

S Y L L A B U S

MASTER OF TECHNOLOGY

TWO YEAR INTERGRATED COURSE

M. Tech. Examination, 2014/2015
Mechanical Engineering- (Production & Industrial
Engineering)



JODHPUR NATIONAL UNIVERSITY
JODHPUR

Jodhpur National University, Jodhpur

(c) M. Tech. Programme (**Production & Industrial Engineering**)

Mechanical Engineering

TEACHING/EXAMINATION SCHEME & SYLLABUS

I SEMESTER

Subject Code	Subject	Hrs./ Week				Marks			Exam Hrs	
		L	T	P	Total	Theory\ Practical Exam	Internal Assess- ment	Total		
MME 111	Strategic Management	4	-	-	4	100	50	150	3	
MME 112	Mechanics of Machining	4	-	-	4	100	50	150	3	
MME 113	Advance Operation Research	4	-	-	4	100	50	150	3	
MME 114.1	Elective - I (Any One) Supply Chain Management	4	-	-	4	100	50	150	3	
MME 114.2										Industrial Economics & Budgetary Control
MME 114.3										Facilities Planning & Plant Engg.
MME 114.4										Financial Management
MME 115	Manufacturing Lab	-	-	6	6	50	50	100	3	
	Total	16	-	6	22	450	250	700	15	

II SEMESTER

Subject Code	Subject	Hrs./ Week				Marks			Exam Hrs	
		L	T	P	Total	Theory\ Practical Exam	Internal Assess- ment	Total		
MME 211	Computer Integrated Manufacturing Systems	4	-	-	4	100	50	150	3	
MME 212	Work Study & Ergonomics	4	-	-	4	100	50	150	3	
MME 213	Production & Operations Management	4	-	-	4	100	50	150	3	
MME 214.1	Elective - II (Any One) Powder Metallurgy & Fabrication of Plastic & Composites	4	-	-	4	100	50	150	3	
MME 214.2										Process Planning & Manufacturing Engg.
MME 214.3										Product Development & Industrial Design
MME 214.4										Metrology & Computer Aided Inspection
MME 215	Industrial Engineering Lab	-	-	6	6	50	50	100	3	
	Total	16	-	6	22	450	250	700	15	

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TEACHING/EXAMINATION SCHEME & SYLLABUS

III SEMESTER

Subject Code	Subject	Hrs./ Week				Marks			Exam Hrs
		L	T	P	Total	Theory\ Practical Exam	Internal Assessment	Total	
	Elective -III & IV (Any Two)	4	-	-	4	100	50	150	3
MME 311.1	Total Quality Management	4	-	-	4	100	50	150	3
MME 311.2	Reliability & Maintenance Engineering								
MME 311.3	Project Management								
MME 311.4	Management Information System								
MME 311.5	Environmental Engg. & Energy Management								
MME 311.6	Flexible/Intelligent Manufacturing Systems								
MME 312	SEMINAR (Literature Survey & Presentation)	-	-	-	-	50	50	100	
	Total	8	-	-	8	250	150	400	6

IV SEMESTER

Subject Code	Subject	Hrs./ Week				Marks		
		L	T	P	Total	Theory Practical Exam/ Viva voce	Internal Assessment	Total
MME 411	Dissertation/Industrial Training/Project Work	-	-	-	-	200	-	200
	Total	0	0	-	-	200	-	200

Total Marks: 700+700+400+200 = 2000

I SEMESTER

MME 111 STRATEGIC MANAGEMENT [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150

'Strategic Management' Could Be A Useful Subjects Of 1st Semester Of M-Tech Courses.
'Strategic Management' As Detailed Below Prepares A Young Budding Technocrat To Manage Assets In More Efficient Way And Lead His/Her Team More Effectively.

