

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –VIII PRODUCTION ENGINEERING
P- 801 COMPUTER AIDED MANUFACTURING

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical/Or al Marks	Term work Marks	Total Marks
04	02	100	03	50	25	175

A. THEORY

1. COMPUTER NUMERICAL CONTROL AND PROGRAMMING

Evolution of Numerical control, NC, CNC , DNC Classification of CNC Machines, Machine configurations, Types of control, CNC controllers characteristics, interpolators. Programming CNC machine , part print analysis and Process Planning, Preparatory (G) and Miscellaneous (M) Codes. Advanced Programming features- Canned cycles, Subroutines, Macros, special cycles etc. Manual part Programming for CNC turning , milling , Computer assisted part programming techniques. Simulation and Verification of CNC programs, Adaptive CNC control techniques, Integration of CNC machines for CIM.

2. ROBOTICS

Introduction Construction of manipulators , advantages and disadvantages of various kinematics structures . Applications, Actuators, Pneumatic, hydraulic and electric, characteristics and control. Nonzero robots, motion planning. Feed back systems, encoders, servo control. Manipulator dynamics and force control , Sensors : Vision, ranging, laser, acoustic , tactile, Developments in sensor technology , sensory control. Programming Language : VAL, RAIL, AML, Mobile robots, walking devices. Robot reasoning, Intelligent robot.

3. COMPUTER INTERATED MANUFACTURING

Introduction to CIM , Basic building blocks of CIM , CNC, machine, flexible manufacturing systems, Tool handling systems, material handling systems. Automatic inspection systems, use of CMM, Communications systems, Links in the network , Computer control systems- from product design to manufacturing introduction to GT, CAPP, Scheduling, MRP I & II, Product data management for CIM, Integration of the production management and business functions for CIM.

B. PRACTICAL / ORAL

It shall be based on term work prepared and knowledge on above syllabus.

C. TERM WORK

It should consist of exercises, experiments and computer print out, Work for this is carried out for major topic areas of syllabus.

D. REFERENCE BOOKS

1. NC Machine Tool By S.J. Martin
2. NC of Machine Tool By T.K. Kundra, P.N. Rao N.K. Tiwari.
3. Computer Control of Manufacturing By Yorem Koren System
4. Robotics for Engineer By Y. Koren, McGraw Hill, 1985
5. CAD/CAM- Computer Aided Design By Mikell, P. Groover & E.W. Manufacturing Zimmers (Prentice Hall)
6. Robotics By K.S. Fu. R.C. Gazalez. McGraw Hill
7. NC & Computer Aided Manufacture By R.S. Pressman & J.E. Willeams. (John Willey , N.Y.)
8. Computer Aided Design & By C.B. Besant & C.W.K., Lui. Manufacture (John Willey , N.Y.)
9. Computer Automated Manufacturing By John H. Powers Jr.(McGrawl Hill) Interlaid Edition
10. Flexible Manufacturing System By Karr, Gill.

(22/01/03)

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –VIII PRODUCTION ENGINEERING
P- 802 PRODUCT DESIGN & PROCESS ENGINEERING

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical /Oral Marks	Term work Marks	Total Marks
04	02	100	03	50	25	175

A. THEORY

1. PRODUCT DESIGN

Product classification and characteristics, product analysis and product design function, various aspects of design such as functional , esthetic, and part manufacturing consideration of human factors in product design, design of ergonomic chair ; stages of design, market research, feasibility studies, standardization and defects investigation, selection of materials important engineering materials and advanced new engineering materials ; process selection criteria.

2. VALUE ENGINEERING

Concept and definition of value analysis & value engineering nature & measurement of Values, VE process – Organization phase, information phase, innovation phase, Evaluation phase & implementation phase, using the process, behavioral & organization aspects of VE , Result & benefits of VE.

3. PROCESS PLANNING

Prerequisites of process-planning, Factors influencing process planning, steps of process planning, route and operation- layout sheets, Costs Benefit analysis and selection of M/c. or Process.

