

# River Hydraulics

## Unit 1: Introduction

Origin, Properties of sediments, size, shape, fall velocity and its effects, orientation, grain size Distribution, Difference between rigid and alluvial channels, incipient motion of sediment Particles, Different approaches to study sediment motion, lift force approach, tractive force Approach, theoretical and sub theoretical analysis of Shield, White and others. Types of bed forms Or regimes of flow.

**Unit 2:** Regimes of flow, complexities of regimes in Natural streams, Resistance of flow and Velocity distribution in alluvial streams, Bed load transport and saltation, bed load equations, Board on dimensional considerations, suspended load transport mechanism, General equation of diffusion, Total load transport, microscopic and macroscopic method. suspended load sampling.

**Unit 3:** Bed level variation in alluvial streams, stream bed changes during floods, degradation, Aggradation, silting of reservoirs, variation in plan form of streams, River training for flood

**Unit 4:** Critical tractive force method for design of stable channels, comparison of the design with Kennedy's and Lacey's Method.

**Unit 5:** Physical and mathematical models. Design of guide bunds and other river training banks

### TEXT BOOKS:

1. Graf, W.H. "Hydraulics of Sediment Transport", McGraw Hill International, 1984.
2. Garde, R.J. and Ranga Raju, K.G. "Mechanics of Sediment Transportation and alluvial stream Problems", New Age International (P) Limited Publishers, 2000.
3. van Rijn, L.C. "Principles of Sediment Transport in Rivers, estuaries and Coastal Seas", Aqua Publications, Delft, The Netherlands, 1993.

### REFERENCE BOOKS:

1. Raudkivi, A.J. "Loose boundary hydraulics" Pergamon Press, 1998
2. Bharat Singh "Fundamentals of Irrigation Engineering", Nem Chand and Brothers, Roorkee.
3. Chapter 8 of the book by Rajesh Srivastava, "Flow through Open Channels", Oxford University Press, New Delhi, 2008.
4. River Behaviour, Control and Training, 1971, CBIP Publication No.69.
5. River Behaviour, Management and Training, Volumel, 1989, CBIP Publication No.204.
6. River Behaviour, Management and Training, Volumell, 1994, CBIP Publication No.204.

Senate  
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