This Subject Would Cover The Following Issues:-

- A) **Managing Change:** - Effective Change Management Is The Need Of The Hour. Situations Change Rather Fast These Days And Has To Prepare Or Mould His / Her Organization To Face Such Changes And Come Out Winningly.
- B) **Crisis Management:** - Every Organization Or Every Individual Do Face Crisis Many Times. A Good Management Or A Good Leader Keeps Himself / Herself Always Prepare For Such Eventualities. Training In This Area Has Often Been Neglected.
- C) **Innovation And Creativity:** - Human Brain Is Very Creative. Creative Thinking Is A Must For The Fast Changing World. Creative Things Results In Innovation And New Finds. Creativity Could Be Developed In A Positive Sense By Training.
- D) **Entrepreneurship:** - Young Budding Technocrats Need Encouragement For Creating Small/Medium Size Organizations. Sessions On This Subject From Industry Leaders Will Help In It.
- E) **Work Study And Re-Engineering:-** Re-Engineering Is Term Used These Days In Place Of Old Terms 'Work Study' Re-Engineering Is Needed Not Only For The Product But Also For The Processes As Well As For The 'Organization'.
- F) **Managing Intangibles:** - An Organization Have (I) Tangibles Assets Like Machines, Material Etc. And Also (Ii) Intangibles Assets Like Staff, Line Managers Etc. Managing 'People' Or Rather 'Leading' People Needs To Be Taught To Young Engineers.
- G) **Communication Skills:** - We Expect Our Managers To Lead Their Terms. For This Communication Skill Is A Must. This Could Be Covered In Class Room Sessions Along With Practice Sessions In Groups Under The Supervision Of A Teacher.
- H) **Quality And Customers Care:** - ISO-9000 Has Become A Hallmark For Quality. This Can Cover Pre-Requisites For An Organization And How To Go About For Getting ISO-9000 Certification.
- I) **Safety And Ergonomics:** - Safety Is Often Talked About But Not Cared For To That Extent Ergonomics Is Even Less Known. Technocrats Need To Know More About Safety And Ergonomics.

TEXT BOOKS:

- 1.Rehfeld, J.E. Alchemy of a Leader: Combining Western and Japanese Management skills to transform your company, John Whily & Sons, New York.1994
- 2.Buzzell, R. and Gale, B. The PIMS Principles: Linking Strategy to Performance, Free Press, New York, 1987.

MME 112**Mechanics of Machining****[4-0-0]****EXAM HRS: - 3****M.M:- 100+50=150****1. Mechanics of Machining**

Introduction to metal cutting; Geometry of single point cutting tool; Tool angle specification systems (BS, ASA, DIN & ISO) Conversion of rake angle system to normal rake system; oblique cutting and orthogonal cutting systems; Types of chip forms, chip breakers; Mechanism or geometry of chip formation; Determination of shear angle; uncut chip thickness ratio; forces on chip (Merchant forces circle); velocity relationship; stress and strain in chip; theories on mechanism of metal cutting: Merchant's model for orthogonal cutting; Lee and shaffer theory; Palmer and Oxley theory; (Numerical parables where required.)

2.Theory of machineability : Tool wear; Tool life & machine ability; Introduction; Evaluation of machineability; Types of tool wear (Crater wear & flank wear) Tool wear equation: variable effecting Tool life. Tool life equation. Tool life-Test; cutting forces & power consumption; Economics of metal cutting, universal machine ability index. (Numerical problems where required.)

3.Thermal aspects and Cutting fluids: Introduction, shear plane temperature in orthogonal cutting; Techniques for measurement of chip – tool interface temperate function of cutting fluids, action of cutting fluids, Requirements of cutting fluids, Types of cutting fluids, selection of cutting fluids, cutting fluids & tool life methods of application of cutting fluids.

4.Abrasive machining Process: Classification of grinding processes: Characteristics of the grinding wheel ; Grinding wheel grade; grinding wheel structure standard marking for grinding wheel, mechanics of grinding operation, grinding wheel wear,Thermal aspect of grinding; cutting fluid for grinding, economics of grinding , effects of grinding parameter on grinding wheel performance; Lapping; honning & super finishing.

5.Surface finishing & surface integrity: Introduction, Surface finish, Effect of machining parameter on surface finish, measure of surface roughness; specification of surface roughness, expression for surface roughness in machining. With single point cutting tool, Roughness specification, measurement of surface roughness. Cost of surface finish, surface integrity, importance of surface integrity. Methods for improving surface integrity.

