ऊर्जा अभियांत्रिकी विभाग
Department of Energy Engineering
School of Technology
North-Eastern Hill University, Shillong-793022.

Dr. Samrat Paul
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No: ENE/LEET/L/D-04/2019-2020/01

August 01th, 2019

ADMISSION NOTICE

LIST OF CANDIDATESPARTIALLY SELECTED FOR APPEARING FOR ENTRANCE TEST:

Sl. No.	Roll No.	Name
1	ENE/BT/LE-2018/01	Dawan Rahnam Lyngkhoi
2.	ENE/BT/LE-2018/02	Sushrita Das
3.	ENE/BT/LE-2018/03	Bonifas Nongsiej
4.	ENE/BT/LE-2018/04	Priyam Pathak
5.	ENE/BT/LE-2018/05	Leaderful K Jahrin
6.	ENE/BT/LE-2018/06	Bhaboklang Nongsiej
7.	ENE/BT/LE-2018/07	Nidaio Susngi
8.	ENE/BT/LE-2018/08	Mondeep Payeng
9.	ENE/BT/LE-2018/09	Phulmoni Chetia
10	ENE/BT/LE-2018/10	Dorsita Duarah
11.	ENE/BT/LE-2018/11	Namrata Kashyap

Important Dates

Important dates related to Lateral Entry Admission into B. Tech in Energy Engineering

SUBJECT	DATES	VENUE
REPORTING TIME OF ENTRANCE TEST	13RD AUGUST, 2019,10 AM	DEPARTMENT OF ENERGY ENGINEERING NEHU, SHILLONG 793022
TIME OF ENTRANCE TEST	13RD AUGUST, 2019, 10:30 AM TO 11:30 AM	
PUBLICATION OF FINAL MERIT LIST OF SELECTED CANDIDATES	13RD AUGUST, 2019, 4:00 PM	
ADMISSION	14TH AUGUST, 2019, 10 AM	

01/08/2019

(Signature of the HoD)
Department of Energy Engineering

Teacher-In-Charge
Department of Energy Engineering
School of Technology
North- Eastern Hill University
Shillong-793022

Syllabus for the entrance test is attached herewith in Annexure I

Annexure I

Syllabus for Lateral Entry Entrance Test for Admission into B.Tech in Energy Engineering 2019

1. Energy and Environment

Environment, ecosystems and biodiversity: Concept of environment: components of environment and their interactions; abiotic and biotic factors; Ecosystems: characteristic feature and structure and function of forest, grassland, desert and aquatic ecosystem (Ponds, streams, lakes, rivers, oceans, estuaries); Ecological pyramid; energy flow and nutrient cycling; Biodiversity: value of biodiversity; loss and conservation of biodiversity

Environmental problems and issues: Environmental problems and issues: greenhouse effect, ozone depletion, acid rain; Renewable and non-renewable resources; natural resources, associated problem and its conservation: forest, water, mineral, food, energy and land resources; environmental impact assessment; environment protection act.

Environmental pollution and management: Environmental pollution: sources and types of air, water, soil, radioactive and noise pollution; Industrial pollutants and their impact on environment and human health; Toxicants and toxicity; toxic chemicals: heavy metals and pesticides; Safety and prevention of industrial pollution; bio-transformation and bioremediation; Aerobic and anaerobic treatment of waste water; waste management and cleaner production.

2. Energy Resources and Technology

Conventional and Non-conventional energy resources, Introduction to Renewable Energy, Global and national energy prospective, Renewable energy resources, Basics of Energy security and Climate Change, Dimensions of the energy problem, Energy Technology and system development. Energy Conservation and its relation to GDP, GNP and its dynamics. Conventional Energy Sources and Overall Energy demand and availability.

Energy Resources, Depletion of energy sources and its impact, Impact of Energy on Economy, Role of Energy usage in Socio-economic Development and Environment,Energy and Environmental policies,Resource assessment-Wind energy, Solar energy, Biomass and bioenergy, Geothermal energy and Ocean and Tidal energy.

Energy Security, Exponential rise in Energy consumption, Energy Consumption and role of UNFCCC. Role of renewables in energy security and climate change, International Energy Policies of G-8 Countries, G-20 Countries, OPEC Countries and EU.

Energy Scenario - Indian and Global context, Fossil fuels, Nuclear and Renewable sources including Petroleum, Coal, Bio-fuels, solar, hydro and wind. Energy consumption in Commercial and non-commercial sector and Energy utilization pattern in the past, present and future projections, study of consumption pattern, Sector wise energy consumption for Industrial, Commercial, Household, Agricultural, Municipality lighting and water pumping.

3. Solar Energy Technology

Earth and Sun Relation, Solar angles, day length, angle of incidence on tilted surface, Sun-path diagrams, Shadow determination, Extra-terrestrial characteristics, Effect of earth atmosphere on terrestrial solar radiation, Measurement and estimation on horizontal and tilted surfaces, Analysis of Indian solar radiation data and applications.

Flat-plate Collectors, Effective energy losses, Thermal analysis, Heat capacity effect, Testing methods, Evacuated tubular collectors,Types of Air flat-plate Collectors, Thermal analysis, Thermal drying, Selective Surfaces, Ideal coating characteristics, Types and applications, Anti-reflective coating, Preparation and characterization.

Concentrating Collector Designs, Classification, and performance parameters, Tracking systems, Compound parabolic concentrators, Parabolic trough concentrators, Concentrators with point focus, Heliostats, Comparison of various designs- Central receiver systems, parabolic trough and compound parabolic systems, Solar furnaces.

