VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

**(VJTI)**

MATUNGA, MUMBAI 400 019

(Autonomous Institute affiliated to the University of Mumbai)

# Curriculum

## (Scheme of Instruction & Evaluation and Course contents)

(Revision 2022)

For

Two Year Postgraduate Program Leading to
Master of Technology (M. Tech.) Degree in Project Management

**Implemented from the batch admitted in the first year, 2022-23**

Head Production Engg. Dept.
V.J.T.I., Matunga,
Mumbai - 400 019.

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA. MUMBAI-19.

**VISION (Department)**

To become a nationally acclaimed Department for imparting state-of-the-art art knowledge in the field of manufacturing technology, industrial engineering, and management to the students, thus making the them preferred choice for employment and enabling them to pursue higher studies besides providing consultancy and services to the other stakeholders.

**MISSION (Department)**

1. Undertake research and consultancy as means to upgrade the knowledge and impart cutting knowledge and skills through technologically advanced teaching-learning methods.
2. Create an intellectually stimulating environment for research, scholarship, creativity, innovation, and professional activity
3. Develop live and synergistic links with industry, academic institutions and professional bodies, and alumni for collaborative working, conducting research and sharing of expertise and other resources.
4. Upgrade curricula to meet the requirements of stakeholders including industries and impart relevant knowledge to students using appropriate and technologically advanced methods of teaching.
5. Develop engineers have proficient communication, professional attitude, and social responsibility to take up leadership positions mainly in engineering firms.
6. To serve the community and profession by providing outstanding leadership and contributions in learning, knowledge, innovation, and entrepreneurship.

## M. Tech Project Management

**Programme Educational Objectives (PEOs):**

1. To prepare the Graduates with a sound foundation in the mathematical, scientific, and engineering fundamentals and equip them with modern tools to analyze, formulate, and solve real-life manufacturing and industrial engineering problems.
2. To prepare graduates to become product and process design professionals for sustainable manufacturing.
3. To prepare the graduates for a successful career in Indian and Multinational organizations and to excel in their Postgraduate studies.
4. To encourage and motivate the graduates in the art of self-learning.
5. To inculcate a professional and ethical attitude, good leadership qualities, and commitment to social responsibilities in the graduates' thought process.

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**Program Outcomes:**

1. Graduates will demonstrate basic knowledge in mathematics, science, and engineering.
2. Graduates will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results.
3. Graduates will demonstrate the ability to improve a production process or system that meets desired specifications and requirements.
4. Graduates will demonstrate the ability to develop manufacturing-friendly products and software packages by working with multidisciplinary teams and applying the knowledge gained during engineering and science laboratory classes.
5. Graduates will demonstrate the ability to identify, formulate and solve manufacturing-related problems.
6. Graduates will demonstrate an understanding of their professional and ethical responsibilities.
7. Graduates will be able to demonstrate effective oral and written communication.
8. Graduates will have the confidence to apply engineering solutions in global and societal contexts.
9. Graduates will be capable of self-education and clearly understand the value of lifelong learning.
10. Graduates will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.
11. Graduates will be familiar with modern engineering software tools and equipment to analyze manufacturing-related problems.

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# M. Tech. Project Management Semester I
## Scheme of Instruction and Evaluation (R-2022)

| | Scheme of Instruction | | | | | | Scheme of Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Course Code | Course Title | L | T | P | Credits | TA | MST | ESE | ESE hours |
| 1 | PEPM5001S | Computational Methods | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 2 | PEPM5011T | Project Management Principles and Applications | 3 | 1 | 0 | 4 | 20 | 20 | 60 | 3 |
| 3 | PEPM5012S | Project Finance Management | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 4 | | Program Elective-I | 3 | 1 | 0 | 4 | 20 | 20 | 60 | 3 |
| 5 | | Program Elective-II | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 6 | | Open Elective-I | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 7 | PEPM5071L | Project Management Software Lab | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| 8 | PEPM5072L | Computerized Financial Management Lab | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| 9 | PEPM5073L | Optimization Lab | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| 10 | ~~MTEC~~5081L | Liberal Learning-I | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| | PEPM | | 18 | 2 | 8 | 24 | | | | |

**Abbreviations:**

**L**: Lecture, **T**: Tutorial, **P**: Practical, **TA**: Teacher Assessment, **MST**: Mid-Semester Test, **ESE**: End Semester Examination, **CIE:** Continuous In-Semester Evaluation.

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# M. Tech. Project Management Semester II
## Scheme of Instruction and Evaluation (R-2022)

| | Scheme of Instruction | | | | | | Scheme of Evaluation | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Course Code | Course Title | L | T | P | Credits | TA | MST | ESE | ESE hours |
| 1 | PEPM5002S | Research Methodology and IPR | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 2 | PEPM5013T | Management of Infrastructure Projects | 3 | 1 | 0 | 4 | 20 | 20 | 60 | 3 |
| 3 | PEPM5014S | Project Risk Management | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 4 | | Program Elective-III | 3 | 1 | 0 | 4 | 20 | 20 | 60 | 3 |
| 5 | | Program Elective-IV | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 6 | | Open Elective-II | 3 | 0 | 0 | 3 | 20 | 20 | 60 | 3 |
| 7 | PEPM5074L | Entreprenueral Resouce Planning and SAP Lab | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| 8 | PEPM5075L | PLM Simulation Lab | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| 9 | PEPM5076L | SAS Probability and Statistics Lab | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| 10 | MTEC5082L | Liberal Learning-II | 0 | 0 | 2 | 1 | 60 % CIE | | 40 | - |
| | | | 18 | 2 | 8 | 24 | | | | |

**Abbreviations:**

**L**: Lecture, **T**: Tutorial, **P**: Practical, **TA**: Teacher Assessment, **MST**: Mid-Semester Test, **ESE**: End Semester Examination, **CIE**: Continuous In-Semester Evaluation.

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# M. Tech. Project Management Semester III
## Scheme of Instruction and Evaluation (R-2022)

| | Scheme of Instruction | | | | | | Scheme of Evaluation |
|---|---|---|---|---|---|---|---|
| S. No | Course Code | Course Name | L | T | P | Credits | |
| 1 | PEPM5091D | Project Stage -I | | | | 5 | 100% CIE |
| 2 | PEPM5092D | Project Stage -II | | | | 5 | 100% CIE |
| 3 | | Self-learning Course - I | 1 | 0 | 0 | 1 | 100% ESE of 3 hours or credit transfer |
| 4 | | Self-learning Course - II | 1 | 0 | 0 | 1 | 100% ESE of 3 hours or credit transfer |
| 5 | PEPM5301S | Effective Business Communication (MNC) | 2 | 0 | 0 | 0 | 100% ESE of 3 hours or credit transfer |
| | | | | | | 12 | |

# M. Tech. Project Management Semester IV
## Scheme of Instruction and Evaluation (R-2022)

| | Scheme of Instruction | | | | | | Scheme of Evaluation |
|---|---|---|---|---|---|---|---|
| S. No | Course Code | Course Name | L | T | P | Credits | |
| 1 | PEPM5093D | Project Stage -III | | | | 5 | 100% CIE |
| 2 | PEPM5094D | Project Stage -IV | | | | 7 | 100% CIE |
| | | | | | | 12 | |

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# Electives - Semester I

## List of Program Elective-I

| Sr. No. | Course Code | Course Title |
|---|---|---|
| 1. | PEPM5021T | Operations Management |
| 2. | PEPM5022T | Reliability Engineering |
| 3. | PEPM5023T | Industrial Engineering |
| 4. | PEPM5024T | Procurement and Material Management |
| 5. | PEPM5025T | Total Quality Management |

## List of Program Elective-II

| Sr. No. | Course Code | Course Title |
|---|---|---|
| 1. | PEPM5031S | Business Environment and Strategies |
| 2. | PEPM5032S | Principles and Practice of Management |
| 3. | PEPM5033S | Facilities Planning and Design |
| 4. | PEPM5034S | Occupational Safety, Health, and Environment |
| 5. | PEPM5035S | Ecology and Sustainable Development |

## Open Elective-I

| Sr. No. | Course code | Course Title |
|---|---|---|
| 1. | PEPM5061S | Entrepreneurship Development |

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# Electives - Semester II

## List of Program Elective-III

| Sr. No. | Course Code | Course Title |
|---|---|---|
| 1. | PEPM5041T | Supply Chain Management |
| 2. | PEPM5042T | Legal Aspects of Project Management |
| 3. | PEPM5043T | Ethics and Leadership |
| 4. | PEPM5044T | Environmental Impact Assessment and Audit |
| 5. | PEPM5045T | Innovation, Entrepreneurship, and Business Transformation |

## List of Program Elective-IV

| Sr. No. | Course Code | Course Title |
|---|---|---|
| 1. | PEPM5051S | Agile Project Management |
| 2. | PEPM5052S | Product Lifecycle Management |
| 3. | PEPM5053S | Value Engineering and Management |

## Open Elective-II

| Sr. No. | Course code | Course Title |
|---|---|---|
| 1. | PEPM5062S | Project Management |
| 2. | PEPM5063S | Management of Software Projects |

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# Self-Learning Courses - Semester III

## List of Self-Learning Courses I

| Sr. No. | Course Code | Course Title |
|---|---|---|
| 1. | PEPM5101S | Infrastructure Economics |
| 2. | PEPM5102S | Business Law for Managers |
| 3. | PEPM5103S | Predictive Analytics |
| 4. | PEPM5104S | Advanced Corporate Strategy |

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## List of Self-Learning Courses II

| Sr. No. | Course Code | Course Title |
|---|---|---|
| 1. | PEPM5201S | Management Of Inventory Systems |
| 2. | PEPM5202S | IP Management & Technology Transfer |
| 3. | PEPM5203S | Innovation and Start-up policy |
| 4. | PEPM5204S | Financial Institutions and Markets |

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# Semester I

| | | |
|---|---|---|
| **Program** | M. Tech (Project Management) | **Semester - I** |
| **Course Code** | PEPM5001S | |
| **Course Title** | Computational Methods | |

**Course outcomes**: On the completion of this course, the learner will able to

1. Formulate OR models, solve and interpret with post-optimal and sensitivity analysis.
2. Formulate and solve problems on NLP, IP, DP, and queuing theory
3. Solve network problems and solve problems Monte Carlo simulation
4. Apply MCDM and MODM to practical situations
5. Apply computer software to solve the proposed models - use LINGO, and EXCEL for integer and nonlinear programming problems and use WINQSB, QM, and TORA to solve network models and games.

| | **Course Content** |
|---|---|
| 1. | **Linear Programming Problems (LPP)**<br>LPP – Model Formulation and special cases of solutions. Simplex method, Big–M method, Two–phase method, Principle of Duality, Dual Simplex, Sensitivity Analysis.<br>Transportation and transshipment problem., Traveling Salesman problem.<br>Parametric programming, goal programming, Integer linear programming, Branch and Bound Algorithm. Cutting plane Algorithm. Decomposition Algorithm |
| 2. | **Non–linear programming**<br>Separable programming. Stochastic Programming. Kunh – Tucker sufficiency conditions. Quadratic Programming. Geometric Programming |
| 3 | **Dynamic Programming**:<br>Bellman's principle of optimality. Bayesian Paradigm. Howards Policy space Technique. Markov Process approach. Value Determination Operation (VDO) Policy Improvement Routines (PIR) for solving sequential decision problems |
| 4. | **Queuing Theory**<br>M/M/S and M/G/1 queues – Queues in series and parallel servicing stations. Pollaczek – Khintchine Formula |