4. PROCESS DESIGN

Role of process engineering , Importance of part print analysis & bill of materials, make and buy decisions, determine principal processes and functional surfaces of part; relating part to dimensional analysis- geometry of form tolerance ; tolerance stack- design as well as process; tolerance chart It's purpose and utilization , rules for dimensions, layout of tolerance chart and it's balancing work piece control Influence of process engineering on product design and process pictures.

5. COSTING

Elements of costing, methods of costing, Classification of cost elements such as ; material, labour, direct & indirect, Other expenses : Overheads-fixed& variable – its allocation method like man-hour rate , machine-hour rate , combination , piece rate calculation etc , selling expenses , prices etc , Interest on capital , Non use of resources like man , machine ,Repairs/Replacement/Maintenance. Grouping of cost elements.

6. ENGINEERING ECONOMIC

Break even analysis, cost information, Economic risk analysis and discounted cash flow techniques in changing economics, depreciation and obsolesce & Present worth, Replacement models, Cash flow saving .

B. PRACTICAL / ORAL

It shall be based on term work prepared as well as on topic areas covered in syllabus.

C. TERM WORK

It shall be based on above syllabus and report should consist of case problems preferably from each of the major topic areas.

D. REFERENCE BOOKS

1. Product Design & Process Engineering By Niebel & Draper McGraw Hill
2. An Engineer's Guide to Costing By I.C. M.A.
3. Industrial Design By Doren MCGraw Hill
4. Financial Management & Cost Control By NPC volume
5. Process Engineering By Eary & Johnson
6. Value Engineering in Manufacturing By ASTME
7. Designing for Industry By Ashford Pitman.
8. Value Engineering -A Systematic By Mudge McGraw Hill Apprexel
9. Technical of Value Analysis & Engineering By L.D. Miles.
10. Manufacturing Processes & Materials for Engineers By Doyle L.E.

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –VIII PRODUCTION ENGINEERING
P- 803 PLANT ENGINEERING & SAFETY

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical /Oral Marks	Term work Marks	Total Marks
04	02	100	03	25	25	150

A. THEORY

1. INTRODUCTION

Concept of Plant Facility, It's Scope, Importance and objectives.

2. PLANT FACILITY LOCATION

Nature of Location Decision, Need for facility location planning, General procedures and Factors influencing location decisions, Facility Location Models, economics and cost analysis, Rural and urban location pattern in India.

3. LAYOUT DESIGNS

Industrial plant design considerations, types of production types of layout, factors affecting layout tools, Techniques & procedure used in workstation and plant layout, quantitative techniques in plant layout, developing Product and Process Layouts, Comparing Layouts, criteria for computerized facility layout, concept of computerized layout programs like CRAFT, CORELAP, ALDEP & PLANTET.

4. FLOW PATTERNS DESIGNS

Overall system flow cycle, Need and advantages of planned material flow, factors for consideration, designing flow patterns, Flow patterns for production lines and assembly lines.

5. GROUP TECHNOLOGY AND FLEXIBLE MANUFACTURING SYSTEMS- CONCEPTS

Fundamentals, Group technology approaches, characteristics of a group/ cell families of parts, coding systems, production flow analysis and choice of family, benefits and applications of group technology, concept of flexible manufacturing system.

6. MATERIAL HANDLING

Scope and functions of Material handling, Manual mechanical Handling ratio, Principles of material handling, Analysis of material handling problem, Classification of Material Handling system, salient features and applications of general purpose Material Handling equipments, Material Handling in stores and warehouses, automation in part handling, handling and industrial robots, Optimum allocation of Material Handling equipment.

7. PLANT MAINTENANCE

Role of maintenance management, Organization & systems of maintenance management, Different types of maintenance management, Their purpose and features, Preventive and Predictive maintenance techniques, Introduction to Total Productive Maintenance: Concepts, Tools and Procedure.

8. INDUSTRIAL ACTS AND SAFETY

Background of Industrial hazards and safety, Safety equipments, effect of accidents- their causes and prevention measures, safety planning and plant maintenance.

