

HYDRAULIC STRUCTURES (WRE-302)

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COURSE CONTENTS

S. No.	Contents	Contact Hours
1	Storage Structures: Types, Selection of Type <u>Earthen Dams</u> - Causes of failure, Elements of Earth Dam, Seepage, Stability <u>Gravity Dams</u> -Site Selection, Forces on Gravity Dam, Stability Analysis, Elementary and Practical profile, Design	10
2	Flow Control Structures: Spillways, Outlets Types and Design Features	6
3	Reservoirs Investigations for Reservoir Planning, Reservoir Sedimentation, Operation of Reservoir, Reservoir Flood Routing	6
4	Head Works Types of Head Works, Components of Diversion Head Works, Types of Weirs, Design of Weirs, Canal Head Regulator. Theory Of Seepage Bligh's Creep Theory, Method of Independent Variable of Khosla,	10
5.	Cross Drainage Works Types of Cross-Drainage Works, Design of Cross-Drainage Works , causeways, culverts, bridges, estimation of design discharge, fixation of waterway, foundation depth and spans	10

REFERENCES

S. No.	Name of Books/Authors/Publishers
S.No.	Names of Books/Authors/Publishers
1.	Hydraulic Structures; P. Novak, AIB Moffat, C. Nalluri, and R. Narayanan: Taylor & Francis, New York
2	Engineering for Dams, Vol I & Vol II; Creager, Justin and Hinds; John Wiley
3	Water Resources Engineering; JB Franzini, DL Freyberg, G Tchobanoglous; McGraw Hill
4	Design Textbooks in Civil Engineering – Irrigation Engineering – Vol VI – Dams; L Leliavsky; Chapman & Hall
5	Design of Small Dams; USBR; Oxford & IBH

6	Fundamentals of Irrigation Engineering; Bharat Singh; Nem Chand
7	Irrigation and Water Power Engineering; BC Punmia, BBL Pande; Laxmi Pub.
8	Irrigation, Water Power and Water Resources Engineering; KR Arora; Standard Pub.
9	Theory and Design of Irrigation Structures; Varshney, Gupta, Gupta; Nem Chand.
10	Irrigation Engineering and Hydraulic Structures; SK Garg; Khanna Pub.

Teacher I/C

Prof. M.A.Lone

The Course is Common to:

- i) M.Tech. 3rd. Sem Water Resources Engg.**
- ii) M.Tech. 1st Sem Structural Engineering**
- iii) M.Tech. 1st. Sem. Geotechnical Engineering**
- iv) M.Tech. 3rd. Sem. Transportation and Planning**

LECTURE 1

General:

The course on Hydraulic Structures is a common course for all the Four Programs being run by the Department of Civil Engineering. These Programs are in the Specialisations of:

- i) Water Resources Engineering
- ii) Structural Engineering
- iii) Geotechnical Engineering and
- iv) Transportation and Planning

The course on Hydraulic Structures has relevance to all these specialisation from one or the other aspect. The course has been as such designed in such a way that the student from each discipline mentioned above get benefitted.

What is a Hydraulic Structure

Briefly, a structure that is used for management of a water resource for any purpose can be termed as a Hydraulic Structure. It can be used for diverting, stopping, storing and other such purposes deemed beneficial for the society.

One of the major natural resource for survival of life is water but it can also create havoc or can get wasted if not managed properly. For its proper management certain measures are to be taken and main being the proper construction of the structures for the purpose. The structures constructed for this purpose are broadly known as Hydraulic Structures.

Some of the examples of the Hydraulic Structures are:

- Dams
- Weirs and Barrages
- Diversion Head Works
- Cross Drainage Works
- Canals
- Falls
- Bridges and culverts etc.

To get maximum know-how about the hydraulic structures in general, the course contents have been divided into six chapters i.e.

1. Storage Structures
- 2.. Flow Control Strutures
3. Reserviors

4.. Head Works

5. Cross Drainage Works

The Structures coming under each heading will be dealt in the subsequent lectures. However students are advised to revise/revisit their know-how about the basics of Hydraulic Structures through which they have gone during their study at their Engineering Bachelors degree level.

For this purpose students are advised to go through the following especially:

- 1) Open Channel Flow concepts
- 2) Design of Canals
- 3) Lacey's silt theory
- 4) Seepage Pressures, Piping phenomenon, Scouring, exit/critical gradients etc.

[Our next lecture will be on Storage Structures](#) .

Assignment

1. *What is Hydraulic Grade line and Total Energy line ? explain.*
2. *Explain the concept of Specific Energy in open channel flow.*
3. *How is seepage flow computed in earthen embankments*
4. *What do you understand by i) Piping and ii) Scouring.*
5. *Explain the Lacey's silt theory and its applications.*

Note: ASSIGNMENTS ARE TO BE SUBMITTED HAND WRITTEN i.e..handwritten, scanned and then to be submitted via e-mial : professorlone@nitsri.net