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| 5. | **Job Sequencing**<br>Palmer's Algorithm and Gupta's Algorithm. CDS algorithm and Barrel and Bound method of sequencing 'n' jobs on m machines. Sequencing of jobs when machine orders are different for jobs |
| 6. | **Network analysis and Monte Carlo simulation**<br>Network terminology. Solution algorithms for shortest Path problem. Maximum flow problem. Minimum Spanning Tree. Minimal cost Network Flows Generalized Network problem<br>Monte Carlo simulation and its applications |
| 7. | **Multi-Criterion Decision-making (MCDM) Methods**<br>Introduction to multi-criterion optimization.Simple Additive Weighting (SAW) Method<br>Weighted Product Method (WPM).Analytic Network Process (ANP).Analytic Hierarchy Process (AHP). TOPSIS Method.PROMETHEE |
| 8. | **Multi-objective Decision making (MODM) Methods**<br>Introduction to Multi-objective optimization, Traditional Techniques such as quadratic programming, geometric programming, goal programming, and dynamic programming.<br>Glimpses of Non-traditional optimization Techniques such as particle swarm, genetic algorithms, simulated annealing, and Techniques based on Neural network & Fuzziness. Data envelopment analysis |
| | **Text Books** |
| 1. | J.K. Sharma: Operations Research, McMillan Publishing. |
| 2. | Hillier, Lieberman, Nag, and Basu: Introduction to Operations Research, McGraw Hill. |
| | **References** |
| 1. | Winston Wayne: Operations Research, Cengage Learning. |
| 2. | Hamady Taha: Operations Research, Pearson Learning. |
| 3. | Ravindran and Phillips: Operations Research: Principle and Practices, Wiley India. |
| 4. | N.D. Vohra: Quantitative Techniques in Management, TMH. |
| 5. | Premkumar Gupta and D.S. Hira: Operations Research, S Chand Publications. |
| 6. | M.S.Bazarra, J.J.Jarvis, H.D.Shelari – Linear Programming and Network Flows – John Wiley & Soles, New York. |
| 7. | R V Rao: Decision Making in the Manufacturing Environment Using Graph Theory and Fuzzy Multiple Attribute Decision Making, Springer Publication |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5011T | |
| Course Title | Project Management Principles and Applications | |

**Course outcomes**: On the completion of this course, the learner will able to

1. apply the basic concepts of project management.
2. Appraise the project using appropriate appraisal techniques.
3. Design and implement the project by considering risk and its evaluation.
4. Learn the process of project planning and execution.

| | Course Content |
|---|---|
| 1. | **Introduction**<br>Characteristics of projects, Complexities of a Project, Different Types of Projects, Determinants of project success, Characteristics of project management, Projects in contemporary organizations, Project life cycle, sustainable project development |
| 2. | **Project Selection and Appraisal**<br>Brainstorming and concept evolution, Project Feasibility Analysis, Approaches to project screening and selection, nonquantitative and scoring models, Types of appraisals, SWOT analysis, and financial feasibility |
| 3. | **Project Integration Management**<br>Project manager- Team building and conflict management, project organizational structure, Selection of project organization, Integration of project organization Developing project charter, Project scope, Project management plan, Direct and managing project execution, monitoring, and control, Close project |
| 4. | Project Scope management: Scope definition and planning, work breakdown structure (WBS), Responsibility matrix, scope control |
| 5. | **Project Schedule Management**<br>Network techniques: PERT and CPM, AON and AOA representation, Three-time estimates-probability distributions for time computation, Probability of project completion, Time scale version of the network, Early start, and late start schedules. |

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| 6. | **Project Resource Management**:<br>Resource allocation, Resource loading, and leveling, constrained resource scheduling, Multi-project scheduling, resource allocation, crashing a project, cost budgeting, and control |
| 7. | **Project Risk Management**<br>Identification, Assessment, and Mitigation. Application of Probability. Application of the theory of constraints and critical chain method for planning and controlling a project; Risk Management Strategies, Risk management Approaches, Risk Identification, Qualitative and quantitative risk analysis, Risk response, Risk monitoring, and control |
| 8. | **Computerized Project Management**<br>Computerized PMIS, Choosing software for project management, using software for project management. Case studies in project management in specific industries such as the Electrical industry, Electronics industry, IT/ITeS industry, Manufacturing industries, fashion industries, infrastructure sector, etc. |
| 9. | **Earned value concept in project control**<br>Calculation of Schedule and Cost Variances, Quality management through statistical tools and Cause and Effect Analysis**Case Studies on Project Management**: Modern cases in project management |
| | **Text Books** |
| 1. | John Nicholas, Project Management for Business and Technology: Principles and Practice. Pearson Prentice Hall, New Delhi. |
| 2. | Shrub, Bard, and Globerson: Project Management: Engineering, Technology, and Implementation, PHI. |
| | **References** |
| 1. | A Guide to the Project Management Body of Knowledge (PMBOK Guide) Latest Edition. PMI. |
| 2. | Harold Kerzner: Project Management-A Systemic Approach to Planning, Scheduling and Controlling, CBS Publishers. |
| 3. | L.S. Srinath: PERT and CPM: Principles and Applications, Affiliated East West Press Ltd. |
| 4. | K. Joy: Total Project Management: The Indian Context, Macmillan India Ltd. |
| 5. | Jeffrey K. Pinto, "Project Management" Pearson publication, |
| 6. | Choudhury: Project Scheduling and Monitoring in Practice. McGraw Hill Education |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5012S | |
| Course Title | Project Finance Management | |

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| | **Course outcomes**: On the completion of this course, the learner will able to<br>1. Appraise the projects from the finance point of view and rank<br>2. To tap major sources of institutional finance for projects that minimize coat and risk<br>3. Analyze, and interpret the financial statements and decide upon the health of a firm.<br>4. Apply costing and accounting and costing practices in solving real-life problems. |
| | **Course Content** |
| 1. | Financial Management, objectives, and goals, Fixed Capital, Floating Capital, Fund flow analysis, and Fund flow statements. Ratio analysis: Classification, structural group, standards for comparison, and limitations |
| 2. | Profit planning and Break-even analysis, the margin of safety. Financial Budgets, control measures, Authorized capital, working capital, reserve, capital Management, floating of shares, share capitals & fundraising –methods and their appraisal. |
| 3. | Working Capital Management<br>Policy For Working Capital, Estimating Working Capital Needs, Inventory Management, Accounts Receivable, Credit And Cash Management, Managing Payments To Supplies and Outstanding.<br>Working Capital Needs Sources, Procedures, Practices in Construction and other businesses |
| 4. | Project Appraisal criteria: Net Present Value, benefit-cost ratio, internal rate of returns urgency, payback period, accounting rate of returns, investment appraisal in practice<br>Analysis of Risk, Types, and measures of risk, simple estimation of risk, sensitivity analysis, scenario analysis, Special decision situations: Choice between mutually exclusive projects of unequal life, optimal timing decision, determination of economic life, inter-relationships between investment and financing aspects, inflation and capital budgeting. Analysis of firm and market risk: |
| 5. | Portfolio theory and capital budgeting, Capital Asset Pricing Model. |

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| 6. | Short and long-term financing<br>Short-term financing. Long Term Financing Working Of Financial Institutes In India And Abroad, Self Financing Stock Exchanges Types Of Securities, Borrowings, and Debentures<br><br>Financial markets; money markets, bill markets, discount houses, call loan markets, etc., Capital markets; mutual funds, stock markets, industrial banks, world bank, UTI, IDBI, ICICI, SEBI and state finance corporations |
| 7. | Relevant Laws Laws Concerning Income Tax, Sales Tax, Professional Tax Turnover Tax, Etc |
| | **Text Books** |
| 1. | Financial Management: Prasanna Chandra; Tata McGraw Hill |
| 2. | Projects: Prasanna Chandra; Tata McGraw Hill |
| | **References** |
| 1. | Financial institutions and markets: L.M.Bhole and Jitendra Mahakud; McGraw Hill Education |
| 2. | Finance Sense- Text and Cases: Prasanna Chandra; Tata McGraw Hill |
| 3. | Financial Management: I M Pandey; Vikas Publishing House |
| 4. | Management Accounting; M.Y.Khan, P.K.Jain, Tata McGraw Hill |
| 5. | Jawaharlal: Cost Accounting, Tata McGraw Hill (TMH). |

# Program Elective-I

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|---|---|---|
| **Program** | M. Tech (Project Management) | **Semester - I** |
| **Course Code** | PEPM5021T | |
| **Course Title** | Operations Management | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Demonstrate understanding of operation flow, and primary and supporting activities to achieve quality and economical products.<br>2. Apply analytical knowledge in the areas of strategic, and operational decision making preferably using quantitative methods and computers.<br>3. To develop analytical competency for production planning and control in manufacturing discrete products.<br>4. Demonstrate applications of the latest trends in OM. |
| | **Course Content** |
| 1. | **Introduction:**<br>Operations-Transformation process model: Inputs, process, and outputs; Strategic and tactical decisions. Classification of operations/ production system - Process types in manufacturing: project, jobbing, batch, line, mass, continuous; Process types in services: professional services, services shops, mass services; Operations Strategy; Trends in Operations Management<br>New Product Development, Selection, and Design of Products / Services. Break-even analysis for process, plant, and equipment selection |
| 2. | **Product Design and Development:**<br>Classification of products. Definition of product design, Design by evolution, innovation, Various phases in product development and Design, Morphology of Design, Considerations in product design, and Product specifications. DFMA. Value engineering and analysis - Material and process selection in value engineering, Cost reduction. |
| 3. | **Production System Design:**<br>Product Strategy and integrated product development, Process Strategy.<br>Facility Location: Location Strategies and its Importance; Factors influencing Plant Location; Globalization; Location Selection Models<br>Layout Planning: Layout Types; Design of Product and Process Layouts; Job Design; Work Measurement. Group Technology, Flexible Manufacturing system. Assembly line balancing (Mixed model line balancing, Current thoughts on assembly lines, Computerized assembly line balancing). Line of Balance (LOB). |

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| 4. | **Production Planning and Control (PPC):**<br>Production planning and Control functions. Techniques for various process choices, production control, and aggregate planning. Demand Forecasting: Methods- Dependent demand and independent demand, Qualitative and Quantitative, Forecast accuracy.<br>Aggregate Production Planning (APP) and its methods; Master Scheduling; Aggregate capacity planning. Aggregate Planning for Service Organizations<br>Material Requirement Planning: Introduction, Master production schedule, Bill of material, Product structure, Ingredients of MRP, MRP calculations, and the concept of MRP-II. Basics of ERP.<br>Scheduling, sequencing, and dispatching: Objectives in scheduling, Loading, Sequencing, and algorithms for scheduling. Monitoring, Advanced Planning and Scheduling Systems, Theory of Constraints, Employee scheduling.<br>Operating Schedules; Sequencing Rules; Optimized Production Technology and Synchronous Manufacturing; Just in Time (JIT) Manufacturing System. |
| 5. | **Logistics and Supply Chain Management:**<br>Basics of SCM and logistics. Material Management: Introduction, Importance, and objectives, Purchasing and Stores: policies and procedures; Vendor selection policies and methods, rating analysis, development. Selective inventory control- ABC, VED, XYZ, HML, FSN.<br>Inventory control systems: Deterministic and probabilistic economic order quantity (EOQ) models, Quantity discounts, Reorder point, and Order quantity for a periodic order system. Newsvendor models. Dynamic lot sizing. |
| 6. | **Maintenance:**<br>Types of maintenance for facilities and equipment; Preventive versus breakdown maintenance; principles of preventive maintenance; Procedure for maintenance; Time of failure; Reliability and machine availability trade-off, concepts of MTBF, MTTR, and MWT and factors of availability; total productive maintenance (TPM). |
| 7. | **Evolutionary Operations Methodology (EVOP):**<br>Overview and Rationale, Statistical basis, Experimental design, One/Two/Three-factor EVOP designs. |
| | **Text Books:** |
| 1. | B. Mahadevan: Operations Management, Pearson India Education, New Delhi. |
| 2. | Chase Richard, Ravi Shankar, and J. Robert: Operations and Supply Chain Management, McGraw Hill India. |
| 3. | Jay Heizer: Operations Management, Pearson India Education, New Delhi |