Industrial Acts and Industrial Labor Regulations: Importance and necessity of labor regulations, labor laws, Factory Act-1948, Payment of Wages Act- 1936, Industrial Dispute Act-1947, Compensation Act-1923, Collective bargaining

B. PRACTICAL / ORAL

It shall be based on teamwork prepared and on topic areas above syllabus.

C. TERM WORK

It shall consist of feasibility study report analysis design of a new or alternate Industrial Plant.

D. REFERENCE BOOKS

1. Practical Plant layout By Multher
2. Plant layout and design By James More
3. Manufacturing management a Quantitative Approach By Robert A Olsem
4. Productions & Operations Management By Lockyer Mulleman & Oakland
5. Operations and Industrial Management By Del mar
6. Plant Layout and Material Handling By James M Apple
7. Plant Layout By Immer
8. Plant Layout By Shubin
9. Industrial Engineering and O.R. By Miller & Schmidt.

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –VIII PRODUCTION ENGINEERING
P- 804 RECENT ADVANCES IN MANUFACTURING

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical/Oral Marks	Term work Marks	Total Marks
04	02	100	03	50	25	175

A. THEORY

1. ENTERPRISE RESOURCE PLANNING

Role of management information system, MIS & Production/ operation system, Decision making information system, Information value & measuring the information value, Assessing information needs, Identification & development of information sources, design & development of information flow network. Different ERP modules and their implementation procedures, Role of ERP in productivity improvement, ERP for different types of manufacturing systems, Software and Hardware need for ERP implementation.

2. LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Role of supply chain, Different models of supply chain management, Optimization of transport Network, Zero inventories.

3. JAPANESE MANUFACTURING SYSTEMS

Japanese approach for productivity improvement; Concepts like JIT, KANBAN systems, KAIZEN Philosophy, Manufacturing Improvement techniques such as SMED, POKAYOKE, JIDOKA.

4. CONTEMPORARY CONCEPTS IN MANUFACTURING

Concept of Design for Manufacturing, Lean Manufacturing, E- manufacturing, E-Commerce

B. PRACTICAL / ORAL:

It shall be based on term work and syllabus as above.

C. TERM WORK:

It shall be based on areas of Method study and work measurement in the form of exercise/ experiment / problem. Student will prepare in-group work system design write up for a given cases study.

D. REFERENCE BOOKS:

1. Enterprise resource Planning: Concepts and Practice By Garg & Venkitakrishnan
2. ERPWARE- ERP Implementation Framework BY Garg & Venkitakrishnan
3. Logistics & Supply Chain Management By Christopher
4. Logistics Engineering & Management By Blanchard
5. Frontiers of E- Commerce By Kalakota
6. Electronic Commerce- A Manager's Guide BY Kalakota
7. Design and Manufacturing By Surender Kumar
8. Kaizen- The Key to Japanese Success By Masaki Imai
9. Japanese Manufacturing Systems By R.J. Schonberger
10. Toyota Production System By Ohno Taiichi

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –VIII PRODUCTIO ENGINEERING
P- 805 OPERATIONS RESEARCH

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical/Or al Marks	Term work Marks	Total Marks
04	02	100	03	50	25	175

A. THEORY

1. **DECISION MAKING & OPERATIONS RESEARCH (OR)**

Scope & phases of operation research, simple decision model it's construction and solution, mathematical formulation of a problem, application of OR to industrial problems.

2. **LINEAR PROGRAMMING (LP)**

Characteristics of L.P. problem, mathematical formulation of L.P. Problems, basic assumptions of linear models, graphical solution for L.P. problem, simplex algorithm- degeneracy, alternative optima, unbounded solution and infeasible solution ; duality method of penalty (Big-M), two phase technique , duality and its linear Programming- application, sensitivity analysis , application of simplex techniques to industrial problems Transportation models and optimality conditions unbalance problem & degenerate problem. Assignment models; mathematical formulation method for solutions unbalanced problems, maximization problem, hanger-on method and traveling salesman problem. Use of computer L.P. models.

