CE/BOS/CE E63/0210

K L UNIVERSITY

WATER POWER ENGINEERING (09 – CE E63)

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SYLLABUS

UNIT – 1 Water Power Engineering

General – Conventional Source of Energy, Status of Electrical Power in the World and India, Advantages and dis-advantages of hydro-electric power over other conventional sources, Place of hydropower in the power system, Investigation and studies for hydro power development. Estimation of Water Power Potential – Mass Curve, Flow Duration Curve, Firm Power & Secondary Power, Power Duration Curve (Available Power) Power Plant Economics – Types, Factors affecting outline design, Useful Life, Connected Load, Maximum Demand, Demand Factor, Load Factor, Load Curve, Base & Peak Load, Plant Capacity Factor, Plant Use Factor, Diversity Factor, Economic Load Sharing between Base Load & Peak Load Power Stations., Cost of Electrical Energy, Energy Rates (Tariff)

UNIT –II Hydro-electric Power Plant

Classification of Hydro-electric Power Plants – Run-Of -River Plant, Valley Dam Plant, Diversion Canal Plant, High Head Diversion Plant – General Arrangements & Different Layouts Storage and Pondage, Pondage Factor Pumped Storage Plants – Essential Requirements, Necessity, Advantages. Problems in Operation, Layout and Principles of power generation - components of power plant – Single and two basin systems – Turbines for tidal power - Estimation of energy – Maximum and minimum power ranges

UNIT –III Water Conveyance System

Types of intakes – Low pressure and High pressure intakes – losses in intakes – low pressure conduit – classification of penstocks – design criteria for penstocks – Economic diameter of penstocks – anchor blocks – conduit valves – types of valves, bends and manifolds, Water hammer analysis-Various methods,.

UNIT –IV Power House

Surge tanks – types – design principles of surge tanks ,Types of powerhouse – surface power house – underground powerhouse – relative advantages - components of powerhouse

UNIT –V Conventional Energy

Solar Energy - Availability - Solar radiation data and measurement - Estimation of average solar radiation - Solar water heater types - Heat balance – Flat plate collector efficiency – Efficiency of heat removal - Thermo siphon flow calculation - Forced circulation calculation - Evacuated collectors - Basics of solar concentrators Solar Energy Applications - Solar air heaters – Solar Chimney - Crop driers - Passive solar system - Active solar systems - Water desalination - Output from solar still –Principle of solar ponds.

Wind Energy – Nature of wind – Characteristics – Variation with height and time – Power in wind –Aerodynamics of Wind turbine – Momentum theory – Basics of aerodynamics.

TEXT BOOKS:

1. Water Power Engineering: Barrows, Tata Mc. Graw Hill Co., New Delhi
2. A text Book of Water Power Engineering R.K.Sharma & T.K.Sharma, S. Chand.
3. Hydroelectric Hand Books: Creager and Justin, John Willey & Sons, New

REFERENCE BOOKS:

1. Water Power Engineering: M.M.Dandekar, K.N. Sharma, Vikas Publishing House Pvt., Ltd.,
2. Water Resources- Environment Planning & development by A.K. Bisws, Tata Mc Graw Hill.
3. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi