

Name of Specialization: Renewable Energy	
No. of Question: 50 (Objective Type)	
Duration: 1 Hr. 30 Min	Maximum Marks: 50

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1. Energy sources & Availability:

Conventional, Non-conventional, renewable, non-renewable sources of energy, prospects & perspectives & advantages. Introduction to different types of non-conventional sources of energy - solar, wind, biomass, OTEC, geothermal, hydrogen energy, fuel cells, MHD, thermionic convertor, thermo-electric power. Geothermal Energy: Status & estimates, geothermal sources, geothermal systems & their characteristics. Energy from ocean: OTEC System, wave energy devices, Tidal Energy.

2. SOLAR ENERGY

Solar radiation, its measurement and prediction. Flat plate collectors: liquid and air type. Theory of flat plate collectors, advanced collectors, optical design of concentrators, selective coatings, solar water heating, solar dryers. Potential and scope of solar cooling. Types of solar cooling systems, solar collectors and storage systems for solar refrigeration and air-conditioning. Solar Cells: Characteristics new materials for solar cell.

3. WIND ENERGY TECHNOLOGY

Wind Energy: Wind energy potential measurement, general theories of wind machines, basic laws and concepts of aerodynamics, aerofoil design; wind mill and wind electric generator. Description and performance of the horizontal-axis wind machines. Description and performance of the vertical-axis wind machines. Small Wind Turbines: introduction. New methods of harnessing wind energy.

4. Biomass Energy:

Introduction to biomass, biofuels & their heat content, biomass conversion technologies. Aerobic & anaerobic digester, Factors affecting biogas production, biogas plants - types & description. Utilisation of biogas - Gasifiers, direct thermal application of Gasifiers. Advantages & problems in development of Gasifiers.

5. FUEL CELL TECHNOLOGY

Fuel Cells. Principle & Classification, types conversion efficiency, polarization & advantages. Description, working principle, components, general performance of AFC, PAFC, SOFC, MCFC. characteristics and comparison.

6. POWER PLANT ENGINEERING

Introduction to economics of power generation. Load duration curves, location of power plants, power plant economics, Indian energy scenario, Levelized cost. Comparison of steam, hydroelectric, diesel and gas turbine power plants.

7. NUCLEAR POWER

Types of nuclear reactors. Heat removal, Reactor coolants, Reactor core. Radioactive waste disposal. Economics of nuclear power.