| | References: |
|---|---|
| 1. | Joseph Metternich: Production and Operations Management, Wiley India. |
| 2. | Lee, Larry, and Malhotra: Operations Management - Processes and value chains, |
| 3. | Pearson Education. |
| 4. | Steven and Tava: Production and Operations Analysis, Waveland Press. |
| 5. | Elion: Elements of Production Planning and Control, Universal Publication. |
| 6. | S.N. Chary: Production and Operations Management, TMH. |
| 7. | Chopra, Meindl, and Kalra: Supply Chain Management, Pearson Education. |
| 8. | K. Otto and K. Wood: Product Design, Pearson Education. |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5022T | |
| Course Title | Reliability Engineering | |
| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Apply the concept of Reliability and analysis of various configurations.<br>2. Apply various techniques to analyze failure data.<br>3. Apply parametric & reaetric methods to analyze real-life cases of system reliability.<br>4. Carry FMEA analysis of parts and systems | |
| | **Course Content** | |
| 1. | Concept of Reliability and analysis of various configurations of assemblies and sub-assemblies. Series, Parallel, and another grouping. | |
| 2. | System reliability. Set theory, optimal Cut Set and Tie Set, 'star-delta' method, matrix method, etc. System reliability determination through 'Event Tree' analysis and Fault tree analysis | |
| 3. | Usage monitoring of plant and evaluation of reliability through failure data analysis. | |
| 4. | Concept of loading roughness, probability in design including evaluation of safety margin. Reliability of Engineering Design; Mean, Median & K statistics for Reliability evaluation (nonparametric, Short Sample). | |
| 5. | Optimal allocation of component reliability to achieve maximum system reliability – various techniques and methods such as Proportional, Conditional, AGREE, ARINC, etc. | |
| 6. | Reliability, Availability, and Maintainability of equipment. case studies in Indian perspectives using Short Sample, nonparametric reliability. | |
| 7. | Fault Tree Analysis (FTA), Failure Modes and Effects Analysis (FMEA), Failure Modes, Effects, and Criticality Analysis (FMECA). R.P.N., Graph theory, etc. Diagnostic maintenance through ferrography, Vibration Signature, SOAP, and another program. | |
| | **Text Books:** | |
| 1. | L.S.Srinath Concepts in Reliability Engineering- Affiliated East West Press. | |
| 2. | C. Singh and C.S.Dhillon, Engineering Reliability-New Techniques and Applications –John Wiley and Sons | |
| | **References:** | |
| 1. | K.C. Kapoor and L.R.Lubersome Reliability in Engineering Design, Willey Publication. | |
| 2. | Kumamoto, System Reliability, Prentice Hall | |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5023T | |
| Course Title | Industrial Engineering | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Deepen the insights in the field of work-study, ergonomics, productivity improvement techniques, and quality engineering.<br>2. Impart skills to apply techniques to enhance the work environment, quality and productivity.<br>3. Impart advanced knowledge in these areas through the study of research papers to enable the students to undertake research and projects in these areas.<br>4. Provide computational skills in using related software |
| | **Course Content** |
| 1. | **Fundamentals of Industrial Engineering:**<br>Productivity Vs Quality, Total productivity & Quality Management, Relationship with Standard of living, Maslow's Theory of Hierarchy of needs. |
| 2. | **Method Study:**<br>Concept, significance, procedure, applications, case studies. |
| 3. | **Work measurement:**<br>Work sampling, Time study, MOST. |
| 4. | **Ergonomics:**<br>Concept, significance, man/machine/environment systems concept, development of ergonomics, Design approach, Controls, Workload, Climate, applications, case studies on ergonomics. |
| 5. | **Plant Location:**<br>Concept, Significance, Factors affecting plant location, Location Economics. |
| 6. | **Plant Layout:**<br>Concept, significance, Types of Plant layout, methods for design of layouts, etc. |
| 7. | **Fundamentals of Material Handling** |
| 8. | **Advanced techniques of Industrial Engineering:**<br>Just in Time, Concurrent Engineering, SMED, Kaizen, Business Process Reengineering, Supply Chain Management, Value Engineering, Lean Thinking, Visual Workplace, Poka-Yoke, Strategic Human Resource Management, and Total Productive Maintenance. |

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|---|---|
| | **Text Books:** |
| 1. | International Labor Organization (ILO): Introduction to Work Study and Ergonomics, Universal Publisher |
| 2. | Shan H.S: Work Study and Ergonomics, Dhanpat Rai & Sons, 1999. |
| | **References:** |
| 1. | Avraham Shtub, Yuval Cohen: Introduction to Industrial Engineering, CRC Press, Taylor and Francis Group |
| 2. | Kjell B. Zandin: Maynard's Industrial Engineering Handbook |

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|---|---|---|
| **Program** | M. Tech (Project Management) | **Semester - I** |
| **Course Code** | PEPM5024T | |
| **Course Title** | Procurement and Materials Management | |

**Course Outcomes**: On the completion of this course, the learner will able to

1. Appreciate the importance of inventory & the role it plays in the profitability of the company with the acquisition of basic knowledge of Materials Management, Inventory Control, and Warehousing for both service as well as the manufacturing sector
2. Apply practical know-how in the application of these concepts in the real-time functioning of a firm for cost analysis, decision-making, quality management, and value analysis.
3. Use deterministic and probabilistic inventory models to optimize the investment in inventory
4. Employ computers in managing the inventory and global purchasing

| | **Course Content** |
|---|---|
| 1. | **Introduction**<br>Introduction to material management and productivity, functions of material management, organization structures in material management, and the role of material management techniques in improved material productivity. |
| 2. | **Material Planning**<br>Objectives, material requirement planning, manufacturing resource planning, JIT production planning, strategic material planning, material control: acceptance, sampling, inspection, make or buy decision, simple cost analysis, economic analysis, break-even analysis, breakeven point theory, whether to add or drop a product line store management and warehousing, product explosion. |
| 3. | **Purchasing**<br>Importance of good purchasing system, organization of purchasing functions, purchase policy and procedures, responsibility and limitations, purchasing decisions, purchasing role in new product development, the role of purchasing in cost reduction, negotiations and purchase, purchasing research: identification of right sources of supply, vendor rating, standardization, vendor certification plans, vendor and supply reliability, developing a new source of supply. |

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| 4. | **Cost reduction**<br>Cost control v/s cost reduction, price analysis, material cost reduction techniques, variety reduction, cost reduction and value improvement, techniques of cost control, standard costing, cost-effectiveness, cost analysis for material management, material flow cost control |
| 5. | **Inventory management**<br>Inventory v/s stores, types of inventory, inventory control, inventory build-up, EOQ, various inventory models – deterministic and probabilistic, inventory models with a finite supply, shortages, and quantity discount. The probabilistic model with variable demand, supply, and lead time. Newsvendor model. exchange curve concept, coverage analysis, optimal stocking and issuing policies, inventory management of perishable commodities, ABC–VED analysis, design of inventory distribution systems, surplus management, information system for inventory management, and case studies. |
| 6. | **E-Procurement**<br>E –markets, E buying, Traditional ERP vs e-Procurement, E contracting, internal ordering processes, online catalogs from approved vendors, and an electronic Request for Proposal (e-RFP) process that leverages online auctions (e-auctions). |
| | **Text Books:** |
| 1. | P. Gopalakrishnan and M. Sundersen: Material management- An integrated approach, Prentice Hall International. |
| 2. | Prem Vrat: Materials Management, Springer |
| 3. | Dale Neef: E-Procurement- From Strategy to Implementation, Prentice Hall International. |
| | **References:** |
| 1. | J.R.T. Arnold and S.N. Chapman: Materials Management, Pearson Learning. |
| 2. | A. K. Dutta: Materials Management, Prentice Hall International. |
| 3. | D. S. Ammer: Material Management, Richard Erwin Inc. |
| 4. | W. R. Stelzer : Material management, Prentice Hall International. |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5025T | |
| Course Title | Total Quality Management | |

**Course Outcomes**: On the completion of this course, the learner will able to

1. Apply philosophies of total quality management by important management gurus.
2. Understand concepts of quality-related costs.
3. Mastering scientific tools for quality improvement.
4. Introduction to offline quality control for quality improvement.
5. To impart an experimental design and data analysis capability

| | Course Content |
|---|---|
| 1. | **Introduction**<br>Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM.Framework - Contributions of Deming, Juran, and Crosby - Barriers to TQM -Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality (Prevention, appraisal, and failure aspects). |
| 2. | **TQM Principles**<br>Leadership - Strategic quality planning, Quality Councils – Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection/ development/ certification, Supplier Rating |
| 3. | **Cost of Quality**<br>Prevention, appraisal, and failure aspects of the cost of quality, planning for investment, return of investment, quality cost data acquisition, consolidation and analysis, performance indices, cost reduction program, and optimum cost. |
| 4. | **TQM Tools And Techniques I**<br>The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Benchmarking - Reason to benchmark, Bench marking process - FMEA - Stages, Types. |

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| 5. | **TQM Tools And Techniques II**<br>Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures. |
| 6. | **Designing for Quality**<br>Quality of design and conformance, reliability, selection of tolerances, design review, failure mode, and fault tree analysis, evaluating design by test, corrective action, availability, maintainability, and safety in design.<br>Experimental design, testing hypothesis, orthogonal design, factorial, and fraction factorials.<br>Taguchi's quality engineering, loss function, orthogonal arrays, parameter, and tolerance design. |
| 7. | **Quality Improvement**<br>Juran trilogy, management controllable defects, operator controllable defects, sporadic and chronic problems of quality, breakthrough sequence, problem-solving methods.<br>Quality of Manufacture: Manufacturing planning, process design, foolproofing, traceability, process control, and flow charts, use of statistical process control tools, process capability, and self-inspection by operators. |
| 8. | **Quality Systems**<br>Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements, and Benefits - TQM Implementation in manufacturing and service sectors. |
| | **Text Books:** |
| 1. | D. H. Besterfield: Total Quality Management; Prentice Hall. |
| 2. | Sunil Luthra, Dixit Garg, Ashish Agarwal, Sachin K. Mangla: Total Quality Management (TQM)-Principles, Methods, and Applications, CRC Press, Taylor, and Francis Group |
| | **References:** |
| 1. | J. Juran, and F. Gryna: Quality Planning and Analysis, TMH. |
| 2. | Quality is Free: Philip B. Crosby; Mentor/New American Library, 1979. |
| 3. | What is Total Quality Control? The Japanese way; Ishikawa K.; Prentice Hall, 1985. |
| 4. | J. M. Juran: Juran on Leadership for Quality; An Executive Handbook; The Free Press, 1989. |
| 5. | P.N. Mukherjee: Total Quality Management, Prentice Hall India |

# Program Elective-II

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5031S | |
| Course Title | Business Environment and Strategy | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Understand the concept of Business Planning<br>2. Apply the strategic plans<br>3. Apply knowledge of Performance Indicators and e-business models<br>4. Implement e-business strategies to enhance business performance |
| | **Course Content** |
| 1. | Importance of Business Planning, Achieving business stability and growth, Business goals, Structure of a business plan, Global and transnational business, global and transnational strategic management process, issues with global and transnational strategies and management. |
| 2. | Strategic analysis- overview, Environmental Mapping, Industry Mapping, SWOT analysis, From To analysis, Root cause analysis, Market analysis, Market mapping, Strategic Business (SBU) analysis, Benefits of SBU analysis, Competitor profiling, Directional policy matrix, Competitive positioning: generic strategies and differentiation, Differentiation and price. |
| 3. | Contribution Approach, Product and service pricing, Cost profiling, Organizational analysis, McKinsey '7S' model. |
| 4. | Options Appraisal, Force-field analysis, Stakeholder analysis, Financial sensitivity, risk exposure evaluation, Evaluating business development options, 'AID' analysis. |
| 5. | Performance measurement, Strategic Key Performance Indicators (SKPIs), Financial Key Performance Indicators (FKPIs), Operational Key Performance Indicators (OKPIs), City Key Performance Indicators (CKPIs), and Value added. |
| 6. | E-Business -Concepts and Trends, Competitive Strategy, E-Business Models, Determining Appropriate Models, Infrastructure Capabilities, Strategic Agility, Strategic Planning, The Y Model for Strategy Work, Resource-Based Strategy, Activity-Based Strategy. |
| | **Text Books:** |
| 1. | George Stonehouse et al: Global and Transnational Business- Strategy and Management, Wiley |
| 2. | Business Environment and Strategy Paul Elkins, Mastering Business Planning And Strategy |
| | **References:** |
| 1. | Michael George, Conquering Complexity in your Business |
| 2. | Michael S. Deimler · Carl W. Stern: The Boston Consulting Group on Strategy: Classic Concepts and New Perspectives |

| Program | M. Tech (Project Management) | Semester – I |
|---|---|---|
| Course Code | PEPM5032S | |
| Course Title | Principles and Practice of Management | |

