EIGHTH SEMESTER

Course Title	L	P	M
THEORY			
Total Quality Management	4	0	100
Automobile Engineering	4	0	100
Elective - IV	4	0	100
PRACTICAL			
Project Work and Viva Voice	0	18	200

TOTAL QUALITY MANAGEMENT

1. INTRODUCTION **9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs – Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES **9**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

3. STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS **9**

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

5. QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

Total hours: 45

TEXT BOOK:

1. Dale H.Besterfiled, et at., Total Quality Management, Pearson Education Asia, 1999. (Indian reprint 2002).

REFERENCES:

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.

ELECTIVE - IV
TECHNOLOGY MANAGEMENT

1. INTRODUCTION **9**

Introduction to technology Management - Environment of Business - Technological changes – Productivity Management - Cultural Impact on Management & Technology - Japanese Management Practices.

2. MANAGING WORLD ECONOMIC CHANGE **9**

Concepts for Managing change - The global environment - Domestic sources of multi national behaviour- Multi national strategies - Economic cycles and Direct Investment.

3. ENTREPRENEURSHIP, CREATIVITY & ORGANISATION **9**

Managing creativity - A perspective on Entrepreneurship creating Effective work groups-understanding self and other people at work -Stress Strain Management - time Management - Strategic management-Innovation Management.

4. INFORMATION TECHNOLOGY IN BUSINESS **9**

Technical foundation - Building information systems - Management organisational support system-Managing Information Systems.

5. MATERIALS MANAGEMENT & PORTFOLIO MANAGEMENT **9**

Micro and Macro Level - Systems Approach-materials-Planing-ABC Analysis -SQC-Incoming material control- Kaizan and 5's - International Buying and Import purchasing practice and procedures-Just in time. Maintenance measurement. Introduction to securities-Risk and return-Economic analysis-Industry analysis-Technical analysis-Portfolio selection-Managing portfolio and performance measurement.

Total hours: 45

TEXT BOOKS:

1. Kenneth C.Lauden, " MIS Organisation & Technology ", Prentice hall, 1995.
2. James A Senn, " Information Technology in Business ", Prentice hall, 1995.
3. Joseph M. Putti, " Management - A Functional Approach ", McGraw-Hill, 1997.

REFERENCES:

1. Ronald J.Jordan, " Security analysis and Portfolio Management ", Prentice Hall, 1995.
2. Irvin M.Robin, " Organisational Behaviour - An Experimental Approach ", prentice Hall, 1995.
3. A.K.Datta, " Materials Management ", Prentice Hall, 1998.

INFORMATION TECHNOLOGY

1. INTRODUCTION **9**

Data-Information-Knowledge-Concepts of Database Design and Architecture-Commercial and Engineering Database.

2. COMPUTER HARDWARE AND SOFTWARE **9**

Mother Board-Memory Devices-Bus-Ports and Peripherals-i/o Devices-PC and Work stations-Foundations of Operating System and its level of Abstraction-Compilers-Interrupt Services-Applications Software - Elements of Visual Programming - Concepts, Components and formats of Multimedia-Principles of Virtual Reality.

3. SOFTWARE ENGINEERING AND QUALITY CONTROL **9**

Introduction-Principles and Requirements-Planning-Cost Estimation-Design Concepts-Modularisation-Notation – Implementation – Verification – Manintenance - Software quality management, ISO and CMM.

4. NETWORKS AND COMMUNICATION **9**

Introduction to Computer Networks-Layered Architecture-Data Communication Concepts – Transmission Media and Topologies-Internetworking Issues-Internet-TCP/IP Protocols and WWW.

5. APPLICATION OF INFORMATION TECHNOLOGY IN MECHANICAL ENGINEERING **9**

IT applications in Design, Materials, Manufacturing, Automation, Controls, Energy and Industrial Management.

Total hours: 45

REFERENCES:

1. Wing Toy benjamin Zee, " Computer hardware/software arichtecture ", Prentice Hall of India,1992.
2. Caralo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, " Fundamentals of software engineering ", Prentice Hall of India, 1998.
3. Andrew S. Tanenbaum, " Computer Networks ", Prentice Hall of India, 1996.

WASTE HEAT RECOVERY AND CO-GENERATION

1. INTRODUCTION:
9

Source and utilization of waste heat, thermodynamic analysis - Second law and waste heat, Recovery of waste heat engines and other power plants -Heat pump for waste heat recovery.

2. DESIGN OF WASTE HEAT RECOVERY SYSTEMS:
9

Design of waste heat recovery system - Heat exchanger - Theory and design. Organic fluid systems – Analysis and design.

3. COGENERATION PRINCIPLES:
9

Cogeneration principles and thermodynamics power cycle analysis, combined for power generation and process heat.

