M.Tech. DEGREE

in

Industrial Engineering and Management

SYLLABUS

FOR

CREDIT BASED CURRICULUM

OPERATIVE FOR STUDENTS OF 2013 -2014 ADMISSION

4 SEMESTER PROGRAMME

CODE : PR

DEPARTMENT OF PRODUCTION ENGINEERING

JUNE 2013
## NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
### DEPARTMENT OF PRODUCTION ENGINEERING
#### M. Tech (Industrial Engineering & Management)
##### Total Credits: 66
(operative for students of 2013-2014 admission)

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Semester 1

MA611 Data Analytics  L 3 T 1 P 0 Credits 4

PR651 Advanced Operations Research  L 2 T 1 P 0 Credits 3

PR653 Analysis and Control of Manufacturing Systems  L 3 T 0 P 0 Credits 3
Production system –Forecasting and its types – Forecasting errors and tracking signals - Inventory costs Terminology of Inventory systems – Inventory policies – Analysis of Static Deterministic Inventory Models-Aggregate Production Planning - Value stream management for lean office Introduction to material requirements planning - Lot sizing – MRP Versus MRP II – Re planning frequency in MRP Introduction to Job Sequencing – n Jobs, One machine – n Jobs, Two machines – n Jobs, Three machines – n jobs - Two Jobs , M Machines – n jobs, M Machines – sequencing Jobs on Parallel Machines – Minimization of Setup costs - Travelling Salesman problem –Job shop scheduling – Assembly line balancing References:

PR 655 Systems Engineering  
L 3 T 0 P 0
Credits 3
Systems theory, Life-Cycle phases, Systems Engineering processes, Seven-phase and twenty-two phase life cycle for systems acquisition. Problem or Issue identification, Formulation of issues with an example

References:

PR 657 Data Analytics Lab  
L 0 T 0 P 3  Credits 2
The objective of this lab is to enable students to have exposure on Data Analytics using SYSTAT, SPSS and GaBi.
1. Linear Regression and Correlation
2. Testing of Hypothesis – I & II
3. Analysis of Variance (ANOVA)
4. Factor analysis
5. Life Cycle Assessment of products
6. Cluster Analysis
7. Performance Measurement of Industrial systems

PR 659 Operations Management Lab  
L 0 T 0 P 3  Credits 2
The objective of this lab is to have practical exposure on operations management packages like OM Expert, CPLEX, LINDO, GAMS, TORA extra and also to study on the ergonomic aspects of human evaluation.
1. Forecasting Models
2. Linear Programming Problem
3. Transportation Model
4. Inventory Models
5. Scheduling Case studies
6. Material Requirements Planning
7. Project management
8. Facilities layout
9. Ergonomics Study
   a. Performance rating using stop watch
   b. Peg board experiment
   c. Time study trainer
d. Fitness study using treadmill

e. Fitness study using ergo cycle

Semester 2

PR 652 Quality & Reliability Engineering  L 3 T 0 P 0  Credits 3

References:

PR654 Modeling and Simulation  L 2 T 1 P 0  Credits 3

References:

PR656 Supply Chain Management  L 3 T 0 P 0  Credits 3

References:
2. Logistics, David J.Bloomberg, Stephen Lemay and Joe B.Hanna, PHI 2002
4. Modeling the supply chain, Jeremy F.Shapiro, Thomson Duxbury, 2002

PR658 Project Management  L 2 T 1 P 0  Credits 3

References:

**PR 660 Simulation Lab**

(Packages: ARENA, Flexsim, QUEST, Simquick & Witness and other emerging packages, Programming in C and Matlab)

**LIST OF EXERCISES**

- Random Number Generation approaches
- Random Variate Generation
- Simulation of Manufacturing Shop
- Simulation of Multiple Servers Queuing System
- Simulation of Supply Chain Inventory System
- Simulation of Batch Production System
- Simulation of Multi Machine Assignment System
- Simulation of Manufacturing and Material Handling Systems
- Simulation of a Shop Floor
- Simulation of Material Handling Systems

**PR 680 Supply Chain Management Lab**

The objective of this lab is to enable students to understand the practical applications of Supply Chain Management concepts.

1. Network design and operations
2. Designing and planning transportation networks
3. Designing and planning distribution networks
4. Value Stream Mapping – Development of Current State Map and Future State Map
5. Decision Making in Supply Chains
6. Lean, agile and leagile supply chains
7. Supply chain restructuring
8. Supply chain performance measures
9. Inventory optimization in supply chain
10. Forecasting models in supply chain
Electives

Industrial Engineering stream

PR661 Intelligent Manufacturing Systems  L 3 T 0 P 0  Credits 3

References:

PR662 Research methodology  L 3 T 0 P 0  Credits 3

References:

PR663 Design and Analysis of Experiments  L 3 T 0 P 0  Credits 3
Steps –Single Factor Experiments- ANOVA- Factorial Experiments- $2^k$ designs with Two and Three factors- Confounding, blocking, nested, Fractional factorial designs - Taguchi Techniques- Quality Loss function, orthogonal designs, application to Process and Parameter design.

References:

PR664 Enterprise Resource Planning  L 3 T 0 P 0  Credits 3
ERP: An Overview - Benefits of ERP - ERP and Related Technologies - Business Process Reengineering (BPR), Data Warehousing - Data Mining, ERP Implementation - ERP Implementation Lifecycle, Business Modules in an ERP Package - ERP Market, Enterprise Integration Applications (EIA) - ERP and E-Commerce - ERP and Internet - Future Directions in ERP.

References:

PR665 Lean and Agile Manufacturing


References:

PR666 Facilities planning and design


References:

PR667 Production Management Systems

Productivity-productivity measurement models-role of work study-work measurement techniques-ergonomics-CIM and Production Management Systems- MRP I, MRP II Lot sizing in MRP-Lot for lot, economic order quantity-periodic order quantity-part period balancing-introduction to optimized production technology-KANBAN-types of KANBAN- value engineering (VE) - approaches of value analysis and engineering –Effective organization for value work, function analysis system techniques-FAST

References:

PR668 Advanced Optimization Techniques


8 Department of Production Engineering

References:

PR669 Work Design and Ergonomics
L 3 T 0 P 0
Credits 3
Introduction to work study - productivity measurement models-Kurosawa structural approach, Lawlor’s approach, Gold’s approach Quick Productivity Appraisal approach (QPA), Motion and time study Work methods design Work measurement and its methods Measuring work by physiological methods Introduction work study/ergonomics softwares, Human Factors, Ergonomics practices design of controls and workspace

References:

PR670 Sustainable Manufacturing
L 3 T 0 P 0
Credits 3

References
Electives

Management stream

PR671 Financial Management  
L 3 T 0 P 0  
Credits 3


References:


PR672 Marketing Management  
L 3 T 0 P 0  
Credits 3


References:


PR673 Total Quality Management  
L 3 T 0 P 0  
Credits 3


References:

PR 674 Human Resource Management  L 3  T 0  P 0  Credits 3
Individual Behavior-Personality –Attribute – Perception –Motivation Theories-Group Behavior-
Group Dynamics, Group decision making, Inter personal Relations-Dynamics of Organizational
Behavior- Organizational Climate–Organizational change –the Change Process & Change
Management-Human Resources Planning–HR audit, Recruitment-Selection-Interviews -Human
Resources Development-Employee Training -Career Development-Performance Appraisal-
Compensation-safety and Health-Employee Relation-Management Development.

References:

PR675 Decision Support Systems  L 3  T 0  P 0  Credits 3
DSS components- Data warehousing, access, analysis, mining and visualization-modeling and
analysis-DSS development -Group support systems- enterprise DSS- supply chain and DSS-
knowledge management methods, technologies and tools-Artificial intelligence and expert
systems- Representation in logic and schemas, semantic networks, production rules and frames,
inference techniques – DSS applications.

References:
3. Vicki L. Sauter, Decision Support Systems for Business Intelligence John Wiley & Sons. Turban, Decision
Support And Business Intelligence Systems, 8/E, Pearson Education India, 2011.

PR676 Knowledge Management  L 3  T 0  P 0  Credits 3
Knowledge society- Drivers of knowledge management-Intellectual capital- KM and learning
organizations-Strategic alignment- Evaluation and strategic alignment-Infrastructural
development and deployment- Role of CKO-Analyzing business environment-knowledge audit
and analysis – designing KM team, system–Technology components- Intranet and Groupware
solutions- tools for collaborative intelligence- Social networking-package choices- knowledge
security-Integrating with web -based and internal operational & support systems- change

References:
1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde

PR677 Product Life Cycle Management  L 3  T 0  P 0  Credits 3
New Product Development, Introduction to PLM, Product Data Management (PDM), Views of
PLM, PLM Strategies and its Development, Product Design Modeling and simulation in product
design. Integration of PLM with other applications, Technology, Forecasting, Virtual product
development tools, Product structures

References:
   2006
3. Michael Grieves, “Product lifecycle management: Driving the next generation of lean thinking”, McGraw-
   Hill, 2006
PR678 Technology Management  
References:

PR679 Multi-Criteria Decision Making Techniques  
References