3. **DECISION THORY & GAMES**

Decision tree, decision under risk, & uncertainty game theory optimal Solution of two person zero sum games, mixed strategies saddle point, algebraic method, method of sub games, graphical method (2xn) & (mx2) game, method of matrices , L.P. method of games, solution of (mxn) game by L.P.

4. **PROJECT PLANNING**

Arrow & network diagrams , critical path, CPM VS PERT, calculations of critical path, determination of floats, crashing the activity, construction of time chart and resource leveling, probability & cost Considerations in project scheduling , up dating and control of project.

5. **QUEUEING THEORY**

Basic elements of queuing model , roles of position and exponible distribution, recognizing queueing process, single queue, simulation of queue (only application of problem).

6. **INTEGER PROGRAMMING**

Use of Integer Programming, Branch and Bound Technique of integer programming.

7. **NON LINEAR PROGRAMMING**

Introduction to non linear problems, Kuhn-Tucker condition for non linear programming, Solution techniques, limitations of non linear programming.

8. **REPLACEMENT ANALYSIS**

Introduction, replacement by alternative equipments, money value changing with time – type replacement problems, Individual and group replacement policy, staffing problems

B. PRACTICAL/ORAL

It shall be based on term work prepared as well as topic area of above syllabus.

C. TERM WORK

It shall be based on major topic areas case problems from industries and some of which should be solved on computer & report should include the computer print outs.

D. REFERENCE BOOKS

1. Fundamentals of Operations Research. By Ackoff and Sesieni.
2. Operation Research. By R.C.Patel & N.R.Dave.
3. Operation Research . by Humdy Taha.
4. Industrial Engineering & Operation Research. By Miller & Schmidt.
5. Operation Research. By Philips.
6. Operation Research & Statistilcal Method. By Manmohan Gupta.
7. Operation Research. By Wagner.

BHAVNAGAR UNIVERSITY
B.E.SEMESTER –VIII PRODUCTION ENGINEERING
P- 806 INDUSTRIAL PROJECT -II

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Marks	Theory Hrs.	Practical /Oral Marks	Term work Marks	Total Marks
**	02	**	**	100	50	150

GENERAL GUIDELINES

Students will undergo at least 6 weeks of Industrial Training during which he will undertake computer based project work in consultation with academic/or industrial tutors or else can under take project work based on questioning techniques and SWOT analysis data obtained from industrial situations.

Tentative areas which may be outlined for project work are as follows:

1. **Production Technology:** Product development, process development, process planning, tooling design, economics of tooling, Effect of process parameters of production technology & its analysis.
2. **Inspection and Quality Control:** Methods of inspection, acceptance sampling design of gauge tolerances & multiple gauging, statistical inference for quality control, Implementation of ISO 9000, and vendor rating.
3. **Plant Layout and Material Handling:** Plant location and layout problems & its analysis, improved layout design, material handling problem and work place layout problem.
4. **Production Planning and Control:** Loading and scheduling analysis line of balance and assembly line balancing, group technology & cell formation and its application in production flow analysis.
5. **Materials Management :** ABC & VED analysis for purchase & purchase function, stores department, stores & stores management, spare parts inventory management, material requirement planning (MRP-I) and material resource planning (MRP-II).
6. **Work Study:** Various charts for work methods, examination of work methods, analysis and improvement of work methods, standard times work system design.

Students shall take up a topic relevant to Production Engineering (as per the list above) in consultation with the faculty member, which should be approved by the Head of the Department. The student will work extensively on the subject to understand, analyze, interpret, synthesize and design the principles, process, and cases if taken up. The work should be started only after defining the problem clearly, deciding the methodology for the approach to work and expected results to be achieved.

TERM WORK

Students shall prepare and submit a work report based on own exposures and experiences during said training / project work. The report should be prepared to the satisfaction of concerned faculty member and should be approved by faculty and Head of the Department before submission.

PRACTICAL / ORAL

Practical oral exam shall be based on above industrial training / project work report submitted.