4. APPLICATIONS OF COGENERATION:
9

Applications in sugar mills rice mills, texitle factories, and other process and engineering industries.

5. COST ANALYSIS OF COGENERATION SYSTEMS:
9

Financial considerations, operating and maintenance cost, investment costs of waste heat recovery and cogeneration system, environmental and air quality consideration.

Total hours: 45

TEXT BOOKS:

1. Charles H.Butler, " Cogeneration ", (1984), Mc Graw Hill Book Co.
2. Goldstick R., et.al., " Principles of Waste Heat Recovery ", (1986), The Fairment Press, Inc., Georgia.

REFERENCES:

1. Kiang Y.H., " Waste Utilization Technology ", (1981), Maecel Dekker Inc.
2. David Hu and Gerald Hrd, " Waste recycling for Energy Conservation ", (1981), John Wiley and Sons, New York.
3. Sydney Reiter, " Industrial and Commercial Heat Recovery Systems ", (1985),Van Nostrand Reinhold.
4. Spiewak Scott A, " Cogeneration and Small Power Production Manual ", (1987), The Fairment Press.
5. Nelson E, Hay, " Guide to Natural Gas Cogeneration ", (1980), The Fairment Press Inc.

WIND AND SOLAR POWER ENGINEERING

1. PRINCIPLE OF SOLAR RADIATION
9

Solar Radiation - Empirical Equations - Solar Chart - Measurements of Solar Radiation and Sunshine – Solar Radiation Data.

2. SOLAR THERMAL ENERGY CONVERSION
9

Solar Thermal Collectors - Flat Plate and Concentrating Collectors - Solar Heating and Cooling Techniques - Solar Desalination - Solar Pond - Industrial Process Heat - Solar Thermal Power Plant - Solar Thermal Energy Storage.

3. SOLAR PHOTO VOLTAICS
9

Introduction - Fundamentals of photo Voltaic Conversion - Solar Cells - PV Systems - PV Applications.

4. WIND ENERGY
9

Wind Data and Energy Estimation - Wind Energy Conversion Systems - Wind Energy Collectors and its Performance - Wind Energy Storage - Applications of Wind Energy - Safety and Environmental Aspects.

5. ECONOMIC ANALYSIS
9

Introduction - Net present value concept - Life cycle cost method - Cost benefit comparison method – Payback method.

Total hours: 45

TEXT BOOKS:

1. WS.P. Suknofme, "Solar Energy Principle of Thermal Collection and Storage ", (1997), Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
2. G.D.Rai, " Non Conventional Energy Sources ", (1999), Khanna Publishers, New Delhi.

REFERENCES:

1. H.P.Garg and J.Prakash, " Solar Energy, Fundamentals and Applications " (1997), Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. B.S.Magal, " Solar Power Engineering " (1993), Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. J.R.Howell, R.B.Bannerot and G.C.Vtiet, " Solar Thermal Systems ", (1982), Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
4. J.A.Duffie and W.A.Beckman, " Solar Engineering of Thermal Process " (1991), John Wiley, New York.

5. Golding E.W. " The Generation of Electricity by Wind Power ", (1976), E and F N Spon Ltd., London.
6. Le Gourieres D., " Wind Power Plant, Theory and Design ", (1982), Pergamon Press, France.

DESIGN FOR MANUFACTURE

1. DFMN APPROACH AND PROCESS

9

Methodologies and tools, design axioms, design for assembly and evaluation, minimum part assessment taquchi method, robustness assessment, manufacturing process rules, designer's tool kit, Computer Aided group process rules, designer's tool kit, Computer Aided group Technology, failure mode effective analysis, Value Analysis. Design for minimum number of parts, development of modular design, minimising part variations, design of parts to be multi-functional, multi-use, ease of fabrication, Poka Yoka principles.

2. GEOMETRIC ANALYSIS

9

Process capability, feature tolerance, geometric tolerance, surface finish, review of relationship between attainable tolerence grades and difference machining processes. Analysis of tapers, screw threads, applying probability to tolerences.

3. FORM DESIGN OF CASTINGS AND WELDMENTS

9

Redesign of castings based on parting line considerations, minimising core requirements, redesigning cast members using weldments, use of welding symbols.

4. MECHANICAL ASSEMBLY

9

Selective assembly, deciding the number of groups, control of axial play, examples, grouped datum systems - different types, geometric analysis and applications-design features to facilitate automated assembly.

5. TRUE POSITION THEORY

9

Virtual size concept, floating and fixed fasterners, projected tolerance zone, assembly with gasket, zero true position tolerance, functional gauges, paper layout gauging, examples. Operation sequence for typical shaft type of components. Prepration of process drawings for different operations, tolerence worksheets and centrality analysis, examples.

