

# Power Plant Instrumentation (Elective – II) [PPI]

B.E. Sem. VIII [INST]

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## EVALUATION SYSTEM

	Time	Marks
<b>Theory Exam</b>	3 Hrs.	100
<b>Practical Exam</b>	–	–
<b>Oral Exam</b>	–	25
<b>Term Work</b>	–	25

## SYLLABUS

1. Energy sources, their availability, worldwide energy production, energy scenario of India. Introduction to Power generation- Classification: Renewable and nonrenewable energy generation resources.  
Renewable: small hydro; modern biomass; wind power; solar; geothermal and bio-fuels.  
Nonrenewable: fossil fuels (coal, oil and natural gas) and nuclear power.
2. **Boiler**  
Types of boilers, boiler safety standards. Boiler instrumentation, control and optimization, combustion control, air to fuel ratio control, three element drum level control, steam temperature and pressure control, boiler interlocks, sequence event recorder, data acquisition systems
3. **Thermal Power Plant**  
Method of power generation, layout and energy conversion process, Types of Turbines & control, Types of Generators, condensers. Types of pumps and Fans, variable speed pumps and Fans, Material handling system, study of all loops-water, steam, fuel etc.
4. **Hydroelectric Power Plant**  
Site selection, Hydrology, Estimation electric power to be developed, classification of Hydropower plants, Types of Turbines for hydroelectric power plant, pumped storage plants, storage reservoir plants.
5. **Wind Energy**  
Power in wind, Conversion of wind power, Aerodynamics of wind turbine, types of wind turbine, and modes of operation, power control of wind turbines, Betz limit, Pitch & Yaw control, wind mill, wind pumps, wind farms, different generator protections, data recording, trend analysis, troubleshooting & safety.
6. **Solar Energy**  
Solar resource, solar energy conversion systems: Solar PV technology: Block diagram of PV system, advantages and limitations.  
Solar thermal energy system: Principle, solar collector and its types, solar concentrator and its types, safety.
7. **Nuclear Power Plant**  
Nuclear power generation, control station and reactor control
8. Comparison of thermal power plant, hydro electric power plant, wind, solar, nuclear power plant on the basis of: Performance, efficiency, site selection, Economics-capital and running, safety standards, pollution, effluent management and handling. Power plant safety, Pollution monitoring, control Sound, Air, smoke, dust, study of Electrostatic precipitator.

**Reference Books :**

1. Boiler Control Systems Engineering (*G.F. Gilman*) 2005, ISA Publication.
2. Power plant engineering (*P.K.Nag*) 3<sup>rd</sup> edition, 2010. McGraw Hill.
3. Power Plant Engg., Domkundwar
4. Non-conventional energy resources (*B. H. Khan*) McGraw Hill, New Delhi.
5. Renewable energy Technology (*Chetan Singh Solanki*) Prentice Hall Publication.
6. Solar Energy (*S. P. Sukhatme*) Tata McGraw Hill, New Delhi.
7. Nonconventional energy sources (*G. D. Rai*) Khanna Publication.
8. Energy Management Handbook (*W.C. Taeruer*)
9. Pollution (*M.N.Rao and H.V. Rao*)
10. Power system control Technology (*Torsten Cegrell*) PMI
11. Energy Technology Handbook (*Considine D.M.*) MHR
12. Solar Energy Technology vol I & II (*Dickinson & cheremision off*)
13. Wind Energy Handbook (*Tony Burton, David Sharpe, Nick Jenkins, Ervin Bossanyi*) (2001), John Wiley & Sons, ISBN: 0471489972,
14. Wind Energy Explained: Theory, Design and Application (*James Manwell, J. F. Manwell, J. G. McGowan*) (2002), John Wiley and Sons Ltd, ISBN: 0471499722
13. Wind Turbine Operation in Electric Power Systems (*Z. Lubosny*) (2003), Springer-Verlag New York, Inc; ISBN: 354040340X.
14. Power Plant control and instrumentation – control of boilers HRSG (*David Lindsey*) Institution of Engineering and Technology.

