

Syllabus – Energy Technology

Global Energy Scenario: - Review of world & Indian energy situation in respect of demand, supply & resources in the historic context, International Energy Policies of G-8 Countries, G-20 Countries, OPEC Countries, EU Countries, International Energy Treaties (Rio, Montreal, Kyoto), INDO-US Nuclear Deal, Future Energy Options: Sustainable Development, Energy Crisis, **Indian Energy Scenario:-** Review of power development in India. Primary & secondary energy resources, their inter convertibility.

Energy Conversion Systems: - Classification of Energy Sources, Principle fuels for energy conversion, Conventional & Renewable Energy, Energy Sources: prospecting, extraction and resource assessment and their peculiar, Characteristics, Direct use of primary energy sources, Conversion of primary into secondary energy sources

Renewable Energy Systems

Solar Energy:- Sun as Source of Energy, Availability of Solar Energy, Nature of Solar Energy, Solar Energy & Environment, Various Methods of using solar energy–Photo thermal, Photovoltaic, Photosynthesis, Present & Future Scope of Solar energy. Hybrid wind energy systems - wind + diesel power, wind + conventional grid, wind + Photovoltaic system etc. Solar Thermal power and technologies.

Biomass :- Combustion & Gasification Routes, Co-generation & Tri-generation: Definition, need, application, advantages, classification, saving Potential, Bagasse based Power Generation, BIG-GT system Generation and utilization, Properties of biomass, Agriculture Crop & Forestry residues used as fuels, Biochemical and Thermo-chemical Conversion, Combustion, Gasification, Biomass gasifiers and types etc..Applications of Gasifiers to thermal power and Engines, Biomass as a decentralized power generation source for villages, Concept of Bio-energy: Photosynthesis process, Bio-fuels, Biomass resources.

Wind Energy: - Wind- Basic Principals of Wind Energy Conversion, Components & classification of a WECS (Wind Energy Conversion System), Application of wind Energy, Interconnected system, Safety systems, Wind Energy: Basics & Power Analysis, Wind resource assessment, Power Conversion Technologies and applications, Wind Power estimation techniques, Principles of Aerodynamics of wind turbine blade, Various aspects of wind turbine design, Site Selection, Concept of wind farm.

Hydro Electric Power: - Basic Principal, Design Criterion and Classification of small Hydroelectric power stations. Ecological & Rehabilitation aspects.

Energy & Power in the country, Tariffs and subsidies. Energy Utility interface. Private sector participation in Power Generation. State role and physical properties, Energy and Development; National Energy Plan; Role of modeling in energy policy analysis.

Energy demand & supply analysis, Energy Action Planning:

Energy Policy:- Global Energy Issues, National & State Level Energy Issues, National & State Energy Policy, Industrial Energy Policy, Energy Security, Energy Vision, Energy

Pricing & Impact of Global Variations, Energy Productivity (National & Sector wise productivity).

Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change, Energy Conservation Act-2001 and its features.

Energy Efficiency in Electrical Utilities - Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Energy audit in Electrical Systems

Energy Conservation Opportunities in Compressed Air Distribution System, Lighting System, Energy Conservation through: Variable Speed Drives.

Energy Audit, Need, Types of Energy Audit, Energy Management Audit Approach,- Understanding Energy Costs, Matching Energy Use to Requirement, Maximizing System Efficiencies, Optimizing the Input Energy Requirements, Energy Audit Instruments.

Investment Need, Appraisal and Criteria, Financial Analysis Techniques-Simple Payback Period, Return on Investment, Net Present Value, Internal Rate of Return, Cash Flows, Risk and Sensitivity Analysis; Financing Options, Energy Performance Contracts and Role of ESCOs.

Clean Development Mechanism :-Major objective of CDM, Projects for benefit from CDM finance, CDM methodology, CDM opportunities & priorities in India, flow of fund in Kyoto protocol, Status of CDM today, Technology assimilation, Transfer of technology, Flow of fund under CDM, Competitors and major developers in India, Technology & Market Assessment of various Power plants- IGCC, Super Critical, Combined Cycle, CFBC and Novel Energy devices, Analysis of selected CDM options: Micro- Hydro Power Generations, Biomass Power Generation, Wind Power Generation, Clean Coal Technology, Indicative Simplified Baseline and Monitoring Methodologies for selected Small Scale CDM project activity Categories.