

**DEPARTMENT OF MECHANICAL ENGINEERING  
SYLLABUS FOR QUALIFYING EXAMINATION FOR PH.D SUBMISSION  
INDUSTRIAL & PRODUCTION ENGINEERING**

**SECTION - A**

Types of operation and process systems – Functions of operation planning and control – Aggregate planning - Master production scheduling - Material requirement planning, MRP-II, Scheduling, sequencing, priority rules for dispatching jobs. Capacity planning and control, Concepts of just-in-time - Pull and push system, Kanban systems – Inventory systems, Inventory control techniques - Project planning, Monitoring and control - Maintenance management.

TQM: QC tools, Quality circles, Bench marking, Quality function deployment, Standardization, ISO 9000 system.

Experiments for process design and improvement: Guidelines for design of experiments, factorial experiments,  $2^k$  factorial design, addition of centre points, blocking and confounding. Introduction to Taguchi Methods: Additive cause-effective model, optimization using signal-to-noise ratios, use of orthogonal arrays, selecting orthogonal arrays and linear graphs.

**SECTION - B**

Composite Materials: Elastic behavior of unidirectional and multi directional composites, Laminated composites, Nano Composite Materials

Machining of materials by conventional methods (Turning, Milling and Grinding) and unconventional methods (USM, EDM and WJM), welding of materials by SMAW, TIG/MIG, Friction, Friction stir processes.

Destructive testing of materials (Hardness, Tensile, Toughness, Fatigue and Creep) and Non destructive testing of materials (Dye penetration test, Magnetic particle method, Radiography and Ultrasonic method).

**Books:**

1. Total Quality Management by Besterfield et al., Pearson Education, India
2. Introduction to statistical quality control, 4<sup>th</sup> Edition by Douglas C Montgomery, John Wiley & Sons, Inc.
3. Operations Management Theory and Practice by B. Mahadevan.
4. Manufacturing Engineering and Technology, Kalpakjian, Adisson Wesley
5. Welding technology and design, V. M. Radhakrishnan, New Age International Publishers
6. A text book of Welding Technology, O P Khanna, Dhanapat rai publications
7. American Society for Nondestructive Testing Handbook
8. Ndt & Evaluation Of Materials, J. Prasad and CGK Nair, McGraw Hill Education
9. Production Engineering, P. C. Sharma, S. Chand
10. Unconventional Manufacturing Process, Singh, M.K. , New Age Publishers

**Note: Set Four Questions from each Section**