

**THREE YEAR P.G. DEGREE COURSE IN MASTER OF ENGINEERING (PART TIME)
PRODUCTION TECHNOLOGY & MANAGEMENT**

FIRST SEMESTER

1SPTM1 ADVANCED METAL CUTTING AND WELDING TECH.

Metal cutting theory, nomenclature system, Developments in tool mat Composites. Design of metal cutting tools, single and multiple point cutting tools. Tooling for NC/CNC M/c -consideration and requirements. Non traditional metal shaping processes. Design of drills jigs and fixtures for milling, broaching, turning, welding and assembly.

JOINING OF METALS

Welding-weldability of metals, pre and post treatments of joints, welding defects Advance welding tech., soldering and brazing.

BOOKS RECOMMENDED:

1. Metal cutting theory and cutting tool design-Arshinov(MIR Publications)
2. Mat. and Process in manufacturing-8e, Degarmo E. Paul, J.T. Black (PHI)
3. Processes and mat. of manufacture-ROY A.Lindberg, 4e (PHI)
4. Fundamentals of metal cutting and m/c tools-Juneja (WEL)
5. Metal cutting theory and practice-A.Battacharya (Central book publisher)
6. Tool design - Donaldson, Cyrll Donaldson, G.H.Lecain, Tata Mc Graw Hill.
7. Jigs and fixtures - Kemptser
8. Jigs and fixtures - Grantt
9. Welding Tech. - Little
10. Welding Tech. - O.P.Khanna, S.Chand & Co.

1SPTM2 ADVANCED METAL FORMING & CASTING TECHNOLOGY

Sheet metal working-Shear action in die cutting, Different die cutting operation, die types & applications. Metal flow in forming & drawing dies, Different forming, bending & drawing operations die types & applications Design of press working tools Roll pass design, roll forming, process & design of forging dies, high velocity rate forming, High energy forming, Powder metallurgical technique & powder forming, selection of metal forming process with reference to products & their desired properties Casting processes, classification & comparison based on different criteria, study of recent developments. Solidification of metal in casting, Metallurgical changes, study & analysis as a heat transfer problem . Feeding of casting under gravitational & external forces, design of feeding system. Defects & testing of castings

BOOKS RECOMMENDED:

- 1) Technique of Press Working Sheet Metal- Eary & Reed(PHI)
- 2) Tool Design Donaldson(TMh)
- 3) Tool Design Astmf(PHI)
- 4) Principles of Rolling Burtsev(MIR)
- 5) Forging Die Design Sharan
- 6) Fundamentals of Casting R.A.Flymn
- 7) Principals of Metal Casting Heine Resenthal
- 8) Die Casting Deohler
- 9) Solidification of Casting
- 10) Process & Materials of ManufactureRoy A. Lindberg, 4e (PHI)

1SPTM3 ADVANCED METAL CUTTING AND WELDING TECH.-LAB.

Practicals based on above syllabus.

1SPTM4 ADVANCED METAL FORMING & CASTING TECHNOLOGY-LAB.

Practicals based on above syllabus.

SECOND SEMESTER

2SPTM1 PRODUCTION MANAGEMENT

Generalised model of prod. System, design optimisation and control of prod. System Forecasting types, demand pattern, qualitalive and quantitative forecasting models and applications Aggregate prod. And capacity planning. Master planning scheduling and Rough cut capacity planning Prod. Control functions, loading charts sequensing and scheduling models,expediting functions and short term capacity control. High volume prod. systems-analysis of automated flow lines, assembly systems and line balancing. Mat. Management functions-standardization, simplification and diversification, purchasing functions, inventory controlstatic and dynamic models, objective control, inventory control under inventory.