References books:

- (i) Fundamental of Metal cutting & Machine Tool. By B. L. Juneja, G. S. Sekhar
- (ii) Production Engineering & Science. By P. C. Pandey & C K Singh
- (iii)Production Engineering. By P. C. Sharma

1. Linear Programming: Revised simplex, duality theorems, dual simplex bounded variables, sensitivity analysis, programming, goal, programming – formulation programming.
2. Integer Programming – Fractional cutting plane algorithm, branch and bound algorithm.
3. Dynamic Programming: Recursive relationship, principle of optimality.
4. Queuing Models – single and multiple channels, finite and infinite queue sizes, finite and infinite population, erlang distribution, machine repairs problems.
5. Monte Carlo Simulation – Application to queuing and inventory problems.

REFERENCES:

1. Handy M. Taha, Operations Research, An introduction, 6th Prentice Hall of India, New Delhi, 2001
M.Tech. (Industrial Engineering)
Department Production Engineering, National Institute of Technology, Tiruchirappalli – 620 015.
2. Don. T. Philips, A.Ravindram and J. Soleberg, Operations Research, Principles & Practice, John Wiley & sons, 1992.
3. Panneerselvam ,R, "Operations Research", Prentice – Hall of India, New Delhi, 2002

1. Strategic Framework of a Supply Chain – Meaning, scope and performance of a supply chain, supply chain drivers and obstacles, demand forecasting and aggregate planning in a supply chain.
2. Planning and Managing Inventories – Managing economies of scale through cycle inventory, managing uncertainty through safety inventory, determining optimum level of product availability.
3. Transportation Logistics in a Supply Chain – Network design and information technology in a supply chain.
4. Co-ordination in a Supply Chain – Role of e-business in a supply chain.
5. Financial Evaluation – Factors influencing supply chain decisions.

REFERENCE BOOKS:

1. Hand Field Robert B., Nichols Jr., Ernest L., "Introduction to supply chain management". Prentice Hall, New Jersey, 1999.
2. Sunil Chopra, Peter Meindl, "Supply Chain Management", Pearson Education, 2001.
3. Roberta S. Russell, Bernard W. Taylor III, Operations Management, PHI, 2003.

1. Some Fundamental Concepts of Industrial Economics: Incremental concept, concept of time perspective, discounting principle opportunity cost concept. Equimarginal. Principal, contribution concept. Demand analysis and Revenue Function, Basic theory of demand, Market structure, Other influences on demand elasticities and demand level.
2. Short Run cost Analysis: Classification of costs, Accounting cost and economic costs, theoretical cost functions, break even charts. Long Run Analysis Economics of Plant replacement, Economic analysis in plant selection and in manufacturing.
3. Pricing: Traditional micro price theory and its limitations Incremental reasoning in pricing. Financial Accountancy Basic concepts of financial accounting, valuation of assets and depreciation.
4. Financing Statement analysis and Budgeting Control: Fund flow statements for control of cost accounting, cost accounting for control, control compels, Controllable costs; direct costing, composition of actual and direct material costs; overheads.
5. Budgeting Costs; Types of budgets, Alternative course of action and decision making, planning capital acquisitions.

Textbooks:

1. James L. Riggs. "Engineering Economics". McGraw Hill Book Company, 1997.
2. Prasanna Chandra, "Projects – Preparation, Appraisal and Implementation". Tata McGraw hill, New Delhi. 1988.

Reference: -

1. Norman N Barish "Economics Analysis for Engineering and Managerial Decision Making", McGraw Hill Book Company, 1983.
2. Leland T. Blank, Anthony J. Tarquin, "Engineering Economy" McGraw Hill Book Company, 1988
3. John A. White et. Al, "Principles of Engineering Economic Analysis", John Wiley & Sons, New York, 1998.

1. Plant Location: Planning for physical facilities. Definition, scope, Importance, objective, functions of plant location, facility design and productivity. Governing factors, theories and procedure for plant location.
2. Plant Layout – Information required for layout planning, governing factors: man, material, machine and equipment, ancillary service, safety, storage. Procedure for development of optimum layout.
3. Types of layout: product, process, fixed, cellular, their characteristics, advantages and limitation.