Total hours: 45

TEXT BOOKS:

1. Harry Peck, "Designing for Manufacture ", Pitman Publications, 1983.
2. Matousek, "Engineering Design, - A Systematic Approach" - Blackie & Son Ltd., London, 1974.

REFERENCES:

1. Sports M.F.., " Dimensioning and Tolerence for Quantity Production ", Prentice Hall Inc., 1983.
2. Oliver R. Wade, " Tolerence Control in Design and Manufacturing ", Industrial Press Inc. New York Publications, 1967
3. James G. Bralla, " Hand Book of Product Design for Manufacturing ", McGraw Hill Publications, 1983.
4. Trucks H.E., " Design for Economic Production ", Society of Manufacturing Engineers, michigan, 2nd edition, 1987.

DESIGN OF HEAT EXCHANGERS

1. CONSTRUCTION DETAILS AND HEAT TRANSFER 9

Types, Shell and Tube Heat Exchangers, Regenerators and Recuperators, Industrial applications.
Temperature distribution and its implications, LMTD, Effectiveness.

2. FLOW DISTRIBUTION AND STRESS ANALYSIS 9

Effect of Turbulence, Friction factor, Pressure loss, Channel divergence. Thermal Stress in tubes, Types of failures.

3. DESIGN ASPECTS 9

Heat Transfer and pressure loss, Flow Configuration, Effect of Baffles, effect of Deviations from ideality, Design of Typical liquid, Gas-Gas-Liquid Heat Exchangers, Plate Heat Exchangers.

4. CONDENSORS AND EVAPORATORS DESIGN 9

Design of Surface and Evaporative Condensors, Design of Shell and Tube, Plate type evaporators.

5. COOLING TOWERS 9

Packings, Spray design, Selection of pumps, Fans and Pipes, Testing and Maintenance, Experimental Methods.

Total hours: 45

TEXT BOOK:

1. D.Q.Kern, " Process Heat Transfer ", Tata McGraw Hill, Edition, New Delhi, 1997.

REFERENCES:

1. Arthur P.Frass, " Heat Exchanger Design ", Second Edition, John Wiley & Sons, New York, 1996.
2. T.Taborek, G.F.Hewitt and N.Afgan " Heat Exchangers ", Theory and Pratice, McGraw Hill Book Co., 1980.
3. Walker, " Industrial Heat Exchangers " - A Basic Guide, McGraw Hill Book Co., 1980.
4. Nicholas Cheremisioff, " Cooling Tower ", Ann Arber Science pub., 1981.
5. Holger Martin, " Heat Exchangers ", Hemisphere Publishing Corporation, London, 1992

POWER PLANT ENGINEERING

1. LAYOUT OF POWER PLANT

9

Layouts of Steam, hydel, diesel, MHD, nuclear and gas turbine power plants - Combined power cycles - Comparison and selection

2. STEAM BOILER AND CYCLES

9

Modern high pressure and supercritical boilers - Analysis of power plant cycles - modern trends in cycle improvement - Waste heat recovery, Fluidized bed boilers.

3. FUEL AND ASH HANDLING, COMBUSTION CHAMBER, DRAUGHT, AIR POLLUTION

9

Preparation and handling of coal - Pulveriser - Dust collector - Ash removal; Stokers - Different types - Pulverised fuel burning ; Draught - Different types - Chimney design - Selection of blowers, Cooling towers - Different types - Analysis of pollution from thermal power plants - Pollution controls.

4. INSTRUMENTATION, TESTING OF BOILERS, POWER PLANT ECONOMICS

9

CO2 recorders - Automatic controls for feedwater, steam, fuel,air supply and combustion, Boiler testing and trails - Inspection and safety regulations. Economics of power plant - Actual load curves, fixed costs – Operating costs - Variable load operation.

5. NUCLEAR AND MHD POWER GENERATION

9

Elementary treatment - Nuclear fission, chain reaction - Pressurised water reactors, boiling water reactors, gas cooled reactors - Fast breeder reactors, MHD power cycle principles.

Total hours: 45

TEXT BOOKS:

1. S.C. Arora and S. Domkundwar, "A Course in Power Plant Engineering", Dhanpat Rai and Sons, Tata McGraw Hill, 1998.
2. P.K.Nag, " Power Plant Engineering ", Tata McGraw Hill Publishing Co. Ltd., 1998.
3. G.R. Nagpal, " Power Plant Engineerig ", Khanna Publishers, 1998.

REFERENCES:

1. Joel Weisman and Roy Eckart, " Modern Power Plant Engineering ", Prentice Hall International Inc., 1985.

2. Bernhardt G. Askrotzki & William A. Vopat, " Power Station Engineering and Economy ", Tata McGraw Hill Publishing Co. Ltd., 1972.
3. Frederick T. Mores, " Power Plant Engineering ", Affiliated East-West Press Private Ltd., 1953.