WATER RESOURCES ENGINEERING-II

Course Code: 13CE1126

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Course Educational Objectives:

- To produce civil engineering students who have strong foundation in concepts of irrigation structures.
- To familiarize student with the knowledge of working operations of reservoirs, dams and spillways.

Course Outcomes:

- Student will be able to demonstrate the behaviour of various irrigation structures and their design principles and construction features.
- Students will be broadly educated about the useful impact of hydro-power engineering.

UNIT-I (12 Lectures)

DIVERSION HEAD WORKS:

Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure and impervious floors using Bligh's and Khosla's theory, exit gradient, functions of upstream and downstream sheet piles.

UNIT-II (14 Lectures)

CANAL REGULATION AND DRAINAGE WORKS:

Types of falls and their location, design principles of Sarda type fall, straight glacis fall, Canal regulation works - principles of design of distributary head regulator, Canal outlets - types of canal modules, proportionality, sensitivity and flexibility, Cross drainage works - types, selection of site, design principles of aqueduct, syphon aqueduct.

UNIT-III (12 Lectures)

RESERVOIRS:

Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve for constant demand only.

WATER POWER ENGINEERING :

Introduction to Hydropower- Advantages and disadvantages, estimation of hydro- power, Flow duration curve, Power duration curve, Load curve, Load factor, Capacity factor, Utilization Factor, Diversity factor, Load duration curve, Firm power, Secondary power, Types of hydel schemes.

UNIT-IV (12 Lectures)

GRAVITY DAMS:

Types of dams, merits and demerits, selection of type of dam, selection of site for dam, forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, stability analysis, drainage galleries.

UNIT-V (14 Lectures)

EARTH DAMS:

Types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.

SPILLWAYS:

Types of spillways, design principles of Ogee spillway, types of spillway gates, Methods of energy dissipation below spillway-Description only.

TEXT BOOKS:

1. S.K Garg, *"Irrigation engineering and hydraulic structures"*, 24th Edition, Khanna publishers, 2012.
2. K.R.Arora, *"Irrigation, Water Power and Water Resources Engineering"*, 3rd Edition, Standard Publishers Distributors, 2010.

3. R.K. Sharma and T.K. Sharma, *"Irrigation Engineering"*, S. Chand Publishers, 2007.

4. B.C.Punmia, B.B.L. Pande, Ashok K.R. Jain, Arun K.R. Jain, *"Irrigation & Water Power Engineering"*, 16th Edition, Laxmi Publications (P) Ltd., New Delhi, 2009.

REFERENCES:

1. G.L.Asawa, *"Irrigation and Water Resources Engineering"*, New Age International Publishers, 2005.

2. Varshney R.S., *"Concrete dams"*, 2nd Edition, Oxford and IBH Pub.Co.in, New Delhi, 1982.

3. Varshney R.S., S. C. Gupta & R.L. Gupta, *"Theory and Design of Hydraulic structures"*, 2nd Edition, Nemchand and Brothers, 1992.

4. Satyanarayana Murthy C, *"Water Resources Engineering"*, 1st Edition, New Age International Pvt. Ltd. Publishers, 1997.

5. Relevant IS codes.