Analysis of Material Flow – Need for analysis of material flow, use of various process charts, multi-product chart, assembly chart, flow diagram, string diagram, activity relationship chart, travel and load charts, etc.

4. Revision, Evaluation and Instillation of Layout-Computer Software for Layout.
- 5 Material Handling Principles and advantage of good material handling system and integration with plant layout. Selection of material. Handling equipments.

REFERENCES

1. Tompkins, J.A. and J.A. White, Facilities planning, John Wiley, 1984.
2. Richard Francis, L. and John A. White, Facilities layout and location, an analytical approach, Prentice Hall Inc 1984.
3. James Apple. M., Plant layout and Material handling, John Wiley, 1977.

MME 114.4 Financial Management [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150

1. **Goals:** Financial management of business enterprises with emphasis on financial analysis, working with capital management, short and long term financing, capital budgeting, cost of capital, Financial statement interpretation through use of ratios, comparisons, budgets, trend percentages, industry standards, cash statements and income analysis.
2. **Goals and functions of finance:** Evolution of finance, objectives of the firm, functions of finance.
3. **Principles of capital budgeting:** Basics of capital budgeting decision, evaluation of proposals, capital discounting and non-discounting based methods.
4. **Working capital management:** Definition and importance of working capital, factors affecting working capital, inventory management, introduction to cash and receivables management.
5. **Sources of finance:** Sources of long term finance, financial instruments, financing institutions, schemes, lease financing.
6. **Capital structure:** Capital structure of a firm, factors affecting the capital structure, optimal capital structure, cost of capital

Reference: -

1. Khan & Jain, "Financial Management", 3rd ed., TMH
2. Prasanna Chandra, "Financial Management", 3rd ed., TMH
3. Allen C. Shapiro, "Modern Corporate Finance", Max well Macmillan
4. Brealey & Onyers, "Principles of Corporate Finance", McGraw Hill
5. Pandey I. M., "Financial Management", Vikas Publishers

MME 115 Manufacturing Lab [0-0-6] EXAM HRS: - 3
M.M:- 50+50=100

(Based on assignment approach relative to subject.)

II SEMESTER

MME 211 Computer Integrated Manufacturing Systems [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150

1. Introduction-Elements of computer Aided Manufacturing, fundamentals of Numerical Control (NC), basic concepts, point to point systems, straight line and contouring system, numerical control components.
2. Computer Numerical Control (CNC), Direct Numerical Control (DNC), functions of Machine Control Unit (MCU), PPT, paraxial and contouring system, coordinate systems, zero offset, tool compensation, Adaptive control strategies in NC machining
3. NC part programming-Manual part programming: tape formats, G & M codes, canned cycles; computer assisted part programming (APT), subroutines, post processor.
4. Machining centres-ATC, AGV, CAI, Computer Added Process planning, GT
5. Recent trends - Computer Integrated Manufacturing (CIM), FMS, robots: basic configuration and industrial application

Text Books:

- 1)S Kant Vajpayee, Principles of computer integrated manufacturing, Prentice hall of india, 2003
- 2)Sadhu singh, Computer Aided Design and Manufacturing, Kanna Publishers, Delhi
- 3)P Radhakrishnan & C.P.Kothanda Raman, Computer graphics and design
- 4)Surender Kumar and A.K.Jha, CAD/CAM, Dhanpat Raj and Co., Delhi.

References:

- 1)Tien-Chien Chang, Richard A.Wysk and Hsu-Pin Wang, Computer Aided Manufacturing, Prentice Hall International, Inc.
- 2)Mikell P. Groover, Automation production systems and computer integrated manufacturing, Prentice hall of india, New Delhi, 2003
- 3)M P Groover and E W Zimmers, CAD/CAM, Prentice hall of india,1984

MME 212 Work Study & Ergonomics [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150

1. Productivity- Introduction meaning, measurement indices, governing factors, improvement methods.
2. Methods Study- Recording, analysis and evaluation of processes and operations, charts, graphs, diagrams, micro motion and memo motion study

3. Work Measurement- Stop watch time study, performance rating, allowances, normal time, standard time, work sampling.
4. Pre-determined Time system- Work Factors system, Methods Time Measurement (MTM), Basic Motion studies, Standard data system, elementary concept of MOST.
5. Ergonomics- Physiological aspects of work design, job design, work place design, tool design, learning curves.

Text Books:

1. Work study & Ergonomics by S Dalela & S Dalela
2. Industrial Engg. & production management by M T Teslang
3. Text book of work study by O P khanna

MME 213 Production & Operation Management [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150

1. Production Function system concept: inputs, outputs, feedback control mechanism, environmental factors, productivity, decision making, historical development. Production system: types and their characteristics; demand forecasting.
2. Mass Production – Assembly line balancing, balance of line.
3. Batch processing – Determination of batch/lot size, aggregate production planning, master production scheduling, material requirement planning, capacity requirement planning.
4. Job-shop Production – Scheduling strategies and heuristics.
5. Project Management – Project scheduling techniques CPM/PERT, resource leveling and allocation.

MME 214.1 Powder Metallurgy & Fabrication of Plastic & Composites
[4-0-0] EXAM HRS: - 3
M.M:- 100+50=150

1. Powder Metallurgy: Introduction, Powder manufacturing method; Blending of metal powder; Compacting; Sintering; finishing operation; Injection Moulding; Hot Isostatics pressing. Properties of P/M products; Advantages, disadvantages and application of powder metallurgy; Design consideration for powder metallurgy.
2. Processing of Plastics: Definition of plastics, classification of plastics, characteristics of plastics; Compounding materials; fiber glass reinforce plastics, Processing of plastics: compression moulding , Transfer moulding , injection moulding ; Expandable moulding ; Blow moulding Extrusion, Thermoforming; Calendering.

3. Ceramics & Composites materials. Introduction for ceramics, classification of ceramics, Advantages of ceramics, application of ceramics, properties of ceramics material, structure of crystalline ceramics, Silicate structure. Processing of ceramics, Introduction for composite materials, classification of composite materials: Particle reinforced, fiber reinforced, & structural composites. Production of composite structure.

Reference books :

- (i) Materials & Processing in manufacturing. By E. Paud Degarmo.
- (ii) Manufacturing Technology. By R. K. Rajput
- (iii) Powder Metallurgy. By A K Singh.
- (iv) Engg. Metal by Kenneth g. budinski

**MME 214.2 Process Planning & Manufacturing Engg. [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150**

1. Production Planning: planning horizons, product exploring, Make and buy decisions, operations planning demand forecasting, conversion of forecast into production goal.
2. Routing and Scheduling: Preparation route sheets. Master route sheets. Scheduling orders and products operation sequencing and balancing. Scheduling for mass production and job order production.
3. Inventory Systems: Cost factors relevant to operations and inventory control, EOQ with shortages and Uniform Productions, quantity discount, Uncertainty; Inter-relationship of operations and inventory control of maintenance and repair items.
4. Project Planning and Control: Network control, control cost considerations and optimization, Resource allocation and leveling. Dispatching and follow up as production control procedures.
5. Aggregate Production Planning Models: Criteria for effectiveness, decision rules. Organization and Documentation for P.P.O. performance reporting.

**MME 214.3 Product Development & Industrial Design [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150**

1. General design situation, specifying design requirements, spectra of requirements for products, data collection and methods of analysis, designing for basic function and value aspects.
2. Designing for Use: Ergonomic and safety considerations in product design, prevention of misuse.
3. Review of product design from manufacturing point of view, Designing for maintenance.

4. Aesthetic Considerations in Product Development: Basic concepts, perception, Line, form and colour. Importance of Graphic/surface treatment, style, components of style.
5. Industrial Design: A comprehensive approach case studies.