**Course Outcomes**: Upon the completion of this course, the learner will be able to

1. demonstrate basic management concepts, principles, and practices.
2. apply strategic planning and decision-making strategies in an organization
3. apply lessons of organizational behavior to improve organizational performance
4. appreciate the Indian administrative and legal environment in which the project is carried out.

| | Course Content |
|---|---|
| 1. | Introduction<br>Nature and Purpose, The Evolution of Management Thoughts, The Function of Manager: Planning, Organising, Staffing, Leading and controlling. Coordination: The Essence of Management, System approach to Management Process. |
| 2. | Planning<br>Types of Plans: Missions or Purpose, Objectives or Goals, Strategies, Policies, Procedures, Rules Programmes, and Budgets. Steps in Planning, Objectives Management by Objectives. Strategies, Policies and Planning Premises, Strategic Planning Process, Presuming and Forecasting, |
| 3 | Decision Making<br>Types of decisions. Rational Decision-Making Process. Economic, Administrative and Social Decision maker models. Contribution of Herbert Simon. |
| 4. | Organizing<br>Nature of Organising, Formal and Informal Organisation, Organization Levels and the Span of Management. Structure and Process of Organisation. Principles of Organising, Line and Staff Authority.Empowerment, Decentralization of Authority, Delegation of Authority, Organization Charts. |
| 5. | Leading and Controlling<br>Motivation: Maslow's Hierarchy of Needs Theory, Herzberg's Motivation- Hygiene Theory, McGregor's Theory of X and Y, Expectancy Theory, Equity Theory, and Goal-Setting Theory.<br>Leadership: Definition, Ingredients, Styles, Theories of Leadership. Committees, and Group Decision Making. Communication: Purpose, Process of Communication, Barriers and Break Downs, Making Communication Effective<br>Controlling: Concepts and Process, Controlling as a Feedback System, Requirements for Effective Control, Major Controlling Techniques: Budgetary and Non-Budgetary Control Devices. |

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| 6. | Organizational Behaviour:<br>Foundation of Individual Behavior, Intelligence, Personality, Perceptions & attribution, Learning, attitudes & values, Motivation, Group dynamics, Team Dynamics, Power & Political behavior, Conflict & negotiation, Leadership, Communication, Organisational culture, Creativity & Innovation, Organisational change & development, Decision-making, Human resource policy & practices, International Organisational behavior |
| 7. | Administrative and Legal Environment in India<br>Public and private administration. Development and regulatory administration. Territorial administration structure.<br>Executive structure, functions, work processes; Cabinet Secretariat; Prime Minister's Office; Central Secretariat; Ministries and Departments; Boards; Commissions; Attached offices; Field organizations. The public sector in modern India; Forms of Public Sector Undertakings.<br>State Government and Administration: Union-State administrative, legislative, and financial relations; Role of the Finance Commission; Governor; Chief Minister; Council of Ministers; Chief Secretary; State Secretariat; Directorates.<br>Civil Services: Constitutional position; Structure, recruitment, training, and capacity-building; Good governance initiatives; Code of conduct and discipline; Staff associations; Civil service neutrality.<br>Financial Management: Budget enactment and interpretation. Role of CAG. Significance for projects |
| | **Text Books:** |
| 1. | Tripathi and Reddy: Principles of Management, TMH |
| 2. | L M Prasad: Principles and Practice of Management, Sultan Chand and Sons Publication |
| | **References:** |
| 1. | Peter Drucker: Management-Tasks, Responsibilities & Practices |
| 2. | Koontz "O" Donnel Weihrich : Elements of Management, , TMH |
| 3. | Stoner: Principles of Management, PHI |
| 4. | Peter Drucker: The Practice of Management, Om Books India |
| 5. | Laxmikant: Indian Polity, McGraw Hill Education (India) |
| 6. | Mohit Bhattacharya: New Horizons of Public Administration, Jawahar Publishers & Distributors |
| 7. | S R Maheshwari: Indian Administration, Orient Blackswan Pvt Ltd |
| 8 | Stephen Robbins and Timothy Judge: Essentials of Organizational Behavior, Pearson Learning |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5033S | |
| Course Title | Facilities Planning and Design | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Understand the product, process, and schedule impact the locating and designing different types of facilities.<br>2. Understand the product flow, space, and activities relationships impact facility design.<br>3. Understand concepts for techniques of material handling and layout approaches used for facility design.<br>4. Understand how facility design for operations like warehouses, manufacturing and commercial facilities.<br>5. Become proficient in evaluating, selecting, preparing, and presenting a facility design. |
| | **Course Content** |
| 1. | **Introduction:**<br>Facilities requirement, Need for layout study - Types of the layout. |
| 2. | **Plant location:**<br>Plant location analysis - factors, costs, location decisions - simple problems in single facility location models, network location problems. |
| 3. | **Layout design:**<br>Design cycle - SLP procedure manpower, machinery requirements-computer algorithms - ALDEP, CORELAP, CRAFT |
| 4. | **Quantitative methods:**<br>Group technology - Production Flow analysis (PFA), ROC (Rank Order clustering)-Line balancing. |
| 5. | **Materials handling:**<br>Principles, unit load concept, material handling system design, handling Equipment types, selection, and specification, containers, and packaging. |
| 6. | Depreciation, Replacement Analysis |
| | **Text Books:** |
| 1. | Jonathan Khin Ming Lian: Facilities Planning And Design, World Scientific Publishing, Singapore |
| | **References:** |
| 1. | Tompkins, White, et.al , Facilities Planning, John Wiley & Sons, Inc. New York. |
| 2. | J.M Apple, Plant Layout & Material Handing, Krieger Publishing Company,. |
| 3. | Vijay Sheth, Marcel Decker, Facilities Planning and Materials Handling, New York |
| 4. | Richard Muther: Practical Plant layout, McGraw Hill |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5034S | |
| Course Title | Occupational Safety, Health, and Environment | |

**Course Outcomes**: On the completion of this course, the learner will able to

1. Developing the basic knowledge of occupational safety, health & environment
2. Capability to apply ideas/concepts and the latest techniques.
3. Investigate and report the accidental incidence
4. Apply legal measures provided to prevent accidents and enhance industrial safety.

| | Course Content |
|---|---|
| 1. | **Concepts:**<br>Concept of man-machine system Applications of human factors Engineering- Man as Sensor, Man as an Information processor, and Man as Controller. Human Behavior Individual Difference Motivation-Frustration and Conflicts-Attitudes -Learning concepts. Principles of Ergonomic Application of ergonomics in a work System-Principle of motion Economy effects of the environment. Factors impending Safety-Technological Factor-Physiological Factor-Legal Factor Administrative Factors Personal protective equipment (different types, specifications, standards, testing procedures, and maintenance). Evolution of modern safety concept- Safety Policy-Safety Organization-line and staff functions for Safety-Safety Committee- budgeting for safety. |
| 2. | **Techniques:**<br>Incident Recall Technique (IRT), disaster control, Job Safety Analysis (JSA), safety survey, safety inspection, safety sampling, and Safety Audit. |
| 3. | **Accident Investigation and Reporting:**<br>Concept of an accident, reportable and non-reportable accidents, unsafe act and condition-principles of accident prevention, Supervisory Role-Role of safety Committee-Accident Causation Models-Cost of the accident. Overall accident investigation process- Response to accidents, India reporting requirement, Planning document, Planning matrix, Investigators Kit, functions of the investigator, four types of evidence, Records of accidents, accident Reports-Class exercise with the case study. |
| 4. | **Safety Performance Monitoring:**<br>Permanent total disabilities, permanent partial disabilities, temporary total Disabilities-Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety "t" score, safety activity rate problems. |

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| 5. | **Safety Education & Training:**<br>Importance of training-identification of training needs training methods -program, seminars, conferences, competitions- method of promoting safe practice-motivation-communication-role of government agencies and private consulting agencies in safety training-creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety Campaign-Domestic Safety, and Training. |
| 6. | **Regulations for Health, Safety, and Environment:**<br>Factories act and Rules-Workmen compensation act. Indian explosive act - Gas cylinder rules - SMPV Act - Indian petroleum act and rules. Environmental pollution act Manufacture, Storage and Import of Hazardous Chemical rules 1989 Indian Electricity act and rules. Overview of OHSAS 18000 and ISO 14000. |
| | **Text Books:** |
| 1. | Accident Prevention Manual for Industrial Operations, N.S.C. Chicago |
| 2. | Heinrich H.W., Industrial Accident Prevention McGraw-Hill Company, New York. |
| 3. | Krishnan N.V, Safety Management in Industry. Jaico Publishing House, Bombay |
| | Dr. K.C. Arora , ISO 9000 to OHSAS 18001, S.K. Kataria & Sons,2000. |
| | **References:** |
| 1. | The Factories Act 1948, Madras Book Agency, Chennai |
| 2. | The Environment Act (Protection) 1986, Commercial Law Publishers (India) Pvt Ltd., New Delhi. |
| 3. | Water (Prevention and control of pollution) act 1974, Commercial Law publishers (India) Pvt Ltd., New Delhi. |
| 4. | Air (Prevention and control of pollution) act 1981, Commercial Law Publishers (India) Pvt Ltd., New Delhi. |
| 5. | Explosive Act, 1884 and Explosive rules, 1883 (India), Eastern Book company, Lucknow, 10th Edition,2002. |
| 6. | The manufacture, storage and import of hazardous chemical rules 1989, Madras book Agency, Chennai. |

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5035S | |
| Course Title | Ecology and Sustainable Development | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. To study the ecology and significance of sustainable development.<br>2. To study the Environmental challenges of sustainable development.<br>3. To understand Corporate Social responsibility for the development<br>4. Create awareness among industrial workers and induce ecological behavior |
| | **Course Content** |
| 1. | **Introduction to Ecology and Sustainable Development:**<br>Components of the environment, Understanding environment, and ecology -a systems perspective, Environment -a multi-disciplinary perspective, Methodological approaches for environment & ecology analysis, Micro level environment, Macro level environment, Manmade environment, Natural environment. |
| 2. | **Environment:**<br>Ecology and quality of life, Environmental Crises, State of Environment in Developed and Developing Countries, Natural Resource Economics, Social Cost-benefit Analysis, Sustainable Development. |
| 3. | **Towards an ecological world:**<br>View, ethics and ecological wisdom, the moral standing of ecosystems, Globalization and environmental issues, Ideologies of environmentalism<br>Awareness, Struggle, rehabilitation, appropriate technology, scientific conservation. |
| 4. | **Development and environment:**<br>Issues of Noise pollution, Land pollution (Municipal industrial, Commercial, hazardous solid waste) Water pollution, Air pollution & Traffic Management, |
| 5. | **Ecological Behavior and Knowledge management:**<br>Recycling, energy, water conservation, political activism, Consumerism, and Commitment to environmental organizations. |
| 6. | **Corporate Social responsibility:**<br>Policy consideration, Training for environmental mental set - The issue of altering habits, Managing Environmental challenges for future |
| | **Text Books:** |
| 1. | The environmental ethics and policy book Philosophy, Ecology, Economics. II edition. 2003 |
| | **References:** |
| 1. | Madhu Gadgil and Ramchander Guha, Ecology and Equity, Penguin books, 1995. |
| 2. | Anuradha Sharma: Environment, Ecology, and Social Development |

# Open Elective-I

| Program | M. Tech. (All Branches) | Semester - I |
|---|---|---|
| Course Code | PEPM5061S | |
| Course Title | Entrepreneurship Development | |

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| | **Course outcomes**: On the completion of this course, the learner will able to<br>1. Demonstrates skills required by an entrepreneur<br>2. Analyze business opportunities and the basics to create, launch and manage new businesses<br>3. Develop a Business Model for their Idea/Problem<br>4. Create MVP (Minimum Viable Product). |
| | **Syllabus** |
| 1. | **Introduction**<br>Discover yourself – Find your Flow, Effectuation, and Identify your entrepreneurial style |
| 2. | **Problem Identification and Idea generation**<br>Identify Problems worth Solving, Introduction to Design Thinking, generate ideas that are potential solutions to the problem identified, GOOTB: Run problem interviews with prospects, Class Presentation: Present the problem you "love", Team Formation. |
| 3. | **Customer Study and Value Proposition**<br>Identify Your Customer Segments and Early Adopters - Market Types, Segmentation, and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns, Customer identification, Market, Creative solution;<br>Craft Your Value Proposition - Come up with creative solutions for the identified problems, Deep dive into Gains, Pains, and "Jobs-To-Be-Done" (using Value Proposition Canvas, or VPC), and Identify the UVP of your solution using the Value Proposition section of the VPC, Outcome-Driven Innovation. |
| 4. | **Business Model Canvas**<br>Get Started with Lean Canvas - Basics of Lean Approach and Canvas; Types of Business Models (B2B; B2C), Sketch the canvas- "Document your Plan A", Intro to Risks; Identify and document your assumptions (Hypotheses); identify the riskiest parts of your Business Plan, Risk identification, Class Presentation: Present your Lean Canvas. |

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| 5. | **Validation**<br>Develop the Solution Demo - Build solution (mock-ups) demo, How to run solution interviews, GOOTB: Run Solution interviews, Does your solution solve the problem for your customers: The problem-solution test.<br>Sizing the Opportunity - Differences between a Start-up venture and a small business; Industry Analysis: Understanding what is Competition and its role, Analyse competition;<br>Building an MVP - Identification of MVP, Solution development, building products/services, Build-measure-learn loop for development |
| 6. | **Money**<br>Revenue streams, Pricing, and cost, Financing Your New Venture - Venture financing, Investor expectations. |
| 7. | **Team building**<br>Shared leadership, the role of a good team, how to pitch to candidates to join your startup Collaboration tools and techniques - Brainstorming, Mind mapping, Kanban Board, #Slack |
| 8. | **Marketing and sales**<br>Positioning of Products/Services, Channels, and strategies, Building Digital Presence and leveraging Social media, Budgeting, and planning.<br>Sales planning - Buying decisions, Sales planning, setting targets, Unique Sales Proposition (USP); Art of the sales pitch (focus on customers' needs, not on product features), Follow-up and closing a sale; Asking for the sale. |
| 9. | **Support**<br>Planning and tracking - Importance of project management to launch and track progress, Understanding time management, workflow, and delegation of tasks.<br>Business Regulation - Basics of business regulations of starting and operating a business; Importance of being compliant and keeping proper documentation; How to find help to get started. |
| | **Text Books** |
| 1. | Roy R.: Entrepreneurship, Oxford University Press. |
| 2. | Maurya A.: Running Lean: Iterate from Plan A to a Plan That Works. O'Reilly Media |
| | **References** |
| 1. | Jeffry A: New venture creation, Tata McGraw Hill |
| 2. | Osterwalder, A and Pigneur Yves: Business Model Generation: A Handbook for Visionaries, Game Changers and Challengers. |
| 3. | Gupta T. S: Intellectual Property Law in India, Kluwer Law International. |
| 4. | Saraswathi S.D: Effectuation: Elements of Entrepreneurial Expertise. Edward Elgar Publishing. |
| 5. | Kim W. C. and Mauborgne R: Blue Ocean Strategy, Harvard Business School Press. |
| 6. | Ries, E.: The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, The Crown Publishing Group |

# Laboratories Semester-I

| Program | M. Tech (Project Management) | Semester - I |
|---|---|---|
| Course Code | PEPM5071L | |
| Course Title | Project Management Software Lab | |

**Course Outcomes**: On the completion of this course, the learner will able to

1. Understand the main features of SPSS
2. Use the SPSS GUI effectively
3. Perform descriptive analyses with SPSS
4. Perform common parametric and non-parametric tests
5. Perform simple regressions analyses

| | Course Content |
|---|---|
| 1. | **SPSS Introduction:** Introduction to SPSS - Data analysis with SPSS: general aspects, workflow, critical issues -SPSS: general description, functions, menus, commands - SPSS file management |
| 2. | **Input and data cleaning:** Defining variables - Manual input of data - Automated input of data and file import |
| 3. | **Data Manipulation:** Data Transformation - Syntax files and scripts - Output management |
| 4. | **Descriptive analysis of data:** Frequencies - Descriptive - Explore - Crosstabs – Charts |
| 5. | **Statistical tests:** Means - T-test - One-way ANOVA - Nonparametric tests - Normality tests |
| 6. | **Correlation and regression**: Linear correlation and regression - Multiple regressions (Linear) |
| 7. | Design of Experiments |
| 8. | MS Project Assignments<br>CPM /PERT analysis using MS Project |

| Program | | M. Tech (Project Management) | Semester - I |
|---|---|---|---|
| Course Code | | PEPM5072L | |
| Course Title | | Computerized Financial Management Lab | |
| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Use computers in analyzing financial statements, and financial evaluation of projects.<br>2. Analyze the financial viability of projects<br>3. Understand the processing of funding applications and methods of funding large projects | | |
| | **Course Content** | | |
| 1. | Analyze the financial statements to understand the financial status of an Indian company and an MNC including financial ratios. | | |
| 2. | Determine the merit order of projects for investment based on financial criteria (capital budgeting) | | |
| 3. | Breakeven analysis | | |
| 3. | Key Performance Indicators/Benchmarks | | |
| 4. | Capital Structure and Dividend Decisions | | |
| 5. | Case Scenario Forecasting | | |
| 6. | Use of tools/software for decision-making. | | |

| Program | | M. Tech (Project Management) | Semester - I |
|---|---|---|---|
| Course Code | | PEPM5073L | |
| Course Title | | Optimization Lab | |
| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Perform decision-making using AHP, TOPSIS, SAW, WPM, Digraph<br>2. Optimize the parameters using a Genetic Algorithm (GA)<br>3. Apply ELECTRE and PROMETHE methods<br>4. Apply MCDM techniques to project management | | |
| | **Course Content** | | |
| 1. | Develop and write the programming code for the AHP, TOPSIS, and ANP using Python, CPLEX, etc. | | |
| 2. | Develop the models using Super decision software for the MCDM/MODM techniques | | |
| 3. | Execution of the one project on PRIMAVERA software from planning to execution | | |
| 4 | ELECTRE | | |
| 5 | Assignments using<br>Genetic Algorithm (GA)<br>Simulated Annealing,<br>Particle Swarm Optimisation | | |
| 6 | Analysis of the project using statistical tools | | |
| 7. | Financial analysis to measure the project and to check the status of it | | |

# Semester-II

| Program | M. Tech (Project Management) | Semester - II |
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| Course Code | PEPM5002S | |
| Course Title | Research Methodology and IPR | |

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| | **Course outcomes**: On the completion of this course, the learner will able to<br>1. appreciate the significance of research and be able to contribute to societal<br>2. demonstrate proficiency in contemporary computer applications (specific software) to solve large and complex real-life problems<br>3. communicate their ideas in oral, written, and graphical form.<br>4. develop an attitude for lifelong learning to the changing technologies and practices and be alive to the ever-changing environment and needs of the Industry and Society.<br>5. demonstrate ethics in research and understanding of IPR. |
| | **Course Content** |
| 1. | **Introduction**<br>Meaning and purpose of research, objectives of the research, types of research, the significance of research, research approaches, research methods v/s methodology, research process, and criteria of good research. |
| 2. | **Research Problem**<br>Steps in Research: Identification, selection, and formulation of a research problem- Research questions-Research design- Formulation of hypothesis- Review of the literature. Definition, necessity, and techniques of defining research problem; Objectives of the research problem. |
| 3. | **Research Design**<br>Meaning need and features of good research design. Types of research designs, basic principles of experimental designs, design of experiments. |
| 4. | **Sampling Designs and Technique**<br>Sampling theory-types of sampling steps in sampling-Sampling and Non-sampling error- Sample size –Advantages and limitations of sampling. Census and Sample surveys, Different types of sample designs, and characteristics of the good sample design. Techniques of selecting a random sample. |
| 5. | **Data Collection**<br>Primary and secondary data. Primary data-Meaning, Collection methods-Observation – Interview-Questionnaire-Schedule-Pretest-Pilot study –Experimental and case studies- Secondary data-Meaning – Relevance, limitations, and cautions. |

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| 6. | **Hypothesis**<br>Definition, Fundamentals, and procedure of hypothesis testing, flow diagram for hypothesis testing. Measurement in Research: Measurement scales – Tests of good measurement construction of Likert and Semantic Differential scales-Source of errors in measurement- Scale validation. |
| 7. | **Parametric and non-parametric test**<br>Parametric and non-parametric tests of hypothesis testing-Important non-parametric tests:Sign, Run Kruskal-Wallis tests and Mann – Whitney test. Testing of significance means, proportion, variance, and correlation- Testing for the significance of the difference between means, proportions, variances, and correlation coefficients. Limitations of tests of hypothesis. |
| 8. | **Technical Paper and Report Writing**<br>Basic concepts of paper writing and report writing, review of literature, Concepts of Bibliography and References, the significance of report writing, steps of report writing, Process and structure of the report, Types of Research reports, Methods of presentation of the report, Plagiarism. |
| 9. | **IPR and Research Ethics**<br>Historical Evolution of IPR Protection – Patent, Copyright, Trademark, Designs, GI, Plant Varieties, Biodiversity, Lay-out designs of ICs. Philosophical & Theoretical Justifications of IPRs, International Protection – Paris Convention, Berne Convention, Lisbon & Madrid Agreement, TRIPS Agreement, World Intellectual Property Organisation (WIPO) Ethical Issues, Ethical Principles that govern Research, Ethically valid Information Sources, Regulatory Compliance. |
| | **Text Books:** |
| 1. | Herman Tang: Engineering Research: Design, Methods, and Publication, Wiley. |
| 2. | C. R. Kothari: Research Methodology: Methods and Techniques New Age International |
| 3. | V K Ahuja: Law Relating to Intellectual Property Rights, LexisNexis Butterworths. |
| | **References:** |
| 1. | R. Panneerselvam: Research Methodology, Prentice Hall India. |
| 2. | Fisher R. A.: Statistical Methods for Research Workers, Macmillan Publishers |

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| **Program** | M. Tech (Project Management) | **Semester** - II |
| **Course Code** | PEPM5013T | |
| **Course Title** | Management of Infrastructure Projects | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Grasp the enormity of large infrastructure and plan<br>2. To understand the basics of infrastructure management and its significance for an effective project manager's role in the organization.<br>3. Determine the financial sourcing and viability of large infrastructure projects<br>4. Apply government policies toward mega projects |
| | **Course Content** |
| 1. | **Introduction and Infrastructure scenario:**<br>Types, role, need and scenario of infrastructure, infrastructure crisis, Basic study, investigations and feasibility studies, project formulation, SWOT analysis, and project report. |
| 2. | **Appraisal:**<br>an infrastructure project, project development cycle, the appraisal, Need of appraisal, and steps of appraisal.<br><br>**Market Appraisal:**<br>Demand analysis, forecasting demand, sources of information, market survey, uncertainties in demand forecasting. |
| 4. | **Appraisals:**<br>Assessment of entrepreneur, chief executive, board of directors, departmental heads, the organization as a whole, technical appraisal: Location, land, buildings, technology and its appropriateness, size of plant, plant and machinery, raw materials, energy requirements, water supply, effluent disposal. |
| 5. | **Financial and economic appraisal:**<br>Cost of the project and means of financing, profitability, break-even analysis, financial projections, financial appraisal tools: urgency, payback period, accounting rate of return, net present value, internal rate of return, benefit-cost ratio, cost of capital, risk analysis, social cost-benefit analysis. |
| 6. | **Ecological appraisal:** Environmental impact analysis. |

