DEPARTMENT OF CIVIL ENGINEERING

NPTEL EQUIVALENT COURSES FOR ADDITIONAL MINOR ENGINEERING DEGREE -2023-2024

NPTEL EQUIVALENT COURSES

S.No.	Course ID	Course Name	Course syllabus
1	noc23-ce62	Principles Of Construction Management	Week 1: General overview and project organization Week 2: Estimation of project cost Week 3: Construction Economics Week 4: Planning and scheduling: part-1 Week 5: Planning and scheduling: part-2 Week 6: Quality management Week 7: Safety Management Week 8: Legal aspects of a construction project
2	noc23-ce59	Project Planning & Control	Week 1 : Introduction, Course Context, Construction Project Management Week 2 : Time Management, Work Breakdown Structure (WBS), Gantt Charts Week 3 : Duration Estimation, Network Representation & Analysis -1 Week 4 : Network Representation & Analysis -2; Two-Span Bridge: Scheduling, Network Analysis and Application Week 5 : Time-Cost Trade-off (Crashing) Week 6 : Resource Scheduling Week 7 : Precedence Diagramming Method (PDM), Project Monitoring & Control Week 8 : Project Monitoring & Control (Earned Value Concepts), Uncertainty in Project Schedules (PERT), Course Summary

3	noc23- ce66	Municipal Solid Waste Management	Week 1:Evolution of Solid Waste Management Week 2:Sources/Types and Characteristics of Solid Waste Week 3: Generation of Solid Waste Week 4:Waste Handling, Separation, storage, and Processing Week 5:Collection of Solid Waste Week 6:Transfer and Transport Week 7: Separation and processing of Solid Waste Week 8:Chemical Transformation (combustion/incineration) Week 9:Biological Treatment (Composting) Week 10:Biological Treatment (Anaerobic Digestion) Week 11: Disposal of Solid Waste Week 12:ISWM and legistlation
4	noc23-ce85	Wastewater Treatment And Recycling	Week 1 : Introduction: General outline; Introduction to wastewater; Various sources and types of wastewater; Need of wastewater management; Concept of wastewater treatment and recycling Week 2 : Wastewater Generation and Characteristics: Wastewater generation and quantity estimation; Water quality parameters and standards (COD, BOD, DO, Solids, Nutrients, metals and emerging contaminants); Sources specific wastewater physical and chemical characteristics Week 3 : Natural Attenuation of Pollutants in Wastewater: Concept of natural attenuation; Wastewater discharge in rivers; Attenuation of pollutants on land application. Week 4 : Treatment Philosophy: Objectives of wastewater treatment; Concept of mass balance; kinetics and equilibrium processes; Reactors tanks; Continuously mixed tank reactors; Plug-flow reactors Introduction to primary, secondary and tertiary treatment; Week 5 : Preliminary and Primary Treatment Processes: Screening; Grit removal; Equalization tank; Sedimentation theory; Rectangular and circular sedimentation tanks Week 6 : Secondary Treatment Processes: Biological treatment of wastewater; Microbial ecology and growth kinetics; Types of microorganisms; Aerobic and anaerobic processes; Suspended and attached growth systems; Activated sludge process; Tricking filters and Rotating biological contactors Week 7 : Secondary Treatment Processes - Anaerobic: Anaerobic treatment; Anaerobic decomposition of organic matter; Fluidized bed systems; Upflow anaerobic sludge blanket systems; Biogas production and collection; other reactor configurations Week 8 : Sludge Management: The quantity and characteristics of sewage sludge; Sludge dewatering, drying, and thickening; Sludge digestion; Aerobic and anaerobic

			sludge stabilization; Composting Week 9 : Tertiary (Advanced) Treatment Processes: Need and Objectives of advanced treatment; Nutrient (N and P) removal; Chemical treatment processes; Advanced oxidation processes; Adsorption and Ion-exchange; Membrane processes Week 10 : Current Treatment Approaches: Conventional systems; Integrated treatment systems; Advanced reactor configurations; SBR, MBR and MBBR; Application and case studies Week 11 : Wastewater Recycling: Scope and demands; Types and stages of recycling; Recycling requirements; Designated reuse criteria; centralized vs decentralized recycling systems. Week 12 : Technology Selection and Decision Making: Research trends in wastewater treatment and recycling; Choice modelling and decision making; Risks and challenges; Socio-economic perspectives; Case studies
5	noc23-ce86	Water Economics And Governance	Week 1: Introduction: General outline; Water availability and uses: national and international scenario; Challenges in water management. Week 2: Water Rights: Need of water rights; Water and sanitation in international law; Right to Water; Entitlements and criteria. Week 3: Water Sustainability: Concept of sustainable water uses; The Dublin statement; Sustainable water management with economical, engineering, ecological and social viewpoints; Stakeholders' participation. Week 4: Valuing Water: The use and non-use values of water; Valuation methods; Non-revenue waters (NRW) and unaccounted for water (UFW); Metering water uses; Water management through economic instruments. Week 5: Water Pricing - Approach and Models: Significance of water pricing; Average and marginal cost pricing; Shortrun marginal cost pricing; Water pricing models - flat rate, uniform rate, increasing block tariff and seasonal rate models. Week 6: Conflicts in Water Pricing: Conflicts on subsidy verses sustainability, efficiency verses fairness in supply, development decisions verses capacity restrictions; Water pricing practices in India and abroad; relevant case studies. Week 7: Economics of Water Projects: Economics of sectoral water allocation; Capital budgeting in water projects; Costs concepts of capital budgeting; Financial evaluation of water projects. Week 8: Economic Evaluation Methods: Methods of project evaluation; Payback Period; Discounted Payback Period; Net Present Value; Internal Rate of Return; Average Rate of Return; Benefit-Cost Ratio. Week 9: Water Governance: Elements and dimensions of water governance; Building blocks; Effective water governance schemes; Benchmarking water governance; Indicators of good governance.

			Week 10: Water Governance in India: National water policies and water acts; Water regulatory authorities; Power and roles of central and state regulatory authorities; Legal and regulatory framework for hydro projects; Institutional arrangement and administrative controls of water service; Interstate water management initiatives; Stakeholders' participation; NGOs and social movements Week 11: Water Disputes Management: Interstate and intrastate water disputes resolutions practices; Judiciary involvements; Tribunals for water disputes resolutions; Treaties and bilateral agreements; Environmental issues and disputes related to water resources projects; relevant case studies. Week 12: Global Water Diplomacy: International freshwater agreements; Global water treaties and transboundary water agreements between the countries on international water resources; Multi-national water disputes and their resolution mechanisms; relevant case studies.
5	noc23-ce89	Integrated Waste Management For A Smart City	Week 1: Introduction to Solid Waste Management Week 2: Municipal Solid Waste Characteristics and Quantities Week 3: MSW Rules 2016, Swachh Bharat Mission and Smart Cities Program Week 4: Municipal Solid Waste Collection, Transportation, Segregation and Processing Week 5: Disposal of Municipal Solid Waste: Landfill Week 6: Biochemical Processes and Composting Week 7: Energy Recovery from Municipal Solid Waste Week 8: Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country Week 9: Construction and Demolition (C&D) Waste Management - Overview Week 10: C&D Waste – Regulation, Beneficial Reuse of C&D Waste Materials Week 11: Electronic Waste (E-Waste) Management – Issues and Status in India and Globally Week 12: E-Waste Management Rules 2016 and Management Challenges
6	noc23-ce98	Environmental Modeling And Simulation	1. Introduction to modeling and simulation, develqpment process and applications; 2. Model classification and evaluation; Basics of EnvironmentalSystem Desion; 3. Introduct on to Software Packages 4. Lumped and distributed parameter models, solution methods using MATLAB; 5. Simulation methodologies, continuous, discrete.Monte - Garlo,agent-based models 6. Game theory,system dynamics 7. Design of experiments. Reactor Modeling, kinetics,parameter estimation,RTO studies and flow reaimes 8. lD models. geometrical approach, Introduct on to nonlinear dvnamics 9. 2D models, bifurcations, sensitivity analysis. Lotka Volterra Models,outbreak models 10. Microbial dynamics.mixinginlakes, river self- purification.dynamics of DO,BOD and

			nutrients 11. Modeling transport phenomena. atmospheric and porous media transport and transformation of oollutants 12. Environmentalrisk management,health r sk assessment, Uncertaintv 13. Cluster analysis. ecological modeling, classification of ecolog ical data. stability of complex ecosvstems
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