DAY 1

Project Initiation and Development

- Overview
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    - Definitions of terms used in project development, analysis, and management
    - Project types and sizes
        - Capital projects – Evergreen, expansions/additions, revamps
        - Maintenance projects – Shutdowns; repairs; alterations; replacements and improvements
    - Project definition, scope and drivers
        - Project mission and drivers
        - Phase 1: Concept generation – potential ways of achieving project mission
        - Phase 2: Project definition - one option is selected and developed
        - Phase 3: Project implementation – continues through construction to the hand-over of the completed project
    - Project Management Process
        - Project Planning
        - Project Scheduling
        - Feasibility study - Is the project feasible? How feasible are the alternatives under consideration; feasibility report
        - Cost, timing, performance, effect of organization
    - Key issues in project analysis

- Models of project development
    - Project evolution and life cycle
    - Basic seven phases of a project
    - Common three main phases of a project
        - Front End Loading -FEL (or Front End Definition - FEED) which includes development of the entire detailed plan and project approvals
        - Execution Phase - Detailed engineering; procurement, construction
        - Commissioning, Handover and Start-up phase
    - Project definition
        - Design Basis Document (DBD) – Development guidelines
        - Implementation strategy – owner involvement
        - Procurement policies, procedures and practices

        - Spare parts policies, procedures and practices
        - Detailed (definitive) cost estimate
    - Project development
        - Project Development Plan (PDP) – Preparation Guidelines
        - Conceptual design alternatives
        - Preliminary cost estimates for alternatives
        - Responsibility charting for stakeholders
        - Selection guidelines for final design alternative
        - Preliminary feasibility analysis – technical and economic feasibility
        - Preliminary schedule
    - Project execution and control
        - Project Execution Plan (PEP) – How to develop an effective execution plan
        - Coordination and Control Procedures
        - Detailed Schedule
        - Detailed Engineering
        - Safety Process Hazard Analysis
        - Construction - Logistics, work Permits, Safety
        - Quality Control / Quality Assurance
        - Project Change Management System
        - Progress Monitoring and reporting
        - Project Management Tools
- Workshop 1 - Key principles and guidelines for successful projects
    - Best practices for project success
    - Common causes of project failures
    - Case study – Anatomy of a Project
    - Capturing key learnings

DAY 2

Technical Evaluation Analysis

- Project Risk and Contingency Analysis
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    - Key issues in project analysis
        - Market analysis – Supply and demand
        - Technical analysis – Technical viability; sensible choices

        - Financial analysis – financial viability; return on investment; risk
        - Economic analysis – social cost-benefit
        - Environmental analysis – likely ecological damage; restoration measures/costs
        - Risk analysis – Levels of risk associated with the project
    - Analysis of project technical and engineering aspects
        - Purpose of technical analysis
        - Technical viability
            - Design basis
            - Existing and proven technologies
            - New and developmental technologies
            - Regulatory approvals – lead time, resources
            - Risk considerations – obsolescence, continuous technical support

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        - Sensible choices
            - Location
            - Process, equipment, methods, procedures
            - Size - optimal scale of operation
            - Constructability, operability and maintainability
            - Availability of human resources, power, and other inputs
            - Realistic work schedule
    - Applicable regulations, codes, standards - design and construction, HSE
    - Mechanical integrity, management of change

- Environmental analysis

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    - Consideration on environmental aspects
        - What is the likely damage caused by the project to the environment?
        - What is the cost of restoration measures required to ensure that the damage in the environment is contained within acceptable limits?
    - Applicable regulations and specifications
    - Due diligence

- Project risk considerations

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    - Types of Risks Associated with Projects

        - Market risk
        - Human resource
        - Financial resources
        - Technology risk
        - Management risk
        - Timing
        - Intellectual property right issues
        - Regulation risks
    - Risk assessment methods and recommended practices
    - Risk Management and Contingency
        - Level of uncertainty in project life cycle
        - Risk analysis and mitigation measures
        - Contingency
- Workshop 2 – Technical evaluation of projects
    - Case study – Technical evaluation of a capital project