**MME 214.4 Metrology & Computer Aided Inspection [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150**

1. Metrological concepts – Concept of accuracy, Need for high precision measurement associated with high precision measurements. Accuracy of numerical control system, Inaccuracy due to thermal aspects,
2. Detailed surface roughness concept, Dimensioning & Dimensional chains, Surface and form metrology flatness, roughness, waviness cylindricity, etc.,
3. Methods of improving accuracy & surface finish, Influence of forced vibration on accuracy, Dimensional wear of cutting tools and its influences on accuracy.
4. Standards for length measurement standards and their calibration - Light interference - Method of coincidence - Measurement errors. Various tolerances and their specifications, gauging assembly, comparators. Angular measurements - principles and instrument measurements.
5. Computer Aided Metrology - Principles and interfacing, soft metrology - Application of lasers in precision measurements- laser interface, laser scanners, Coordinate measurement machine (CMM),
6. Type of CMM & applications, Non contact CMM, Electro optical sensors for dimension, contact sensors for surface finish measurements. Image processing and its Metrology. Acoustical measurements, Digital techniques in mechanical measurements, Assessing and presenting experimental DATA.

Reference: -

1. ASME - Hand book of Industrial Metrology
2. Hume - Metrology, McDonald
3. Sharpe - Metrology, ELBS
4. Taher - Metrology, ELBS
5. Ted Busch - Fundamentals of Dimensional Metrology, 3rd Edition, Delmar Publishers

**MME 215 Industrial Engineering Lab [0-0-6] EXAM HRS: - 3
M.M:- 50+50=100**

(Based on assignment approach relative to subject.)

III SEMESTER

**MME 311.1 Total Quality Management [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150**

1. Evolution of 'Quality' as a strategy – Defining quality – Philosophies of quality 'gurus' and experts. The basic concepts of 'Total Quality Management (TQM)', TQM as a business strategy.
2. Measures of quality – quality process and quality product – Cost of quality – direct costs & indirect costs – 'defectives' and its significance. Traditional model and emerging model of 'cost-of-quality.'
3. Basic tools – seven tools graphical tools & diagrams, analysis of data using statistical techniques. Statistical Process Control – control charts and use of probability distributions.
4. Advanced – Enhancing the seven step method, process capability and six-sigma. Quality, Taguchi's loss function, Continuous Improvement.
5. QFD and the house of quality. Application of TQM – in manufacturing industry and service industry.

Reference: -

1. The Essence of Total Quality Management - Bank J; Prentice Hall
2. Managing Quality - Dale B.G. Prentice Hall
3. Total Quality Management 1st Edition, Excel Books, New Delhi.

**MME 311.2 Reliability & Maintenance Engg. [4-0-0] EXAM HRS: - 3
M.M:- 100+50=150**

1. Various Concepts in Maintenance: Preventive Breakdown and corrective Maintenance policies.
2. Generalized Replacement Model.
3. Concepts of Reliability: Queue theoretic and reliability theoretical approach to maintenance planning.
4. Relevant Costs of Maintenance: Spare parts, Inventory control.
5. Management information systems for maintenance

Textbook: -

1. Rowland Caplan, "A Practical Approach to Reliability", 1982

References: -

1. Govil A. K., "Reliability Engineering", 1989.
2. Carter A. D. S. "Mechanical Reliability", 1989.

MME 311.3

Project Management

[4-0-0]

EXAM HRS: - 3
M.M:- 100+50=150

- 1. Project feasibility Analysis-** Marketing, Technical, and financial feasibility's- report preparation-case studies.
- 2. Project Management-** nature and scope- PERT and CPM techniques, Estimates-time, cost, resources (man, material, tool).
- 3. Forecasting Methods-**Time series analysis-method of least square, moving average, curvilinear, and correlation analysis.
- 4. Risk Analysis-**risk in economic analysis-measuring risk in investment; risk profiles, decision trees, formulation of discounted decision trees, simulation.
- 5. Reports:** Daily reports for completed activity, lagging activities, overall progress review, Management high-level reports, individual Departmental reports.

Reference: -

1. Courter, Mastering MS Project 2000, BPB Publishers.
2. Harvey Maylor, Project Management, Pearson Education.
3. PrasannaChandra, Project Management, Tata McGraw Hill.
4. Prasanna Chandra, Projects, Tata McGraw Hill.

MME 311.4

Management Information System

[4-0-0]

EXAM HRS: - 3
M.M:- 100+50=150

1. Role of Management Information system in industry.
2. Systems Approach to Management Information system, Information systems for functional operations, Assessing information needs.
3. Design of integrated management information systems.
4. Choice of hardware and software data processing systems.
5. Implementation and evaluation of management information systems in manufacturing industry.

