of non-ferrous metals like Aluminum, Magnesium, Copper and its alloys, and other various alloys, their engineering properties, special purpose metal alloys and their industrial applications.
4. Applications of non-metallic materials, plastics, silicon, rubber, ceramic, composites, their important engineering properties.
5. Non-destructive testing and inspections, analysis of test results and their interpretation.
6. Powder metallurgy, historical and recent developments, their advantages and limitations, practical applications, characteristics and testing of metal powders, general idea about manufacturing of powder metals.
7. Influence of various factors like corrosion, erosion etc. on the life span of materials, methods of improving the life span of materials.

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सत्यं शिवं सुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Engineering Estimation and Costing (MEC 2148)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week		Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	
		Page : 1 of 1 Academic Year : 2003-04	
		M. E. Part - I	

Syllabus

1. Cost estimation for material required for a product, estimation of labour cost and manufacturing cost.
2. Costing and cost accounting, various systems of costing, their merits and demerits, salvage value and various costing techniques.
3. Cost reduction techniques, basic concept of economic analysis like demand, competition, profit and pricing, breakeven analysis.
4. Essentials of cost accounting and budgetary control.
5. Basic concept of product design and its effect on cost estimation.
6. Basic concept of Value engineering and its application in costing.
7. Case studies of cost estimation of products using foundry process, press working, fabrication, welding, metalworking, etc.
8. Estimation and costing under special circumstances.

 सयोजिरावसुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Optimization Techniques (MEC 2149)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week	Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	Page : 1 of 1	
		Academic Year : 2003-04	
		M. E. Part - I	

Syllabus

1. Introduction to Optimization:

Historical Development, concept of optimization, methods of optimization, engineering applications of optimization.

2. Linear Programming:

Convex sets and Linear programming theory, simplex method – Big-M method, Two-phase method, Dual simplex method, revised simplex method, Degeneracy, unbounded solution, Duality in Linear programming, sensitivity analysis, Integer Linear programming, Transportation Algorithm – Production problems, Transshipment problems, Assignment problems.

3. Non-Linear Programming:

One-dimensional minimization methods, unconstrained optimization techniques, constrained optimization techniques, Quadratic programming.

4. Dynamic Programming:

Characteristics of Dynamic programming, Bellman's principle of optimality, Concepts of dynamic programming, tabular method of solution, calculus method of solution, Applications of Dynamic programming in production and Inventory control.

5. Theory of Games:

Minimax (Maximin) criterion, Minimax theorem, stable game, unstable game, graphical and analytical methods of game theory, solution of (m x n) game by simplex method.

6. Waiting Line Models:

Single channel queuing theory
Multi-channel queuing theory

7. Inventory Control:

Deterministic Inventory models, Probabilistic inventory models, Inventory models with price breaks.

8. Simulation:

Introduction, Monte Carlo method, Operational Gaming method, System simulation method, Advantages and limitations of Simulation techniques, Generation of Random number.

9. Decision Theory:

Decision making under certainty/under uncertainty/under risk, Decision tree analysis, Posterior probabilities and Bayesian analysis, utility theory and decision-making.

10. Replacement Theory:

Introduction, replacement models and their solution, group replacement method.

	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Quality Control and Production (MEC 2150)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week	Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	Page : 1 of 1	
		Academic Year : 2003-04	
		M. E. Part - I	

Syllabus

1. Planning for controlled production, planning of all in-processes and final inspection.
2. Control of production, measuring equipments, and test equipments, corrective action.
3. Handling and postproduction, packaging, after sales servicing, market reporting.
4. Quality documentation and records, personnel training, qualification, motivation.
5. Economics of quality assurance.
6. Use of statistical methods, quality control charts/CUSUM techniques, statistical sampling inspection, quality circle, quality by pinning tags on a fish bone organization for quality, zero defect and total quality control.
7. Recent trends in quality assurance, like ISO-9000 series etc.

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सयं शिवं सुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Advances in Manufacturing Technology (MEC 2256)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week		Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	
		Page : 1 of 1 Academic Year : 2003-04	
		M. E. Part - II	

Syllabus

Survey of manufacturing techniques basic philosophy of shaping components, role of material technology in development of manufacturing techniques. Factors limiting the conventional manufacturing techniques capability.

1. Advances in Plastic Deformation Process:

High velocity forming, electro-hydraulic forming, electromagnetic forming, explosive forming and petro-forge machines, vacuum forming.

2. Fusion Process:

Vacuum moulding, advantages and limitation, magnetic moulding, cryogenic moulding.

3. Micro Manufacturing:

Definition of micro manufacturing, techniques – machining, chemical etching process, CNC, Laser, electron beams and other conventional processes adapted with high technology for micro-manufacturing, micro lithography, plasma etching, thin film deposition, chemical vapour deposition, micro plasma welding.

4. Fabrication:

Cryogenic assembly, adhesives and techniques of microfilm deposition, ultrasonic welding, explosive welding, laser beam welding plasma arc welding electron beam welding.

5. Advances in Unconventional Machining:

Wire-cut EDM, Abrasive Jet Machining, Water Jet Machining, Electro-Chemical Grinding.

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सयं शिवं सुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Automation in Manufacturing (MEC 2260)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: Nil	Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : Nil Total : 100 Marks	Page : 1 of 1	
		Academic Year : 2003-04	
		M. E. Part - II	

Syllabus

1. Introduction of Manufacturing Systems:

Classifications, chief features of

- (i) Cam controlled mechanical automates
- (ii) Programme sequence controls
- (iii) Numerical and computer numerical controls, programmable logic controllers.