BOOKS RECOMMENDED

1. Prod. and operations management-Dilworth
2. Prod. and operations management-Adam and Ebert
3. Prod. and operations management-Buffera
4. Automation prod. system and CIM-M.P. Groover, (PHI)
5. Hand book of mat. management-Gopalkrishnan
6. Mat. Management.-procedures, text and cases-A.K.Dutta
7. Prod./Operations management. Roger W.Schmenner
8. P.P.C.-Samuel Eilon

2SPTM2 PRODUCTIVITY AND QUALITY MANAGEMENT

Industrial Inspection I-Design considerations for gauges and measuring instruments. Tolerances for linear dimensions and dimensional chains. Limits Fits and tolerances as per I.S., inspection of threads and gears. Measurement of surface texture etc. Industrial inspection II-Pneumatic gauging, in-process gauging, geometrical and positional tolerances, geometrical and physical limitations in metrology, automated inspection principle and methods, sensor technologies for automated inspections, CMM, flexible inspection systems, inspection probs, machine vision etc. Quality management-Quality of products: meaning of quality, evaluation of total quality control, fundamental factors affecting quality, modern quality problems, total quality systems, quality information feedback, quality training, orientation and work force Development Quality costs: introduction, identifying quality cost items, analysis of quality costs S.Q.C., ISO 9000. Modern approach to productivity improvement: Quality management. Tech, QFD, Taguchi method, Poka Yoke tech., quality philosophies of quality Gurus; Deming Juran, Ishikawa, Croshy, Cmway, total quality management. Self assessment (QMS/A), Kaizen and innovation, Kanban, TPM, SMED,5S. Total factor and partial factor productivity, measurement of productivity, qualitative tech. For improving productivity.

BOOKS RECOMMENDED:

1. Engineering M.Q.C.-I.C. Gupta
2. Quality planning and analysis-Juran, Tata Mc Graw Hill.
3. S.Q.C.-Grant
4. S.Q.C.-Juran
5. Introduction to total quality-David Goetsch and Stanley Devis
6. Automation prod. Systems-Mikell P.Groover, (PHI)
7. Total quality control-A.V.Feigenbann, Mc Graw Hill, 3e
8. Productivity Engineering and Management.-D.J.Sumanth
9. KAIZEN-M.Imai
10. Prod. and operation management-Dilworth
11. Managing for total quality-N.Logothetis
12. Profile of ISO 9000-Bureau of business practice.

2SPTM3 OPERATIONS RESEARCH TECHNIQUES

Linear programming: Formulation of O.R. problems. Simplex method, duality on linear programming, sensitivity analysis, revised simplex method.1 Integer programming, goal programming. Dynamic programming: Characteristics of dynamic programming, stagecoach Problem, capital budgeting problem, salesman problem, production smoothing problem, forward & backward recursion Decision theory: Decision making under uncertainty, Decision making under risk, decision trees, utility theory. Game theory: two person Zero sum games, pure & mixed strategies, dominance, algebraic & graphical methods of solution, linear programming methods to solve mixed strategy games. Simulation: Introduction, formulating & implementing a simulation model, role of random number in simulation, application of simulation to inventory control problems, queuing problems, investment problems, & projecting network problems, role of computers in simulation. Waiting line models Multiple server models (M/M/S)

BOOKS RECOMMENDED:

- 1) Askhedkar R.D. & Kulkarni R.V. : OperationsResearch, Dhanpat Rai & Sons.
- 2) Shenoy G.V. : Linear Programming Methods and Applications, Wiley Eastern Ltd.
- 3) Sharma J.K. : Operations Research Theory & Applications, Macmillan India Ltd.
- 4) Shenoy G.V., Srivastava U.K., Sharma S.C.: Opearions Research & management, Wiley Eastern.
- 5) Hamdy A. Taha : Operations Research, An Introduction, Prentics Hall of India Pvt. Ltd., New Delhi.
- 6) Wagner Harvey M. : Principles of Operations Research with Applications to Managerial Decisions, Prentice Hall of India Pvt. Ltd., 7. Hiller and Liberman : Opearions Research.
- 8) Budnick Frank S., Dennis McLeavey, Richard Mojena : Principles of Opearions Research for Management, Richard D. Irwin Inc.,Homewood Illinois 60430, All India Traveller Bookseller, Delhi. 110 051
- 9) Ravindran, Phillips, Solberg: Oparions Research Principles and Practice, John Wiley & Sons Inc.

- 10) Nair N.G. : Operations Research, Dhanpat Rai & Sons.
 11) Verma A.P. : Operations Research with Numeric Analysis & Statistical Methods., S.K.Katariya & Sons, Delhi. 110 006
 12) Gupta Premkumar, Hira D.S. : Operations Research, S.Chand & Co. Ltd., Ram Nagar, New Delhi. 55
 13) Goel B.S., Mithal S.K. : Operations Research, Pragati Prakashan, Meerut, U.P. (India)

THIRD SEMESTER

3SPTM 1 ERGONOMICS

Introduction : ergonomics and man machine systems. Basic ergonomics, Work psychology and method of measurement of work, Paced & Unpaced performance. Design & selection of displays and controls. Application of anthropometric data and design of work place. Layouts, Environmental studies, industrial safety & training, case studies.

