100808 Common Paper (ME/LT)	Total Quality Management	3L:0T:0P	3 credits

Objectives:

To facilitate the understanding of total quality management principles and processes

Contents:

Module: 1

Introduction, need for quality, evolution of quality; Definitions of quality, product quality and service quality; Basic concepts of TQM, TQM framework, contributions of Deming, Juran and Crosby. Barriers to TQM; Quality statements, customer focus, customer orientation & satisfaction, customer complaints, customer retention; costs toquality. **(Lectures 8)**

Module: 2

TQM principles; leadership, strategic quality planning; Quality councils- employee involvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognition and reward, performance appraisal; Continuous process improvement; PDCE cycle, 5S, Kaizen; Supplier partnership, Partnering, Supplier rating & selection. **(Lectures 8)**

Module: 3

The seven traditional tools of quality; New management tools; Six sigma- concepts, methodology, applications to manufacturing, service sector including IT, Bench marking process; FMEA- stages, types. **(Lectures 8)**

Module: 4

TQM tools and techniques, control charts, process capability, concepts of six sigma, Quality Function Development (QFD), Taguchi quality loss function; TPM- concepts, improvement needs, performance measures. **(Lectures 8)**

Module: 5

Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements, documentation; Quality auditing, QS 9000, ISO 14000- concepts, requirements and benefits; TQM implementation in manufacturing and service sectors. **(Lectures 8)**

Course Outcomes:

Upon completion of this course, the students will be able to use the tools and techniques of TQM in manufacturing and service sectors.

Text Books:

1. Bester field D.H. et al., Total quality Management, 3rd ed., Pearson Education Asia, 2006.
2. Evans J.R. and Lindsay W.M., The management and Control of Quality, 8th ed., first Indian edition, Cengage Learning, 2012.
3. Janakiraman B. and Gopal R.K., Total Quality Management, Prentice Hall India, 2006.
4. Suganthi L. and Samuel A., Total Quality Management, Prentice Hall India, 2006.

102804	Energy Conservation and Management	3L:0T:0P	3 credits

Objectives:

To understand the energy data from industries and carry out energy audit for energy savings

Contents:

Module: 1

Introduction to energy & power scenario of world, National Energy consumption data, environmental aspects associated with energy utilization; Energy Auditing- need, types, methodology and barriers, role of energy managers, instruments of energyauditing.

(Lectures 8)

Module: 2

Components of EB billing, HT and LT supply, transformers, cable sizing; Concept of capacitors, power factor improvement, harmonics; Electric motors- motor efficiency computation, energy efficient motors; Illumination- Lux, Lumens, types of lighting, efficacy, LED lighting and scope of energy conservation in lighting. **(Lectures 10)**

Module: 3

Thermal systems, Boilers, Furnaces and Thermic Fluid heaters- efficiency computation and energy conservation measures; Steam distribution and usage, steam traps, condensate recovery, flash steam utilization; Insulation & Refractories. **(Lectures 10)**

Module: 4

Energy Conservation in major utilities, pumps, fans, blowers, compressed, air systems, Refrigeration & Air Conditioning system, Cooling Towers, DG sets. **(Lectures 6)**

Module: 5

Energy Economics- discount period, payback period, internal rate of return, net present value; Life Cycle costing- ESCO concept. **(Lectures 6)**

Course Outcomes:

Upon completion of this course, the students will be able to perform of energy auditing for the energy consumption of industries.

Text Books:

1. Witte L.C., Schmidt P.S. and Brown D.R., Industrial Energy Management and Utilization, Hemisphere Publ., Washington, 1988.
2. Callaghn P.W., Design and Management for Energy Conservation, Pergamon Press, Oxford,1981.
3. Murphy W.R. and McKay G., Energy Management, Butterworths, London, 1987.
4. Energy Manager Training Manual, Bureau of Energy Efficiency (BEE) under Ministry of Power, GOI, 2004 (available at www.energymanagertraining.com).

102807	Safety Management	3L:0T:0P	3 credits

Objectives: This course is directed towards creating safety awareness, identifying hazards and mitigation of accidents along with introduction of legal requirements and following up action.
Outcome: After reading the course an engineer may develop confidence of over safe operations.
Module: 1
Need, Modern safety concepts, OSHA norms. (**Lectures 3)**
Module: 2
Safety Management function, Cost analysis of accidents, system safety analysis. **(Lectures 6)**
Module: 3
Hazards identification and control. Pressure hazard, fire hazard and Electrical hazard. **(Lectures 12)**
Module: 4
Hazard in construction industry, Hazard due to acceleration and fall, Mechanical hazard, Hazard due to heat and temperature. (**Lectures 11)**
Module: 5
Safe practices rules, Personal protective equipment. (**Lectures 4)**
Module: 6 Ergonomics. (**Lectures 6)**
Text/Reference Books:

1. Safety Management - John V. Grimaldi& Rollin H Simmands.
2. Ergonomics at work - Osborne, D. J, John wiley&Sons.s
3. Industrial safety Handbook - Handey, W, Mcgraw Hill.
4. Designer's Guide to OSHA - Mcgraw Hill.
5. Handbook of occupational safety and Health – Johnwiley& Sons.
6. Industrial Accident Prevention – Heinrich, Hetal, Mcgraw Hill.

102808	Non-Conventional Manufacturing	3L:0T:0P	3 credits

Objective: To understand how the material removal by using various energy and to know how the new materials and complex parts are produced with high accuracy by using new technology.

Module:1

Introduction: Historical background of non-conventional machining processes, Classification, Basic fundamentals of various process and related comparison. (**Lectures 4)**

Module: 2

Mechanical Machining Process: Principle and working and applications of mechanical machining processes such as ultrasonic machining, water jet cutting. (**Lectures 7)**

Module: 3

Thermal and Chemical Machining Process: Principle and working and applications of thermal and chemical machining processes such as electro-discharge machining, electro-chemical machining. (**Lectures 7)**

Module: 4

Non-conventional welding process: Principle and working and application of non-conventional welding processes such as laser beam welding, electron beam welding, ultrasonic welding, plasma arc welding. explosive welding, cladding under water welding, metallising.

(**Lectures 10)**

Module: 5

Non-conventional forming process: Principle, working and applications of high energy forming processes such as explosive forming, electro-magnetic forming, electro-discharge forming, water hammer forming, explosive compaction. (**Lectures 10)**

Module:6

Introduction to Micro Manufacturing: Micro manufacturing fundamentals, significance, application of NCMPs for micro manufacturing, Micro to Nano finishing processing information. (**Lectures 4)**

Text Books/ References Books:

1. P.C. Pandey and H.S. Shah, *Modern Machining Processes*, Tata Mcgraw-Hill Publishing Co. Ltd, New Delhi, 1980.
2. A. Ghosh and A.K. Mallik, *Manufacturing Science*, 2nd edition, Affiliated East West Press, New Delhi.
3. G.F. Benedict, *Nontraditional Manufacturing Processes*, Marcel Dekker Inc., New York (ISBN 0-8247-7352-7), 1987.
4. V.K. Jain, *Advanced Machining Processes*, Allied Publishers, 2009.
5. J. A. McGeough, *Micromachining of Engineering Materials*, Taylor & Francis, 2001.

Outcome: Students will be able to understand the fundamentals of various non-conventional machining processes and their influence on performance and their applications.