2. Control Theory and System Modelling:

Analog and digital or sample data control systems technique of study transient and steady state responses, dynamic stability analysis.

3. Manufacturing System Devices and Components Drives:

Hydraulic, electric, analog digital, device for feedback.

4. Control Loops of NC/CNC system:

Open loop incremental and absolute closed loop incremental and absolute measures for PTP and contensing system reference pulse and sampled data system for CNC system.

5. Adaptive Control System:

Types of adaptive control systems ACO and ACC, variable gain AC system, design of AC of grinding.

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सत्यं शिवं सुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Industrial Engineering (MEC 2257)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week		Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	Page : 1 of 1 Academic Year : 2003-04 M. E. Part - II

Syllabus

1. Productivity its importance, tools of productivity, various techniques to raise productivity.
2. Production planning control, types of production, objectives and methods of sales forecasting, long term and short term forecasting, preplanning, long range planning, planning for seasonal and fluctuating and its systems, machine loading.
3. Material management, role and concept of material management in industry, purchasing methods and procedure, duties and responsibilities of purchase department, location and methods of storing various techniques to control inventory line ABC analysis etc. responsibilities and duties of stores department, and personnel management, concepts and objectives, recruitment, selection training, safety, accidents, welfare and discharge of employees.
4. Maintenance management, various types of recent developments in plant maintenance.
5. Replacement analysis, reasons, factors for replacing equipments, various methods used in selection of alternatives.
6. Industrial psychology, aim concept and scope of industrial psychology, individual and group psychology, theory x and y, motivation and working environmental conditions.
7. Industrial relations, trade unions, industrial disputes, strikes lockout picketing, workers participation in management, factory acts.
8. Job evaluation and merit rating, introduction method procedure and objectives.
9. Design making, techniques of decision making decision making under certainty and uncertainty decision making process.
10. Group technology and Flexible Manufacturing System.

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सयं शिवं सुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Machine Tool Engineering (MEC 2258)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week	Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	Page : 1 of 1	
		Academic Year : 2003-04	
		M. E. Part - II	

Syllabus

1. Introduction of Machine tools, their classifications, operational accuracy capability, recent developments in machine tool engineering.
2. General principle of machine tool design techno-economical prerequisites of the design of new machine tools.
3. Kinematic Analysis of machine tools drive, regulation of speed and feed rates, design of speed gearbox and feed gearboxes, quick returns mechanism, intermittent mechanism.
4. Design of machine structure criteria material selection, statics and dynamics stiffness. Design of beds, columns and housings, tables, saddles and carriages model technique in design of machine tool structures.
5. Design of spindles and spindle supports, material selection, design principles, spindle design, bearing selections.
6. Vibrations in machine tools sources, types and elimination methods, general procedure for assessing machine tools dynamic stability, stability analysis.
7. Control systems in machine tools, function, requirements and classification, control system for speed and feeds, hydraulic control system and their applications, numerical controls, manual part programming, CNC, automates.
8. Features of NC machine tools, system devices, drives, feed back devices, counting devices, digital to analog converters.
Introduction of industrial robots, basic concepts, massipulator control and devices programming, intelligent robots, economics applications of robots.

 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA सयोजिवसुन्दरम्	Mechanical Engineering Department Faculty of Technology & Engineering The M. S. University of Baroda, Vadodara, Gujarat, India-390 001 Website: http://www.msubaroda.ac.in		
Subject: Modern Manufacturing Systems Design and Analysis (MEC 2259)			
Specialization: Production Engineering			
Teaching Scheme: Lectures: 4 Hours per Week Practicals/Termwork: 2 Hours per Week	Examination Scheme: Theory Paper : 100 Marks PR/TW/Viva : 50 Marks Total : 150 Marks	Page : 1 of 1	
		Academic Year : 2003-04	
		M. E. Part - II	

Syllabus

1. Concept Of System and System Modelling:

Perspectives of production systems, manufacturing system conceptual frame of manufacturing systems, SPUR model, Peklinik model, concurrent engineering as tool for manufacturing system design JIT manufacturing philosophy.

2. Subsystem Design and Analysis:

Axiomatic design for manufacturing design for assembly, Taguchi method for robust design, manufacturing process design rules.

3. Group Technology:

Coding systems, classification, facility design using group technology, similarity coefficient and cell manufacturing.

4. Process Planning:

Part families retrieval type planning, generative type planning machinability data systems and computerization process. Planning systems, process tolerancing and dimensional chains. Process capability manufacturing planning and control, materials requirements planning, capacity planning, quality assurance, cellular manufacturing, JIT manufacturing philosophy.

5. Material Handling:

Automated guided vehicles, AGV Fork lifts, industrial robots, assembly robots, automatic tool changers, automated pallet changers, measurements analysis and actuation sensing and measuring detection and identification, PID controls analysis for control by programmable controllers actuation, ancillators, drives- motors electric, hydraulic, pneumatic flexible manufacturing systems equipments used in FMS, materials handing, transfer systems, head changing FMS, variable mission manufacturing systems (VMM), Flexible manufacturing cells and flexible manufacturing channels.

6. Bond Graph Simulation for Dynamic System Analysis:

Classification of bonds, junctions and sources development of state space equations. Use of COSMO-KGP software for analysis using bond graph simulation of manufacturing system.