BOOKS RECOMMENDED :

- 1) Ergonomics Design for People at Work, Vol.I & II : Eastman Kodak Co.
- 2) A Guide to the Ergonomics of Manufacturing : Martin Heylander, East West Press, Teylor & Fransis.
- 3) Ergonomics : Man in his Working Environment : K.F.H. Murrel, Chhapman & Hall Ltd., U.S.A.
- 4) Ergonomics at Work : David J.Oborn, John Wiley & Sons, New York.
- 5) Motion & Time Studies : Ralph M.Barnes, John Wiley & Sons.
- 6) Motion & Time Studies : Martin E. Muldel, PHI.
- 7) Hand Book of Industrial Engg. : Gavriel Salvendy, John Wiley & Sons.

3SPTM2 COMPUTER INTEGRATED DESIGN & MANUFACTURING

Evaluation of CAD/CAM, integrated CAD/CAM concept, CAD applications, scope of CIM, geometric modeling, CAD process, concept of concurrent engineering. Numerical control: introduction to NC, CNC, DNC, adaptive control system, constructional and operational features, CNC part programming, and economics of CNC. Introduction to GT,FMS, scope and applications, types and elements of FMS, FMS Layouts. Robotics:Robot characteristics, motions, work space description, Robot applications in CIM. Manufacturing system integration requirements for integrating manufacturing. Systems, CAPP, CAQC and automated mat. Handling systems.

BOOKS RECOMMENDED:

1. Computer integrated design and Manufacturing- David D. Bedworth, M.R. Henderson, Mc Graw Hill International Edition.
2. CAD/CAM Mickell P. Groover, (PHI) 3. Automation prod. Systems and CIM-Mickell P. Groover, (PHI)
4. CAD/CAM-Ibrahim Zeid
5. Computer control and management. Systems-Yoren Koren.

3SPTM 3 ERGONOMICS - LAB.

Practicals/ case studies based on above syllabus.

3SPTM 4 COMPUTER INTEGRATED DESIGN & MANUFACTURING

Practicals/ case studies based on above syllabus.

FOURTH SEMESTER

4SPTM 1 PROCESS ENGINEERING

Process planning/engineering functions, preliminary part print analysis, approaches to process planning, Dimensional analysis, " Theory of dimension chains" Tolerances analysis, Tolerance chart, purpose utilisation. Workpiece control-Equilibrium theories, gauging, classifying operations Selecting and planning manufacturing process; determining manufacturing sequence Selection of equipments, standard and special equipments, classification of tooling Process picture, operation routing, computer aided process planning, structure of CAPP, limitations, process planning system and their selection criteria. Computer aided process planning-structure of CAPP system, limitations of cad based process planning, forward and backward planning, implementation, criteria consideration, process planning system and their selection criteria.

BOOKS RECOMMENDED

1. Process Engineering. for Manufacturing - Eary and Johnson (PHI)
2. Computer Integrated Design and Manufacturing - David D. Bedworth (TMH)
3. Dimensional Control in Precision Manufacturing - Gdzala I.L.

4. Tolerance Control in Design and Manufacturing - Wade O.R.

4 SPTM 2 RESEARCH METHODOLOGY

1) Research concept : process of growth of knowledge, generation/realization of new facts, establishing logic for the generated facts, scope of quantification of cause effect relationship, evolution of hypothesis.

2) Approach of formulation of the research task : literature review, sources discussions, field studies; critical analysis of generated facts, hypothetical proposals for future development, constraints for proposal selection, prioritization.

3) Research approaches : conceptual research, theoretical research, applied research, Experimental research : experimental validation of proposed logic, experimentation to generate design data.

4) Modeling & Simulation : concept of modeling, concept of simulation, types of simulation (quantitative, experimental, computer, fuzzy based, statistical), process of formulation of models based on selected type of simulation.

5) Model Optimization.

6) Formulation of hypothesis.

REFERENCES :

1) T.S.Wilkinson & P.L.Bhandarkar : Methods & Techniques of Social Research, Himalaya Pub., Mumbai.

2) Averill M. Law & W.David Kelton : Simulation, Modeling & Analysis.

3) H.Schenck Jr. : Theories of Engg. Experimentation, McGraw Hill.

4) Montgomery : Design of Experiments.

5) Bart Kasko & Klir : Neural Network & Fuzzy Systems, Prentice Hall.

6) T.J.Roff : Fuzzy Logic with Engg. Application, Tata McGraw Hill.

7) Fuzzy Sets, Uncertainties & Information, Prentice Hall.

8) S.S.Rao : Optimization Theory & Applications, Wiley Eastern.

9) Back Volumes of Journal : Modeling & Simulation, AMSE Press, France.

4SPTM3 ELECTIVE

(1) FACILITY PLANNING

Plant location-major factor influencing the location of an industry choice of site. The big city and small town plant location. Localisation of industries, social and governmental factors in plant location. Decentralisation of industries and self-sufficiency. Industrial housing, discussion on the location of some major plants in India. Plant layout-factors influencing plant layout, balance in departments and operations, production or centers and the work places layout, product or line layout, layout by process or functions, work in progress bank, service centers, tools and techniques used in making layouts, flow diagram, process charts, machine layout, data cards, visual aids such as templates and three dimensional models, layout drawings and lot plans or model of plant, illustrative examples of representative plants in selected industries, factors indicating poor layout, means of securing more floor space. Computer aided layout-planning. Plant building and services sizes and types of factory building and their construction, latest trends in factory building and industrial architecture, building costs of alternate types, scope for expansion lighting, poor ventilation, air-conditioning, dust removal, water, steam, compressed air, industrial waste disposal. Industrial safety engineering-accident prevention, machinery safe guards (mechanical and electrical)- precautions against fire, explosions and health hazards-ventilation and personal protective gear, factories and allied Acts. Material Handling:- importance of proper materials handling in increasing productivity and affecting saving, factors determine the nature of material handling equipment's, the material and its container building characteristics, equipment operating costs, volume of handling activity and annual cost analysis equipment decision, types of handling equipment, maintenance of handling equipment, illustrative examples, design of conveyors, their uses and typical applications, internal and external transportation.

REFERENCES:-

1 Materials Handling- Therodore H.Allegri Sr.

2 Material Handling System Design-James M.Apple

3 Plant Layout & Mat.Handling-Eastman

4 Plant Layout- J.M.Maore

5 Accident Prevention-Henrich

6 Industrial Safety-Black

ELECTIVE

(2) MAINTENANCE & RELIABILITY ENGINEERING

Elements of pneumatic, hydraulic, electrical & electronic control systems. Maintenance of electrical, mechanical drives & systems, std. Maintenance practice & procedures, machine diagnostics, machine condition monitoring and signature analysis. System reliability, availability and maintainability, reliability testing, prediction & improvement, maintenance cost, evaluation of maintenance performance, FMEA, economics of replacement. Maintenance types, work standards, logistic support, organization for maintenance.

BOOKS RECOMMENDED :

1. Maintenance Engineering. Handbook-Higgins
2. Maintenance planning and control-Anthony Kelly
3. Industrial maintenance -H.P.Garg
4. Reliability Engineering - L.S.Srinath
5. Reliability of Engineering Systems -L.Ryabinin
6. Practical Reliability Engineering -Patric D.T. O'Connor
7. The Assurance Science -Halpern.

4SPTM3 ELECTIVE

(3) COMPUTERS IN PRODUCTION MANAGEMENT

Basic concept of data base system, Relational DBMS data structures, normalization, SQL, SQL forms, reports and loader, DBTG, subschema and schemas Concept of DSS, architechure and application. Expert systems development in design and manufacturing, expert system tools. Industrial applications of AI and expert systems

BOOKS RECOMMENDED:

1. Database System Concepts, H.F.Korth, S. Sudarshan, McGraw Hill International Edition.
2. Principles of Data Base Management - Martin, (PHI)
3. Expert system - Shashikumar
4. An Introduction to Database Systems, C.J.Date, Pearson Education.
5. Introduction to Expert System - James P. Nizio
6. Artificial Intelligence - Enaine Rich & Kevin Knight
7. DSS - Spragne (Prentice Hall)
8. DSS - Jayshankar

