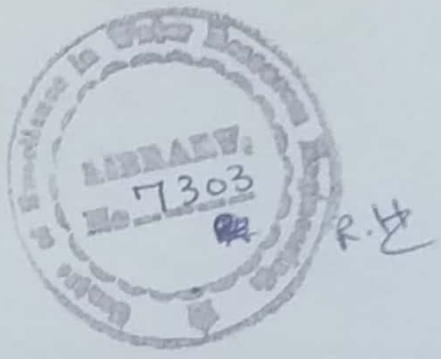
M.Sc Thesis

# PHYSICAL SCALE MODEL STUDY FOR OPTIMAL DESIGN OF HYDROPOWER PRODUCTION ON NOKHAR BRANCH




ADVISOR

DR. GHULAM NABI

Submitted By

MUHAMMAD ARFA HASSAN
(2010-PG-HPE-88)

CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING
UNIVERSITY OF ENGINEERING AND TECHNOLOGY,
LAHORE-PAKISTAN

2015

## ABSTRACT

Energy is the most important aspect of development. Priority of energy grid is urban area forsaking the major population present in the rural area. An efficient irrigation system is present in rural areas of Punjab. Constraints of natural grade pursue the designers to provide fall structures on irrigation canals, every fall is designed to efficiently dissipate energy. The objective of this study was to propose a system that can efficiently extract energy instead of dissipating it, without any major change to existing structures. The major problems with existing systems are that for such small head and discharge, these systems have very low efficiency and high construction maintenance cost. So such a system was explored which can efficiently extract energy from present irrigation canal system without disturbing it.

A canal fall was selected on Nokhar branch canal at RD 24+500. A symmetrical physical model of this fall was developed. A system of vertical columnar turbine was tested for feasibility (in terms of hydraulic efficiency). The vertical columnar turbine was placed inside the stilling basin of the fall. Its effects were analyzed.

Analysis of the fall show that the fall is not designed in accordance with the USBR standards. The experimentation showed that the presence of vertical columnar turbine adversely effected the energy dissipation, rendering the turbine unfeasible. More extensive experimentation is required on a vast scale. Physical model testing with respect to USBR stilling basin types is required.