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| 7. | **Project financing and implementation:**<br>Types and sources, Agencies involved in implementation, methods of implementation like Build, operate, and transfer (BOT) method and its variants like BOO, BOOT, BOLT etc. |
| | **Text Books:** |
| 1. | Keat Paul, K Young Philip, Erfle Steve, College Dickinson (Author), Banerjee Sreelatha, Managerial Economics, Pearson Publications, 7th edition, 2017. |
| 2. | Jawaharlal: Cost Accounting Third Edition Tata McGraw Hill Publishing |
| 3. | Dominick Salvatore, Siddhartha Rastogi, Managerial Economics: principles and worldwide applications, Oxford University Press; 9th edition 2020. |
| | **References:** |
| 1. | M.Y.Khan and P.K. Jain: Management Accounting, Tata McGraw Hill |
| 2. | Sasmita Mishr, Engineering Economics and Costing 2nd edition. |
| 3. | D N Dwivedi, Managerial Economics, Vikas Publishing House, 2015, 8th Edition |
| 4. | Prasanna Chandra: Fundamentals of Financial Management, Tata McGraw Hill |
| 5. | Varshney and Maheshwari: Managerial Economics, Sultan Chand and Sons, New Delhi. |
| 6. | Thusen and Thusen : Engineering Economics, Prentice hall of India. |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5014T | |
| Course Title | Project Risk Management | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Identify, and classify the various risks faced by projects<br>2. Analyze and Quantify the various types of risks involved with the projects<br>3. Devise risk mitigation plans<br>4. Devising a disaster recovery plan |
| | **Course Content** |
| 1. | **Risks:**<br>Definition, dynamic and static risk, uncertainty, and risk. Risk in the Project Life Cycle |
| 2. | **Risk and construction:**<br>Time, money, and technology, the people and the risks, processes and risks, risks and clients, consultants and contractors, decision making in construction, contracts, and risks. |
| 3. | **Risk management system:**<br>Risk identification, sources of risks, risk classification, types, impact and consequences of risk, risk analysis, risk response: retention, reduction, transfer, avoidance. |
| 4. | **Tools and techniques of risk management:**<br>Risk-adjusted discount rate, subjective probabilities, decision analysis, multi-attribute value theory, sensitivity analysis, Monte- Carlo simulation, portfolio theory. |
| 5. | **Utility and risk attitude:** Utility theory, utility function. |
| 6. | **Risk analysis of single projects:**<br>Risk measures, analysis of un-correlated, perfectly correlated, and moderately correlated cash flows, and decision tree analysis. Risk analysis in practice. |
| 7. | **Disasters and recovery plan:**<br>Natural and manmade, possible effects, identifying critical processes and systems. Basic requirements, documenting disaster recovery plan, rehearsing the disaster recovery plan, for example, disaster recovery plan. |
| | **Text Books:** |

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| 1. | Paul Hopkin, Fundamentals of Risk Management: Understanding, Evaluating and Implementing Effective Risk Management . |
| 2. | Roland Wanner, Project Risk Management: The Most Important Methods and Tools for Successful Projects |
| | **References:** |
| 1. | Project Management Body of Knowledge (PMBOK) 9th Edition, PMI Institute |
| 2. | N J Smith, Managing Risk in Construction Projects. |
| 3. | The Failure of Risk Management: Why It's Broken and How to Fix It 2nd Edition |

# Program Elective-III

| Program | M. Tech (Project Management) | Semester - II |
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| Course Code | PEPM5041T | |
| Course Title | Supply Chain Management | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Analyze and improve supply chain processes using key concepts of supply chain management.<br>2. Evaluate and manage an effective supply chain.<br>3. Understand the fundamental role of logistics as it relates to transportation and warehousing.<br>4. Align the management of a supply chain with corporate goals and strategies |
| | **Course Content** |
| 1. | **Building a Strategic Framework**<br>Supply chain stages and decision phases, Process view of the supply chain: Supply chain flows, Examples of supply chains, Competitive and supply chain strategies, Achieving strategic fit: Expanding strategic scope, Drivers of supply chain performance. Framework for structuring drivers: inventory, transportation facilities, information obstacles to achieving fit.<br>Supply Chain Performance, Supply Chain Drivers, and Metrics |
| 2. | **Designing the Supply Chain Network**<br>Distribution Networking: Role, Design, Supply chain network (SCN): Role, Factors, a framework for design decisions. |
| 3. | **Inventory Management**<br>Scope, Importance, Classification of materials, Procurement, Purchasing policies, Vendor development, and evaluation. Inventory control systems of stock replenishment, Cost elements, and Inventory models – deterministic and probabilistic. |
| 4. | **Logistics Management**<br>Introduction: A macro and Micro Dimensions, Logistics interfaces with other areas, Approach to analyzing logistics system, Logistics, and systems analyzing: Techniques of logistics system analysis, factors affecting the cost, and Importance of logistics. |
| 5. | **Warehouse and Transport Management**<br>Concept of strategic storage, Warehouse functionality, Warehouse operating principles, Developing warehouse resources, Material handling and packaging in warehouses, Transportation Management, Transport functionality and principles, Transport infrastructure, transport economics, and Pricing. Transport decision making |

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| 6. | **IT in Supply Chain**<br>IT framework, Customer Relationship Management(CRM), internal Supply chain management, Supplier Relationship Management (SRM), Transaction management, |
| 7. | **Supply Chain Coordination**<br>Lack of supply chain coordination and the Bullwhip effect, Obstacle to coordination, Managerial levers, Building partnerships and trust. |
| 8. | **Emerging Trends and Issues**<br>Vendor-managed inventory-3PL-4PL, Reverse logistics: Reasons, Role, Activities; RFID systems: Components, Applications, Implementation; Lean supply chain, Implementation of Six Sigma in the supply chain, Green supply chain. Introduction to Global Supply Chain Management. Globalization network design, Green SCLM, understanding supply chain excellence, case studies. |
| | **Text Books:** |
| 1. | Chopra Sunil, Meindl Peter, and Kalra D.V: Supply Chain Management: Strategy, Planning & Operation, Pearson Prentice Hall. |
| 2. | Shah Janat: Supply Chain Management: Texts & Cases, Prentice Hall. |
| | **References:** |
| 1. | David Simchi Levi, Philip Kaminsky, Edith Smichi Levi, and Ravishankar: Designing & Managing Supply chain, McGraw Hill (Indian Edition) |
| 2. | David Simchi Levi, Philip Kaminsky, Edith Smichi Levi, and Ravishankar: Designing & Managing Supply chain, McGraw Hill (Indian Edition) |
| 3. | Donald Bower Sox and David Closs: Logistical Management: The Integrated Supply Chain Process, McGraw Hill Education |
| 4. | Martin Christopher: Logistics and Supply Chain, FT Publishing International |
| 5. | Narayan Rangaraj, G Raghuram, Mandyam M Srinivasan: Supply Chain Management for Competitive Advantage- Concepts & Cases TMH |
| 6. | Douglas Lanibert& James Stock: Strategic Logistics Management. McGraw Hill |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5042T | |
| Course Title | Legal Aspects of Project Management | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Implement industrial laws including labor and establishment laws<br>2. learn about land Acquisition and Development Acts<br>3. demonstrate working knowledge of the contract act and labor act<br>4. Apply Arbitration and Reconciliation methods |
| | **Course Content** |
| 1. | Introduction - Law and The Common Man, Legal Systems In India<br>Basics of tender; law of tort; the role of the project manager; insurance; bonds; builders liens; labour law; intellectual property; avoidance of claims and disputes; ADR, the arbitration act; future trends in contracting. |
| 2. | Sales of goods Act |
| 3. | Contract Management and administration<br>Bid Cycle, Contract Conditions Interpretation By Parties To Contract, Obligation And Responsibilities Of The Parties, Protection And Indemnification, Bonds And Insurance.<br>Inspection Of Work, Change Of Work, Rejected Work And Deficiencies, Deviations Extra Claims And Their Management, Contract Disputes And Their Settlement, and Project Closure. |
| 4. | International Contracting Scope, Nature, Types, Rules & Procedures |
| 5. | Indian Contract Act, 1872 Provisions Of Contract Act, Important Clauses Of The Act |
| 6. | Labour Acts<br>Indian Labor Code 2020. Payment Of Wages Act, Contract Labour Act. Minimum Wages Act, Employees' State Insurance Act, and Workmen's Compensation Act. |
| 7. | Arbitration & Reconciliation Act 1996 |
| | **Text Books:** |
| 1. | Akhileshwar Pathak: Legal Aspects of Business, McGraw Hill Education. |
| 2. | M K Nabi: Legal Aspects of Business \| Text & Cases, Taxmann |
| | **References:** |
| 1. | Kumar: Legal Aspects of Business, Cengage Learning |
| 2. | David Right: Law for Project Managers, Routledge; |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5043T | |
| Course Title | Ethics and Leadership | |
| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Use Moral and Ethics in individual behavior<br>2. Demonstrate and Apply leadership qualities<br>3. Manage Corporate Responsibility<br>4. Apply social responsibility | |
| | **Course Content** | |
| 1. | Moral concepts – values; Personal values, Moral concepts – relationships, community stakeholders versus stockholders, Social responsibility, Corporate citizenship | |
| 2. | Ethical decision-making models; Ethical problems that arise in business, Moral concepts – honesty, fairness, equality, unethical dual relationships, Corporate responsibility – ethical and legal issues, Construct an ethical argument | |
| 3. | Ethical problems that arise in business, Ethics versus law, Sarbanes-Oxley, Whistleblowing Federal Sentencing Guidelines for Organizations, Moral concepts including instrumental and intrinsic goodness, values, justice, and vision, Moral philosophies including consequentialist, non-consequentialist, virtue ethics and justice ethics, Relativism Ethical and decision-making models and frameworks, Ethical issue intensity, Moral intensity, | |
| 4. | Economic value orientation, Kohlberg's theory of moral development, Ethical spheres of influence, Personal values and vision and their role in a business environment, Qualities of ethical leadership, Roles and habits of leaders, Transitional leader, Transformational leader, The role of organizational culture and corporate governance in business ethics.Power – reward, coercive, legitimate, expert, referent, Motivation, Group norms – formal and informal<br>Corporate responsibility and the role of ethics audits, environmental audits, and social audits. Ethical problems that arise in business. | |
| | **Text Books:** | |
| 1. | CSV Murthy: Business Ethics Text & Cases, Himalaya Publishing House | |
| 2. | A.C. Fernando: Business Ethics: An Indian Perspective, Pearson India | |
| | **References:** | |
| 1. | S K Mandal: Ethics in Business and Corporate Governance, McGraw Hill Education | |
| 2. | Robert Lorber: Organizational behavior, An Experiential Approach." | |
| 3. | Kouzes and Posner, The Leadership Challenge | |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5044T | |
| Course Title | Environmental Impact Assessment and Audit | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Evaluate the impact of the project on the environment<br>2. apply the Environmental Assessment Process<br>3. Carry environmental audit<br>4. Prepare an Environmental Impact Statement |
| | **Course Content** |
| 1. | **Environmental Impact Assessment:** Brief history, Significance, Objectives, Role in planning and decision-making process. |
| 2. | **Environmental Assessment Process:**<br>Assessment methodologies, Socioeconomic impact assessment, air, noise, water, vegetation & wildlife and energy impact analysis, cumulative impact assessment, ecological impact assessment, and risk assessment. |
| 3. | **Environmental Impact Statement:**<br>Basic concepts behind EIS, Various Stages in EIS production, Typical EIS outline, Rapid EIA. |
| 4. | **Environmental auditing:**<br>Aims & Objectives, Audit principles, Partial environmental audits, Scope of audit, Case studies. |
| | **Text Books:** |
| 1. | Larry W. Canter, Environmental Impact Assessment, McGraw Hill International Edition 1995. |
| 2. | A.K. Mhasker Environmental Audit, M/s Media Enviro EIA Notification Govt. of India, 2005. |

| Program | M. Tech (Project Management) | Semester - II |
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| Course Code | PEPM~~5052S~~ PE PM5063S | |
| Course Title | Management of Software Projects | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Apply Project Management principles while developing software.<br>2. Obtain adequate knowledge about software process models and software effort estimation techniques<br>3. plan and manage projects at each stage of the software development life cycle (SDLC).<br>4. manage software projects and control software deliverables.<br>5. Estimate the risks involved in various project activities. |
| | **Course Content** |
| 1. | **Project Evaluation and Project Planning**<br>Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning. |
| 2. | **Project Life Cycle And Effort Estimation**<br>Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model |
| 3. | **Activity Planning And Risk Management**<br>Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules. |
| 3. | **Project Monitoring and Control**<br>Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index(SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming |

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| 4. | **Software Quality Assurance and Testing**<br>Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process. |
| 5. | **Project Management and Project Management Tools**<br>Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS- Project. |
| 6. | **Roject Management and Control**<br>Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management. |
| | **Text Books:** |
| 1. | Bob Hughes, Mike Cotterell, and Rajib Mall: Software Project Management –Tata McGraw Hill, New Delhi. |
| 2. | S. A. Kelkar, Software Project Management |
| | **References:** |
| 1. | M.Cotterell, Software Project Management. |
| 2. | Richard Thayer: Software Engineering Project Management, Wiley |
| 3. | Gopalaswamy Ramesh, —Managing Global Software Projects – McGraw Hill Education (India) |
| 4. | Pankaj Jalote: Software Project Management in Practice, Pearson Education India; |
| 5. | Robert K. Wysocki —Effective Software Project Management – Wiley Publication |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5053S | |
| Course Title | International Business Management | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. use the most widely used international business terms and concepts.<br>2. understand the international trading practices and issues<br>3. appreciate the working of MNC<br>4. Identify the role and impact of political, economical, social, and cultural variables in international business. |
| | **Course Content** |
| 1. | **Introduction to International Business and EPRG & LPG framework:**<br>Globalization forces – Meaning, dimensions and stages in Globalization – Globalization Boon or bane. Theoretical Foundations of International Trade. Introduction to theories of International Trade by Adam Smith, Ricardo and Ohlin & Heckler – Trading Environment of International Trade- Tariff and Non-Tariff Barriers – Trade blocks. |
| 2. | **International Business Environment:**<br>Political Economic, Social and Cultural Legal, Technological, Natural Environments Country Risk Analysis. Opportunities and threats for International Business. Regional Economic Cooperation, European Union (EU), ASEAN, NAFTA. |
| 3. | **Bilateral and Multilateral Trade Laws:**<br>Foreign Trade Promotion Measures and Organizations in India, general Agreements on Trade & Tariffs (GATT), World Trade Organization (WTO), different rounds, IPR, TRIPS, TRIMS, GATS, Ministerial Conferences, SAARC. |
| 4. | **International Financial Environment**:<br>Balance of Trade, International Monetary fund, Balance of Payment Account, and Theories of the exchange rate. Asian Development Bank, World Bank, Introduction to Export and Import finance, methods of Payment in International Trade, International Financial Instruments. |
| 5. | **International Marketing**:<br>Objectives and Challenges in International Marketing, Major Players in International marketing, market Selection, Entry Strategies. |

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| 6. | **Multinationals (MNCs) in International Business:**<br>Contemporary Developments and Issues in International Business, SEZ – Introduction – Types of economic zones, Meaning and Nature of SEZ – Mechanism of the setting of SEZ, opposition to SEZ. |
| 7. | **Case Studies and Web Exercises:**<br>Case Studies on Global Environment Analysis, International Marketing, International Finance, and Country Risk Analysis<br>**Web Exercises:** Visit websites of different International organizations like UNO, World Bank, International Monetary Fund, SAARC, Euro, and related links etc. |
| | **Text Books:** |
| 1. | Francis Cherunilam: International Business. PHI |
| 2. | Charles Hill and Arun Kumar Jain: International Business, Tata McGraw Hill Publishing |
| | **References:** |
| 1. | P.G. Apte: International Financial Management, McGraw Hill Education |
| 2. | P Subba Rao, International Business, Himalaya Publishing House |
| 3. | V K Bhalla and S Shiva Ramu, International Business, Anmol Publications Private Ltd |
| 4. | Anant Sundaram, International Business Environment, PHI Publications. |
| 5. | International Business Environment – Bhalla and Raju |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5054S | |
| Course Title | Value Engineering and Management | |

**Course Outcomes**: On the completion of this course, the learner will able to

1. Discuss various phases of value engineering. Analyze the function, approach of function, and evaluation of function. Determine the worth and value.
2. Developing the basic knowledge of Risk & Value Management and developing the capability to apply such principles for handling complex problems in Project management, Discuss queuing theory.
3. Appraise the value engineering operation in maintenance and repair activities, Discuss queuing theory.
4. Create the value engineering team and discuss the value engineering case studies.

| | Course Content |
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| 1. | **Introduction and Organization:** Value engineering concepts, advantages, applications, problem recognition, role in productivity, criteria for comparison, and element of choice. Level of value engineering in the organization, size, and skill of VE staff, small plant, VE activity, unique and quantitative evaluation of ideas. |
| 2. | **Value engineering job plan & analysis function:** Introduction, orientation, information phase, speculation phase, analysis phase. Selection and Evaluation of value engineering Projects, Project selection, methods selection, value standards, application of value engineering methodology Anatomy of the function, use esteem and exchange values, basic vs. secondary vs. unnecessary functions. The approach of function, Evaluation of function, determining function, classifying function, evaluation of costs, evaluation of worth, determining worth, evaluation of value, Value engineering techniques &Versatility. |
| 3. | **Value engineering level of effort:** Value engineering team, co-coordinator, designer, different services, definitions, construction management contracts, value engineering case studies |
| 4. | **Project Risks & Risk management system:** Definition, dynamic and static risk, uncertainty and risk. Risk and construction project time, money and technology, the people and the risks, processes and risks, risks and clients, consultants and contractors, risk allocation in contracting. Risk identification, sources of risks, risk classification, types, impact and consequences of risk, risk analysis, Sensitivity analysis, and breakeven analysis, scenario analysis, risk response: retention, reduction, transfer, avoidance, Qualitative and quantitative methods in risk management. |

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| | **Text Books:** |
| 1. | Anil Kumar Mukhopadhyaya: Value Engineering Mastermind: From concept to Value Engineering Certification, SAGE Publications. |
| 2. | Miles, L.D.: Techniques of Value Analysis and Engineering, McGraw Hill |
| | **References:** |
| 1. | Alphonse Dell'Isola: Value Engineering: Practical Applications for Design, Construction, Maintenance & Operations, R S Means Co. |
| 2. | Richard Park: Value Engineering: A Plan for Invention, St. Lucie Press. |
| 3. | Del L. Younker: Value Engineering analysis and methodology, Marcel Dekker |
| 5. | N J Smith: Managing Risk in Construction Projects. |
| 6. | L W Zimmerman and G D Hart: Value Engineering, CBS Publishers. |
| 7. | R Flagnan R and G Norman, Risk management and Construction, Blackwell Scientific. |
| 8. | Thompson P A and Perry J G: Engineering Construction Risks- A guide to Project risk analysis and risk management, Thomas Telford. |

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| **Program** | M. Tech (Project Management) | **Semester** - II |
| **Course Code** | PEPM5055S PEPM5052S | |
| **Course Title** | Product Lifecycle Management | |

**Course outcomes**: On the completion of this course, the learner will able to

1. Designing products with consideration to business constraints.
2. Understanding the market aspects involved and the process involved in bringing new products to the marketplace.
3. Understand the principal issues involved in technical product management throughout all phases of the product life cycle.
4. Be able to develop, plan and manage with a product management plan that covers design, development, testing, marketing and sales, and customer support.
5. Develop a strategic plan that relates to organizational objectives for a product or product area including its phase-out and replacement at the end of the product life cycle.

| | **Course Content** |
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| 1. | **Introduction**<br>Definition, PLM Lifecycle model, Threads of PLM, Need for PLM, Opportunities, and benefits of PLM, Views, Components, and Phases of PLM, PLM feasibility study, PLM visioning |
| 2. | **PLM Concepts, Processes, and Workflow**<br>Characteristics of PLM, Environment driving PLM, PLM Elements, Drivers of PLM, Conceptualization, Design, Development, Validation, Production, Support of PLM |
| 3. | **Product Data Management (PDM) Process and Workflow**<br>PDM systems and importance, the reason for implementing a PDM system, and financial justification of PDM implementation. Versioning, check-in and checkout, views, Metadata, Lifecycle, and workflow. Applied problems and solutions to PDM processes and workflow. |
| 4. | **Collaborative Product Development**<br>Engineering vaulting, product reuse, smart parts, engineering change management, Bill of materials and process consistency, Digital mock-up and prototype development, design for environment, virtual testing and validation, marketing collateral, Tools of communication for collaborative work, Digital Manufacturing. |

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| 5. | **Developing a PLM strategy and conducting a PLM assessment**<br>Strategy, Impact of strategy, implementing a PLM strategy, PLM initiatives to support corporate objectives. Infrastructure assessment, assessment of current systems and applications. |
| 6 | **Evolution of the Industrial Internet of Things (IoT)**<br>IoT in a manufacturing environment, Integration of operation with information Technology, End to end Industrial IoT Environment |
| | **Text Books:** |
| 1. | Michael Grieves: Product Lifecycle Management, McGraw-Hill. |
| 2. | Antti Saaksvuori, Anselmilmmonen: Product Life Cycle Management, Springer |
| | **References:** |
| 1. | John Stark: Product Lifecycle Management: Paradigm for 21st Century Product Realization, Springer-Verlag |
| 2. | Uthayan Elangovan: Product Lifecycle Management (PLM) A Digital Journey Using Industrial Internet of Things, CRC Press |

# Open Elective-II

| Program | M. Tech | Semester - II |
|---|---|---|
| Course Code | PEPM5062S | |
| Course Title | Project Management | |

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| | Course outcomes: On the completion of this course, the learner will able to<br>1. To understand the basic concepts of project management.<br>2. Appraise the project using appropriate appraisal techniques.<br>3. Design and implement the project by considering risk and its evaluation.<br>4. Learn the process of project planning and execution. |
| | **Course Content** |
| 1. | **Introduction**<br>Definition, need, appropriateness and Characteristics of projects, Complexities of a Project, Different Types of Projects, Determinants of project success, Characteristics of project management, Projects in contemporary organizations, Project life cycle, sustainable project development |
| 2. | **Project Selection and Appraisal**<br>Brainstorming and concept evolution, Project Feasibility Analysis, Approaches to project screening and selection, nonquantitative and scoring models, Types of appraisals, SWOT analysis, and financial feasibility |
| 3. | **Project Integration Management:**<br>Project manager- Team building and conflict management, project organizational structure, Selection of project organization, Integration of project organization Developing project charter, Project scope, Project management plan, Direct and managing project execution, monitoring, and control, Close project |
| 4. | **Project Scope management:** Scope definition and planning, work breakdown structure (WBS), Responsibility matrix, scope control |
| 5. | **Project Schedule Management**<br>Network techniques: PERT and CPM, AON and AOA representation, Three-time estimates-probability distributions for time computation, Probability of project completion, Time scale version of the network, Early start, and late start schedules. |

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| 6. | **Project Resource Management**:<br>Resource allocation, Resource loading, and leveling, constrained resource scheduling, Multi-project scheduling, resource allocation, crashing a project, cost budgeting, and control |
| 7. | **Project Risk Management:**<br>Risk Management Strategies, Risk management Approaches, Risk Identification, Qualitative and quantitative risk analysis, Risk response, Risk monitoring, and control |
| 8. | **Computerized Project Management**<br>Computerized PMIS, Choosing software for project management, using software for project management. Case studies in project management in specific industries such as the Electrical industry, Electronics industry, IT/ITeS industry, Manufacturing industries, fashion industries, infrastructure sector, etc. |
| 9. | **Case Studies on Project Management**: Modern cases in project management |
| | **Text Books:** |
| 1. | John Nicholas, Project Management for Business and Technology: Principles and Practice. Pearson Prentice Hall, New Delhi. |
| 2. | Shrub, Bard, and Globerson: Project Management: Engineering, Technology, and Implementation, PHI. |
| | **References:** |
| 1. | A Guide to the Project Management Body of Knowledge (PMBOK Guide) Latest Edition. PMI. |
| 2. | Harold Kerzner: Project Management-A Systemic Approach to Planning, Scheduling, and Controlling, CBS Publishers. |
| 3. | L.S. Srinath: PERT and CPM: Principles and Applications, Affiliated East West Press Ltd. |
| 4. | K. Joy: Total Project Management: The Indian Context, Macmillan India Ltd. |
| 5. | Jeffrey K. Pinto: Project Management, Pearson publication. |
| 6. | Choudhury: Project Scheduling and Monitoring in Practice. McGraw Hill Education(I) Pvt.Ltd, |