DAY 3

Economic Evaluation Analysis

- Objectives of economic evaluation analysis
    - Definitions and overview
    - Typical categories of engineering economic decisions
        - New Product and Product Expansion
        - Equipment and Process Selection
        - Equipment Replacement
        - Cost Reduction
        - Service Improvement

- Economic (financial) evaluation
    - Introduction
    - Basic concepts of economic evaluation
    - Economic evaluation methods – static and dynamic
        - Simple payback
        - Benefit-Cost Ratio (BCR)
        - Net Present Value (NPV)
        - Internal Rate of Return (IRR)

    - Capital equivalent of energy and maintenance savings

- Principles of time value of money and the discount rate
    - Discounted Cash Flow (DCF) Calculation - Definitions and premises
    - Project Cash Flow Components
    - Discounting and time-value considerations
    - Distinguishing cash flow and other measures of profitability
    - Cost of capital and inflation issues
    - Capital budgeting techniques and best practices
    - Methods of computing time-value of money
        - The algebraic (or formula) method
        - The financial table method
        - The financial calculator method

- Methods of ranking investment proposals
    - Non-Discounted Cash Flow Methods
        - Payback method (or Payback Period)
        - Accounting Rate of Return (ARR)
    - Discounted Cash Flow Methods
        - Net Present Value Method (NPV)
        - Internal Rate of Return (IRR)
    - Profitability Index (PI)

- Workshop 3 – economic evaluation of projects
    - Case study – Economic evaluation of a capital project

DAY 4

Business Focused Facilities

- Business-Focused Facilities (BFF)
    - Economic interpretation of engineering work
    - Fundamental BFF principles
        - Total cost (full cycle) perspective
        - Common and clear goals
        - Adaptive process and change management
        - Teamwork
        - Continuous improvement

- Life-cycle (total) cost analysis
    - Basics of Life Cycle Cost (LCC) Analysis
    - LCC Models - SAE model
    - Life-Cycle Management (Value Management)
        - Renewal/replacement intervals
        - Servicing costs
        - Failure consequences
        - Asset redundancy
        - Maintenance strategies
        - Energy efficiency
        - Design life service factor

- Effective Life-Cycle Management Tools
    - Engineering economics
    - Remaining life estimates
    - Statistical analysis
    - Opportunity costing
    - LCC Calculation Procedures

- Project cost estimating
    - Types of estimates, accuracy
    - Estimating methods
    - Cost indices and economic indicators
    - Direct and indirect costs
    - Computer based estimating

- Equipment sizing and costs
    - Power Sizing Model
    - Rough estimates
    - Semi-detailed estimates
    - Detailed estimates

- Workshop 4 – cost estimating
    - Case studies – Project cost estimates using different methods

DAY 5

Evaluation of Maintenance Projects

- Types of maintenance projects
    - Complete turnarounds – extent, frequency
    - Opportunistic minor turnarounds
    - Specialized repair methods
    - Replacement in kind and improvement opportunities
    - Specialized Inspection Projects – Application and frequency
- Concept of component life
    - Introduction
    - Physical life
    - Economic life
    - Technical life – technical obsolescence
- Technical evaluation of maintenance projects
    - Key project characteristics and special requirements
        - Significance of schedule and maintainability – optimum cost or least downtime
        - Availability of human resources
        - Constructability considerations
    - Fitness-For-Service Assessments (FFS)
        - Basics of FFS
        - Run/repair/replace decisions
    - Alternative repair strategies and methods
        - Temporary repairs
        - Permanent repairs
    - Alternate repair technologies and procedures
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    - Management of change
        - Basics of management of change
        - Impact of maintenance projects on mechanical integrity and reliability
        - Regulatory, codes and standards requirements

- Workshop 5 – Evaluation of maintenance projects