Solar Cell Basics, Types of photovoltaic cells, Determination of shift in Fermi energy level, Shift of Fermi energy due to doping, Probability of occupation of allowed states, Density of electrons and holes, Carrier transport- Drift, diffusion, continuity equations, Absorption of light, Electron-hole pair generation, Recombination process, Introduction to Excitonic Solar Cells.

4. Biomass and Biofuel Technology

Selection of biomass as feedstock, Introduction to photosynthesis, characteristics of C_3 and C_4 plants as biomass fuel, physicochemical characteristics of biomass as fuel, Biochemical, chemical and thermo-chemical biomass conversion routes, Biochemical conversion by Aerobic and Anaerobic digestion of biomass.

Types of digesters, design of biogas plants, installation, operation and maintenance of biogas plants, biogas plants manure-utilization and manure values, Biogas storage, biogas for motive power generation, Alcohol production from biomass, Types of Materials of alcohol production-process description, distillation.

Chemical conversion processes, hydrolysis and hydrogenation, Biofuels-different processes of production, Economics on utilization, Mechanism of trans-esterification, fuel characteristics of biodiesel, technical aspects of biodiesel engine application, Bio-diesel storage, Induction time, Oxidation stability, Principle and working of Rancimatapparatus for oxidation stability.

Concept of Waste land, selection of plants for energy plantation, utilization through energy plantation in waste land, Biomass based power generation using biomass gasifiers and biogas plants, Classification of Bio-fuels from Plant and animal wastes, advantages and disadvantages of bio-fuel produced from animal wastes over plant feedstock.

5. Energy Economics, Accounting and Planning

Introduction to Energy economics, Basic concepts, National accounting framework, Criteria for sustainable development, Economic theory of demand, production and cost market structure, Calculation of unit cost of power generation from different sources with examples, Eco-ground rules for investment in energy sector.

Payback period, NPV, IRR, and benefit-cost analysis with examples, Socio-economic evaluation of energy conservation programme, Application of econometrics, input and output optimization and simulation methods to energy planning and forecasting problems, Dynamic models of the economy and simple theory of business fluctuation.

Uncertainties and social cost-benefit analysis of renewable energy systems, Financing mechanism of different renewable energy systems, Case studies, Renewable energy projects for reductions in CO_2 emissions, Conflict between energy consumption and environmental pollution, Economic approach to environmental protection and management, Externalities, economics of pollution control, emission taxes, subsidies.

Material and Energy balance, Facility as an energy system, Methods for preparing process flow, material and energy balance diagrams, Energy Action Planning, Key elements, Force field analysis, Energy policy purpose, perspective, contents, formulation, ratification, Organizing the management, location of energy management, Energy Conservation Act 2001 and amendments.

Duties and responsibilities of energy managers and auditors as per Energy Conservation Act 2001, Defining monitoring and targeting, Elements of monitoring and targeting, Data and information analysisand techniques,Energy consumption, production, cumulative sum ofdifferences (CUSUM).

6. Hydro, wind, ocean and Tidal Energy Technology

Introduction to Hydro-energy systems, potential site selection, Site selection and civil works, dam size and construction, estimation of power, Overview of micro, mini and small hydro systems, Elements of turbine, Assessment of Hydro Power, Selection and design criteria of turbines, Speed and voltage regulation.

Ocean energy resources, ocean energy routes, Principle of ocean thermal energy conversion systems, ocean thermal power plants, Principles of ocean wave energy and tidal energy conversion, Indian perspective for ocean and tidal energy-technical problems and limitations.

Wind energy statistics, Measurements and Data Presentation, Wind Turbine Aerodynamics, Momentum Theories, Basics of Aerodynamics, Aerofoils and their Characteristics, HAWT - Blade Element Theory, Prandtl's Lifting Line Theory (prescribed wake analysis), VAWT Aerodynamics, Wind Turbine Loads, and Aerodynamic Loads in Steady Operation.

Wind Turbulence, Yawed Operation and Tower Shadow, Sitting-Rotor Selection, Annual Energy Output, Horizontal Axis Wind Turbine (HAWT) Vertical Axis Wind Turbine, Rotor Design Considerations, Number of Blades, Blade Profile of 2/3 Blades and Teetering, Coning, Upwind/Downwind characteristics and properties

7. Fuel Cell and Hydrogen Energy

Hydrogen as an alternate fuel, Physical and chemical properties of Hydrogen as a fuel, Advantages and limitations of Hydrogen over conventional fuels, Hydrogen Economy, Suitability of Hydrogen as a fuel and Fuel Cell as energyconversion device, Hydrogen Transport, Technical constraints of transport of Hydrogenby Road, Railway, Pipeline, and by Ship. Safety measures for Hydrogen production, transport and storage.

Hydrogen Production from fossil fuels, electrolysis, thermal decomposition, photochemical, photo-catalytic, hybrid, Sea as a source ofDeuterium, production of hydrogen from sea water, Hydrogen Storage in Metal hydrides, Metallic alloy hydrides, Basic thermodynamics of Fuel Cell, Reaction kinetics, Charge and masstransport.

Fuel Cellmodelling for charge and mass transport, In-situ and Ex-situ Fuel Cell characterization, System and components of a Fuel Cell, Types of Fuel Cells based on working temperature, electrolyte and fuel, Fuel Cell power stations, Power management, Thermal management, Pinch analysis.