# Laboratories Semester-II

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5074L | |
| Course Title | ERP and SAP Lab | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Overview of the best-known and widely used enterprise planning systems SAP and/or Oracle.<br>2. Maintain Key master data to execute each business process;<br>3. Apply ERP transactions required to complete each business process cycle;<br>4. Use Key integration points between the different business disciplines supporting each business process cycle |
| | **Course Content** |
| 1. | **Implementing standard software**<br>Standard software, An introduction to enterprise resource planning systems. SAP Navigation |
| 2. | **SAP software components and product landscape:**<br>Business-oriented product components, Technological product components, SAP R/3 Enterprise / Oracle, mySAP ERP / Oracle E-Business Suite / Collaboration Suite, Adaptability, Development environment and standards, System architecture. |
| 3. | **Introduction to the use of SAP / Oracle:**<br>Navigating in SAP / Oracle, Sales, and distribution, Materials Management, Production planning, Quality management, Personnel management/development, Financial Accounting, Controlling |
| 4. | Execution of Procure-to-Pay Cycle and report generation and its analysis |
| 5. | Case Study on SAP-MM Organizational Structure |
| 6. | Execution of Procure-to-Pay Cycle and report generation and its analysis |
| 7. | Execution of Order to Cash Process and report generation and its analysis |
| 8. | Theory assignment on MRP<br>Execution of Manufacturing Process Cycle and report generation and its analysis |
| | **References:** |
| 1. | Balla, J. & Layer, F: Production Planning with SAP APO, Galileo Press. |
| 2. | Jones, P. & Burger, J.: Configuring SAP ERP Financials and Controlling, John Wiley & Sons. |
| 3. | Masters, J., Kotsakis, C. & Krishnamoorthy, V: ERecruiting with SAP ERP HCM 1st edition, Galileo Press. |
| 4. | Mohapatra, A: Optimizing Sales and Distribution Functionality and Configuration in SAP ERP, Galileo Press. |
| 5. | Sopracolle, V: Quick Reference Guide to Financial Accounting with SAP ERP Financials, Galileo Press. |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5075L | |
| Course Title | Simulation Lab | |

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| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Model & Simulate the system<br>2. Carry out Layout simulation<br>3. Carry out assembly line simulation<br>4. Use linear programming software for analysis. |
| | **Course Content- Case studies and assignments on:** |
| 1. | Basic Simulation Modeling, System model & Simulation, continuous & discrete, simulation of an inventory system, Single server, simulation of simple systems. |
| 2. | Introduction to Simulation Software, comparison of simulation packages with programming languages, classification of simulation software. |
| 3. | Layout simulation using simple situations |
| 4. | Assembly line simulation |
| 5. | Generating and evaluating what-if scenarios for finalizing the layout |
| 6. | Mini project using simulation software |

| Program | M. Tech (Project Management) | Semester - II |
|---|---|---|
| Course Code | PEPM5076L | |
| Course Title | Computerized Applied Probability Statistics Lab | |
| | **Course Outcomes**: On the completion of this course, the learner will able to<br>1. Proficient in handling application software - MS Excel, SPSS, R<br>2. Demonstrate the use of software for solving production & industrial engineering problems | |
| | **Course Content** | |
| **Note:** Course involves solving problems on probability and statistics using computer software Excel or R and specialized software SPSS. Unsolved problems are given in textbooks and references listed below. | | |
| 1. | Basic statistics | |
| 2. | Regression and correlation | |
| 3. | Analysis of Variance | |
| 4 | Design of experiment | |
| 5. | Demand forecasting models | |
| 6. | Statistical quality control – control charts, acceptance sampling, process capability studies | |
| 7. | Application of Statistics and Probability to inventory management (Selective inventory/ newsvendor / deterministic inventory models) | |
| 8 | Revenue Management | |
| | **Textbooks:** | |
| 1. | Richard Levin, David Levin, Massod Siddiqui, and Sanjay Rastogi: Statistics for Management, Pearson Education India | |
| 2. | Sheldon Ross: Introduction to Probability and Statistics for Engineers and Scientists, Elsevier. | |
| 3. | Murray Spiegel and Larry Stephens: Statistics, Schaum's Series, TMH Publishing. | |
| 4. | Murray Spiegel: Probability and Statistics, Schaum's Series, TMH Publishing. | |
| | **References:** | |
| 1. | S. Gupta and V. Kapoor: Fundamentals of Mathematical Statistics, S. Chand and Co. | |
| 2. | R. Walpole, R. Myers, Myers and Keying: Probability and Statistics for Engineers and Scientists. | |
| 3. | Montgomery and George Runger: Applied statistics & probability for engineers, Wiley publisher. | |
| 4. | Jay Devore: Probability and Statistics for Engineering and the Sciences, Thomson and Duxbury Publications. | |

# Semester-III

# Self-Learning Courses-I

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5101S | |
| Course Title | Infrastructure Economics | |

**About Course**

This course is expected to introduce the role of infrastructure in economic growth. The broad view of physical as well as social infrastructure will be dealt with in depth which will be helpful to M.Tech students of multi-disciplinary Project Management having a background in Civil Engineering,

**Overview of Course Contents**

- Economics and Infrastructure
- Finance for Infrastructure
- Infrastructure and Economic Growth
- Challenges for Infrastructure Development
- Economic Model for Infrastructure Development
- Infrastructure in an Open Economy,
- Infrastructure Development in India
- A Comparison of Infrastructure in India with the world.

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5102S | |
| Course Title | Business Law for Managers | |

**About Course**

The course is designed to elucidate the legal framework within which enterprises operate. This course will help the students and employees to understand legal and regulatory issues affecting or likely to have a bearing on the profitability and sustainability of the businesses.

**Overview of Course Contents**

- Corporate Law and Its Changing Dynamics
- Corporate Governance
- Law of Contracts: Offer & Acceptance, Valid Contract
- Industrial Dispute Act – Industrial Relations
- Factories Act – Health & Safety, Labour Welfare
- Pit (Prohibition of Insider Trading), Competition Act
- Legislations on Wages – Payment of Wages, Minimum wage and Bonus, and Social Security
- Legislations on Social Security – Provident Fund, Gratuity, and Employee State Insurance

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5103S | |
| Course Title | Predictive Analytics | |

**About Course**

Predictive analytics aims to predict the probability of the occurrence of a future event such as customer churn, loan defaults, and stock market fluctuations – leading to effective business management.

Models such as multiple linear regression, logistic regression, auto-regressive integrated moving averages (ARIMA), decision trees, and neural networks are frequently used in solving predictive analytics problems. Regression models help us understand the relationships among these variables and how their relationships can be exploited to make decisions.

**Overview of Course Contents**

- Introduction to Analytics
- Simple Linear Regression (SLR)
- Multiple Linear Regression (MLR)
- Logistic Regression
- Decision Trees and Unstructured data analysis
- Forecasting and Time-series Analysis using software –SPSS or other

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5104S | |
| Course Title | Advanced Corporate Strategy | |

**About Course**

This course is expected to offer advanced exposure to corporate strategy. It builds on "Strategic Management" which dealt with strategies for single business firms. The principal focus of this course will be the strategic issues that are faced by firms operating in more complex, multi-dimensional environments.

**Overview of Course Contents**

- Corporate Advantage
- Product Diversification
- Vertical Integration
- Geographic Diversification
- Modes of Diversification

# Self-Learning Courses-II

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5201S | |
| Course Title | Management Of Inventory Systems | |

**About Course**

The course expects to offer the basic concepts and statistical and other quantitative techniques and methods employed in the broad area of materials management, in general, and inventory control and management, in particular. Static and dynamic inventory problems under certainty, risk, and uncertainty, design of inventory study and decision procedures, current approaches in inventory management, important methods and approaches in purchasing, storing, distribution, value engineering/analysis, logistics, and SCM.

**Overview of Course Contents**

- Inventory Problems and Selective Inventory Management:
- Static and Dynamic Inventory Problems under Risk and uncertainty
- MRP
- JIT material management
- Basics of Purchasing Management
- Theory of Constraints and Materials Management
- Value Engineering/Analysis and Stores Management

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5202S | |
| Course Title | IP Management & Technology Transfer | |

**About Course**

Intangible assets often are the most important assets held by businesses, start-ups, and any ventures. For many organizations, intellectual assets are the wellsprings of wealth and competitive advantage. Their management along with technology transfer plays a crucial role in Business development. This course will provide details about IPM and technology transfer and will help learners to plan their IP activities efficiently.

**Overview of Course Contents**

- Introduction to IP Management (IPM)
- Types of IP and various jurisdictions
- Emerging areas & IPM System (IPMS)
- Development of IPMS of an organization (start-up/academic/research/ industrial organization)
- IP lifecycle management – use of IP policy
- Use of IP analytics for your IPM
- Technology transfer– Definition and concepts, different ways
- Interconnection between IP management and technology transfer, technology transfer-contracts, and other legal procedures

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5203S | |
| Course Title | Innovation and Start-up policy | |

**About Course**

Innovation requires commitment from companies and support from the government policy for R&D and entrepreneurship. Development of newer technologies and newer way of doing things require an eco-system where venture capital financing is available and also enough funds for doing Research and Development and for marketing new ideas and technologies. Scientists, Researchers, Entrepreneurs, and Venture Capitalists are required in that ecosystem. The Government policies in the area of R&D, venture financing, and entrepreneurship help create that ecosystem of innovation and entrepreneurship. Innovations come from both big and small companies. These companies through their initiatives promote new ventures and technological innovation in terms of products and services.

**Overview of Course Contents**

- Innovation and Innovation Eco-System
- The Policy Framework
- Startup Landscape and Innovation Hubs
- Digital India and Make in India
- Linking Innovation with Intellectual Property Rights
- Raising Finance for Startups in India
- Innovation in the Indian Context
- Writing a business plan

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5204S | |
| Course Title | Financial Institutions and Markets | |

**About Course**

This course would provide an understanding of the functions, and operations of the financial markets and institutions operating in India. It explains the role of the financial system in economic development. Various conceptual issues related to risk and return, the role of regulatory bodies, the mechanism of commercial banking, operations of insurance companies, and mutual funds are discussed elaborately. It also describes the importance of small savings, provident funds, pension funds, and credit rating agencies. The course provides a comprehensive overview and systematic evaluation of the mainstream markets of various financial instruments such as call money, bond, stock, derivatives, and exchange rates.

**Overview of Course Contents**

- Financial System and Economic Development indicators of Financial Development
- Financial Markets and Institutions
- Theories of Level and Structure of Interest Rates
- Financial Regulations and Regulatory Institutions in India (RBI, SEBI, IRDA, PFRDA)
- Commercial Banking and Other Important Financial Institutions
- Money Markets in India
- Stock Market and Securities
- Derivatives Market
- Foreign Exchange Market

# Mandatory Non-Credit Courses (MNC)

| Program | M. Tech (Project Management) | Semester - III |
|---|---|---|
| Course Code | PEPM5301S (MNC) | |
| Course Title | Effective Business Communication | |

**About Course**

In a business scenario, communication includes written letters, summaries, and emails. Clear communication skills are needed for impactful oral presentations in front of an audience. Even everyday practices like participating in meetings and managing interpersonal communication are key to achieving long and short-term business goals.

This course is intended to improve these communications skills by exploring the inherent challenges and providing techniques to help overcome hurdles.

**Course Content**

- The Process of Communication
- Professional Writing - The Basics and applications
- Presentations
- Interpersonal Skills

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|---|---|---|
| **Program Name** | : | **M. Tech. (Project Management) SEMESTER – II** |
| **Course Code** | : | PEPE5082LA |
| **Course Title** | : | **Professional Ethics in Engineering** |
| Course Outcomes | | Students should be able to<br>1. demonstrate an awareness on Engineering Ethics, aptitude, and Human Values,<br>2. Value Moral and Social Values and Loyalty and to appreciate the rights of others.<br>3. apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.<br>4. Understand harmony at all levels of human living, and bring it into their life and profession. |

| Sr.No. | CONTENTS |
|---|---|
| 1 | **Human Values**<br>Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self Confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management. |
| 2. | **Engineering Ethics**<br>Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories. |
| 3. | **Aptitude and Emotional Intelligence**<br>Attitude: Content, Structure, Function; its Influence and Relation with Thought and Behaviour; Moral and Political Attitudes; Social Influence and Persuasion.<br><br>Aptitude and Foundational Values, Integrity, Impartiality and Non-partisanship, Objectivity, Dedication, Empathy, Tolerance and Compassion.<br><br>Emotional Intelligence-Concepts, and their Utilities and Application in Administration and Governance. |
| 4. | **Safety, Responsibilities and Rights**<br><br>Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination |
| 5 | **Global Issues**<br>Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility. |