References:

- 1) Jerome Kanter – Managing with Information
- 2) Gordon B. Davis and Alson – Management Information Systems
- 3) Robert C Murdick Joel E Ross and James R Clagget – Information Systems for Modern management
- 4) Henry c Lucas Jr. – The Analysis Design and Implementation of Management Information Systems.
- 5) Kickson and Wheterbe – Management Information Systems.

1. Energy Engineering- World energy outlook. Application of Non Conventional and Renewable Energy Systems - Use of Energy Efficient Technologies -Solar energy –solar energy collectors and energy storage-applications of solar energy. Wind energy-basic components of a wind energy conversion system-performance of wind machines-applications of wind energy. Energy from biomass – biomass conversion technologies-types of biogas plants-Energy conservation schemes-case studies.
2. Electrical system optimization-Importance of power factor-Power factor correction-Energy efficient motors –lighting basics-energy efficient light sources-domestic, commercial or industrial lighting. Energy conservation in lighting schemes-case studies.
Energy conservation in HVAC system, energy conservation by cogeneration scheme-boiler efficiency improvement-waste heat recovery –case studies
3. Energy economics-payback analysis-energy auditing and accounting-types-energy use profiles-the energy survey-Sankey diagram for energy audit- Energy Audit Instruments- Thermal Energy Efficiency & Audits - Electrical Energy Efficiency - Audits -case studies
Energy management- Maintenance management-Preventive maintenance schedule-Energy management organization.
4. Energy and Environment. Environmental aspects of energy utilization-public health issues related to environmental pollution. Methods to measure pollution in industries-air pollution & water pollution. Compliance with standards-International Environmental Policy. Energy recovery by solid waste management. Environmental auditing-case studies.

References:

1. A.P.E.Thumann, Fundamentals of Energy, Engineering,Prentice Hall,1984.
2. A.P.E.Thumann, Plant Engineers and Managers Guide to Energy Conservation, 7e,UNR,1977.
3. W.F.Kenney, Energy Conservation in the Process Industries, Academic press,1984
4. M.H.Chiyogioji, Industrial Energy Conservation, Marcel Dekker,1979
5. C.B. Smith, Energy Management Principles, Pergamon Press, New York, 1981.
6. Amit Tyagi, Handbook on Energy Audit and Management, TERI, New Delhi, 2000
7. Environmental Considerations in Energy Development, Asian Development Bank (ADB) publication,Manila, 1991

1. Group technology(GT); Role of GT in computer aided manufacturing(CAM), Impact of GT on system performance, Method of developing part families , classification and coding, Mono code, poly code, mixed code, opitz part coding system, hierarchical cluster algorithm, economics of GT.

2. Cellular manufacturing; Pull production- kanban system ,push production, work cell concepts, work cell applications, work cell design, linked work cell and sub-cell, work cell time, staffing work cell, equipment issues, issues in implementing cellular manufacturing.
3. Process planning; process planning for parts, preparation of route sheet, process planning for assemblies, draw backs of manual process planning, computer aided process planning(CAPP), approaches to computer aided process planning, variant and generative approach, process planning system, criteria for selecting a CAPP system , implementation issues, .
4. Flexible manufacturing system (FMS) and Flexible manufacturing cell (FMC); Types of FMS, advantages of flexible automation, components of FMS, work station, material handling and storage system, FMS layout configuration- inline, loop , ladder, open field, robot centered cell, FMS planning and design issues, FMS operational issues, bottle neck model.

References:

1. David .D.Bedworth, Mark.R.Hederson and Philip. M. wolfed, Computer integrated design and manufacturing ,McGraw hill international edition.
2. Mikell .P. Groover, Automation, Production systems and Computer integrated manufacturing, Prentice hall of India private limited.
3. John Nicholas, Competitive manufacturing management- continues improvement, lean production and customer focused qualities, McGraw-Hill international editions.
4. Tien – Cheng, Richared A Wysk and Hsu-pin Wang, Computer aided manufacturing, Prentice hall international ,Inc.

MME 312

SEMINAR

M.M:- 50+50=100

IV SEMESTER

MME 411

DESSERTATION

M.M:- 200