4SPTM3 ELECTIVE

(4) PLASTIC TECHNOLOGY

New tech. for alloying of polymers, speciality FRP's & composites, Introduction to some advanced plastic alloys & speciality plastics, standard test procedures, testing devices & set-ups for plastics, Recent development in mould processes & equipments. Parameter setting in processing of plastics, achieving quality & productivity in moulding process using techniques such as QMC, Intelligent process control etc. Defect cause analysis & trouble shooting in plastic processing. Computer applications in moulding process. Plastic part design: Part design for various moulding processes. Mat selection, Ribs & undercut design, parting line location, design for service requirements, aesthetics, part design for Thermoforming. Mould design & building: mould/ die design in view of polymer melt flow behavior, mat. Shrinkage property, cooling/heating system design, gutes & flow channel design, parting line layout for split mould collapsible cores, ejector system design, design for QMC/SMED, stack mould design. Computer aided mould design: Introduction to mould design software packages, electronic catalogues. Mould materials, mould building methods, requirements of tool room & shop facilities for in house mould making. Plastic packaging:unit & bulk packaging, outstanding features ofn plastic packaging, Globally & Nationally major emerging areas of use of plastics-medical, automobile, agriculture, Information tech. etc. Joining of plastics: Various welding techniques for plastics, Boss, weld & seal design, adhesive selection for joining plastic parts. Recycling of plastics:various tech., biodegradable plastics, environment protection through plastics, guidelines for processing & use of plastics.

BOOKS RECOMMENDED :

1. Plastic mat. Hand book - Brydson
2. Plastic mat. Hand book, Vol. I & II -A.S.Athaley
3. Plastics-Harry Duboise
4. Simple methods for identification of plastics-Beann(Hanser)
5. Polymer science-Birley/Haworth (Hanser)
6. Designing with plastics-Ethrenstein/Erhard (Hanser)
7. Plastic failure guide-Myer Ezrin (Hanser)
8. Injection moulding-A.S.Athley
9. How To Make Injection Moulds-Menges/Mohren (Hanser)

10. Extrusion dies for plastic & rubber-Michaeli (Hanser)
11. Technology of Thermoforming-James L.Throne (Hanser)
12. Plastics Recycling - Ebric (Hanser)

4SPTM3 ELECTIVE

(5) PRODUCT DESIGN

Finite element analysis (FEA)- Introduction, physical problems, mathematical models & use of finite element solution. Finite element analysis an integral part of computer aided design. Rapid prototyping tech- Stereo-lithography, solid grounded curing, selective laser sintering, fused deposition modeling, 3-dimensional printing, laminated object manufacturing Virtual prototyping physical prototyping v/s. virtual prototyping. Taguchi's concept of product design & quality-Robust design testing, design and analysis of experiments using statistical techniques. An integrated approach for product and process design-Concurrent engineering.Strategies, cost impact of design decision, concurrent engineering. Tools and methods, application of new tools, CIM & concurrent engineering. Quality function deployment(QFD) approach for product design. Virtual manufacturing Introduction to latest product design packages viz Pro-engineer, mechanical desktop, solid works etc.

BOOKS RECOMMENDED

1. Maynards Industrial engineering. Handbook 4th edition-William K Hodson (McGraw Hill)
2. Finite element producers-Klaus-Jurgen Bathe (PHI)
3. Managing for total quality-N. Logothesis (PHI)
4. Product design for manufacturing-A.K.Chitale & R.C.Gupta (PHI)
5. Product design and manufacture-John R Lindbeck
6. Stereo Lithography & other rapid prototyping & manufacturing technologies-Paul F Jacobs (PHI)
7. Assembly automation:The Virtual & Physical manufacturing engineering-Charles J. Cohrad
8. Quality engineering. Using robust design - M.S.Phadake (Prentice Hall)
9. Taguchi system of experiment design-Ed Don Clansing (UNIPUBKRAUS int.pub.)

FIFTH SEMESTER

5 SPTM 1 SEMINAR AND DISSERTATION

SIXTH SEMESTER

6 SPTM 1 SEMINAR AND DISSERTATION
